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Promoting Attainment: Examining the Impact of Institutional Expenditure Patterns on  
Graduation Rates

Matthew Lovesky

A dissertation submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Doctor of Philosophy

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## Abstract

This study explored how university expenditures differently impact attainment of enrolled students at regional public universities in the United States. Research of this nature is vital with an increasing number of professions requiring a postsecondary education and the unmistakable personal, social, and economic benefits of postsecondary attainment. The purpose of this study was to add to the expenditure literature by focusing strictly on regional public universities, who tend to be more understudied and undervalued compared to the more affluent and prestigious 4-year institutions (McClure et al., 2020). Two separate hierarchical/sequential multiple regression analyses using block-wise entry were utilized to examine the relationship between the different functional expenditure areas and 4- and 6-year graduation rates, after accounting for entry characteristics (race, gender, selectivity, and SES). From there, model and parameter estimates were compared between the 4- and 6-year models to explore the differing impact of entry characteristics and expenditures on 4- and 6-year graduation rates. Results indicated that selectivity, gender, and SES were significant predictors for both the 4- and 6-year criterion, while race was only statistically significant for the 4-year criterion. The only expenditures to reach significance were institutional expenditures and public service expenditures. As expected, instructional expenditures were positively related to graduation rates, while public service expenditures were negatively associated with graduation rates. Implications for understanding how entry characteristics and university expenditures impact student outputs are discussed.



## Chapter 1: Introduction

Postsecondary attainment has and will continue to be a national priority in the United States. It is what some would call a kitchen table issue; where families discuss the prospect, problems, and opportunity that it presents, which permeates from the front page of the news, gubernatorial platforms, and Presidents of the United States (Thelin, 2017, p. 1). It is so important to our national identity, that former President Barack Obama set a goal to have the highest proportion of college graduates in the world by 2020 (Obama, 2009). Postsecondary attainment as a priority makes sense since we have transitioned from an industrial economy to a knowledge economy where most newly created jobs need a degree or credential beyond high school (Lumina Foundation, 2020). In fact, Joe Biden (2020) stated that about six out of every ten jobs require education beyond a high school diploma. Further, median earnings for individuals who graduate with a bachelor's degree, are about twice as high as someone with only a high school diploma or GED (Broady & Hershbein, 2020). Despite its vital role in our collective prosperity (U.S. Department of Education, 2006), and a track record of other positive outcomes (Mayhew et al., 2016), the postsecondary industry faces several challenges. One of the numerous challenges facing the industry is that many students who start pursuing a postsecondary degree, will not finish. Another issue is that public trust in universities is dissolving in part due to the economics of higher education and lack of accountability for success (Pasqueralla, 2017). This study looks to explore the intersection of these two issues.

To add context to the issue of postsecondary attainment, consider the following statistics. In 2017, the average 6-year graduation rate for all first-time, full-time undergraduate students who began seeking a bachelor's degree at a public 4-year degree-

granting institution, was 60% (National Center for Education Statistics, 2020). Said differently, for every 5 people that began a full-time bachelor's program, only 3 graduated within 6 years. Additionally, the total cost of educating students has increased, while at the same time we have seen a shift to the student assuming most of the bill. In 1980, the average student share of the total education revenue was 20%, and by 2019, that number climbed to 46% (State Higher Education Executive Officers Association, 2020). Further, between 2004–05 and 2014–15 net tuition revenue rose by \$3000 per FTE student, while federal/state/local government revenues declined by \$2,280 per FTE (Urban Institute, 2018). This marked growth of cost, coupled with the shift to students taking on much of the payment burden, has all levels of postsecondary constituents asking for evidence that this money is well spent (Gansemer-Topf, 2004).

At the intersection of issues in attainment and cost, is an alarming phenomenon where some individuals accrue student debt, but ultimately don't end up graduating. This debt without a degree can be incredibly detrimental to the individual's financial well-being for a number of reasons, but one important reason is that it increases a borrower's likelihood of defaulting on their student loans. In 2011-2012, non-completers were more than twice as likely to default on their student loan payments, compared to their peers who earned a certificate or degree (Miller, 2019). This is troublesome because defaulting on your student loans has dramatic consequences for an individual's financial well-being; from accelerating the balance of the loan, to losing eligibility for future student aid, getting reported to the credit bureaus, getting wages garnished, accumulating fees associated with the collections process, and more (Federal Student Aid, n.d.).

Further, not persisting through graduation impacts more than just the individual's pocketbook. Taxes at the federal/state/local level all contribute to the total education revenue. In 2015, the average federal funding per full-time equivalent student was \$4,544 per year, while the average state funding per full-time equivalent student was \$5,099 per year (Pew, 2019). When students graduate, that public investment typically pays off in a predictable pattern by way of increased tax revenue associated with higher paying jobs as well as decreased reliance on social welfare programs such as food stamps, Medicaid, and probability of unemployment (Blagg & Blom, 2018). However, when a student does not finish their degree; not only is there reduced lifetime income potential and increased probability of reliance on social welfare programs, but also there is the loss of the direct investment per FTE mentioned above.

Beyond (but related to) the economic benefit of postsecondary attainment are numerous other social and health benefits. For one, access to a quality education is considered to be a social determinant of health, which means that it is “a condition in the environment where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks” (Healthy People 2030). Generally speaking, higher levels of educational attainment increases a person's likelihood of overall health and longevity, and contributes to the likelihood of landing a safe, stable, and high paying job (Healthy People 2030). A few examples that highlight the connection between educational attainment and health include higher levels of self-reported health, increased access to care and preventive services, decreased incidence of heart disease, high blood pressure, diabetes, anxiety, and depression

(Healthy People 2030), decreased risk of dying from cancer, and increased health awareness and vaccination rates (Raghupathi, V & Raghupathi, W. 2020).

With college completion being so important for our national, organizational (e.g., college or university), and individual economic prosperity (Mayhew, et al., 2016; Lumina Foundation, 2014), researchers and leaders in the field need to work creatively to increase our graduation success rate, while simultaneously addressing the associated costs.

Issues of persistence and fiscal responsibility are not necessarily new to the postsecondary industry, and the federal government has taken a number of action steps to attempt to provide structure and accountability. The Federal Student Right-to-Know and Campus Security Act of 1991, required that institutions disclose completion and graduation rates of all full-time degree-seeking undergraduate students as defined by completion within 150% (or 6 years) of normal time. Compliance with this act was required in order to be eligible for Title IV funds. Additionally, in 2008 with the reauthorization of the Higher Education Act, a term was added that any school receiving title IV funds had to publicly post net price calculators on their websites. A tool that has helped institutions respond to these transparency efforts was the Integrated Postsecondary Educational Data System (IPEDS). This annual survey collects information on a variety of topics at the institutional level, including enrollment, institutional characteristics and resources, admissions, degrees and certificates conferred, student persistence and success, institutional prices and student financial aid (National Center for Education Statistics, 2020). Despite these accountability measures being enacted, we sadly still see swelling costs and meager graduation rates for students.

## **Problem Statement**

With an increasing number of professions requiring a postsecondary education and the unmistakable personal and economic benefits of higher education attainment, it is prudent that higher education scholars explore ways to increase graduation rates of enrolled students. Importantly, this line of inquiry must also be viewed through a lens of fiscal responsibility by institutions. Work thus far on persistence and attainment research has primarily focused on the individual, while failing to take the organizations actions into account (Chen, 2012). Due to the public call for accountability in higher education spending, the scope of this research will be to focus in on university expenditures and their subsequent impact on attainment. Additionally, looking at this problem “through an organizational perspective reminds us that colleges and universities are organizations and organizational behavior does affect students” (Berger & Milem, 2000, p. 273).

Despite a slow growing body of research on institutional expenditures and their impact on graduation, results have been surprisingly mixed over the years. A handful of studies (Astin, 1993; Chen, 2012; Webber & Ehrenberg, 2010) found that student services were positively related to retention and/or attainment; whereas other studies found either no link (Ryan, 2004; Marsh, 2014), or a negative relationship between student services and attainment (Gansemer-Topf & Schuh, 2006). Results for instructional spending have been more consistent, yet still inconclusive with some studies showing positive relationships between instructional spending and retention or attainment (Ryan, 2004; Gansemer-Topf et al., 2004), while other studies showed no relationship (Chen, 2012; Titus, 2006). Additionally, limited research showed a negative relationship between institutional support expenditures and attainment (Gansemer-Topf & Schuh,

2006), while other studies showed no relationship (Ryan, 2004; Webber & Ehrenberg, 2010). This inconsistency in results is something this study seeks to address by adding more research to the body of literature.

The inability to consistently produce agreement in results is also one of the biggest weaknesses in the expenditure and graduation rate research line. The inability to produce consistent results is at least in part due to the relative dearth of studies specifically examining the phenomena. Adding more research dedicated to the subject will help bolster the body of work and will (hopefully) start to steer the ship toward consistent results. Only when that consistency occurs, can we as scholars and practitioners use the conclusions to inform practice.

There is also a gap in this research line at the population level. Currently, there is a dearth of studies that investigate the relationship between institutional expenditures and graduation rates at strictly regional public universities in the United States, this study will change that. Addressing the research gap in expenditure impacts at regional public universities is important for several reasons. For one, regional public universities are incredibly understudied and undervalued compared to their more prestigious and affluent counterparts (i.e., elite private and flagship universities) (McClure et al., 2020). This relative lack of attention in the literature is interesting due to the fact that there are over 400 regional public universities in the United States that actually confer about 30% of all degrees in the postsecondary sector (Orphan, 2018), or 70% of undergraduates at 4-year public institutions (Fryer, 2015). That means that regional public universities make up about 10% of degree granting postsecondary institutions, yet they produce 30% of all postsecondary degrees (Orphan, 2018). That should highlight just how productive and

important regional publics are to the education system, and why they deserve researchers undivided attention. Additionally, regional public universities enroll a higher proportion of underrepresented students than any other 4-year college, including underrepresented racial minority, immigrant, first-generation, and low-income students (Orphan & Broom, 2021). With that, one could say that regional public universities are instrumental in reducing degree-attainment disparities in the United States. Since underrepresented students already are attending these regional universities at higher rates, an important focus for these schools needs to be centered around increasing the proportion of enrolled students who graduate. Additionally, regional public universities see a bulk of their revenue come through tuition and fees (30% on average) as well as the ever-dwindling state appropriations (32% on average) (McClure & Fryer, 2020). They typically don't have the breadth of revenue streams that many research and/or flagship universities enjoy, such as endowment money or research revenue, which means they rely on steady enrollment to pay the bills. Lacking any real substantial alternative revenue stream is worrying when you consider even slight enrollment drops can have huge ripple effects on the university budget. Now consider enrolling students during a pandemic, or even thinking ahead to the expected enrollment cliff, and the topic of money and resource allocation becomes all the more important. Finally, adding to the research on university expenditures impact on graduation rates, specifically for regional public universities, will help inform the strategic decision-making process for leaders of these institutions.

In addition to the gaps and issues mentioned above, there also is a fair amount of inconsistency in how the research question is approached empirically. You can almost count as many different tools for analysis as you can number of studies in the

“expenditures effect on graduation rate” research line. Some scholars seek to use econometric approaches (Webber & Ehrenberg, 2010), while others have chosen to examine their structural relationships (Fung, 2010), and still others used OLS multiple regression (Ryan, 2004). While there are certainly merits and inherent weaknesses with each of the approaches mentioned above (and others) when studying the subject; it’s important for us as researchers to not get analysis-paralysis and focus on putting out this important research that could really impact postsecondary leader’s decision making.

A point on efficiency that Massy made (as cited in Gansemer-Topf, 2004) is that we are better served to conduct rigorous research quickly on this subject, while at the same time being ok with imperfect but actionable conclusions. This point highlights the urgency in needing to solve this problem, but also recognizes the fact that it’s a big question with a lot of unknowns. With that, this study will utilize OLS hierarchical multiple regression, based upon the research questions being asked. This technique involves testing variables in blocks (or individually) in a sequential order that is determined based upon theory. Doing this allows a researcher to make inferences about a predictor’s explanatory power in the presence of the other predictor variables previously entered.

An important layer that needs to be accounted for in any college impact model is the impact of what would be considered “entry characteristics” on graduation. These characteristics include several variables such as race/ethnicity, gender breakdown, socioeconomic status, and student aptitude. It would be a disservice to make any conclusions about the impact of college without taking into consideration the inputs direct impact on the outcome variable (graduation rates for this study). With that, an



important note for this study is that certain entry characteristics will be utilized in the model as control variables due to their empirically supported impact on graduation rates, but they will not be the central focus of this study. This study seeks to understand the relationship between university functional area spending and graduation rates at regional public universities, controlling for the entry characteristics of the university populations.

### **Significance**

This study will add to the literature on educational attainment and institutional expenditures/resource allocation in several ways. First, by approaching the study from an organizational perspective, implications of results will have the ability to impact the entire university community through by way of university policy (Berger & Milem, 2000).

Second, by narrowing the focus of the study to a select subset of institutions (regional public universities), more robust inferences will be possible for that select group of schools. Narrowing the focus should also help address the inconsistency in results that has occurred in studying resource allocation effects on attainment. With the very modest number of studies on the subject and the moderate disagreement about actual impact of resource allocation on educational attainment, more research is needed to provide support one way or another for actual impact.

Also, by building a model that looks at 4-year graduation rates and then another one that looks at 6-year graduation rates, I will be able to make inferences about how student input characteristics as well as expenditures differently (or similarly) relate to 4-year versus 6-year graduation rates. At the parameter level, this could add interesting

nuance to the literature if expenditures are related to one graduation rate, but not the other. At the model level, it will provide insights as to whether there are notable differences in total variance explained in each of the models, as well as how the variance changes with the block-wise entry of predictors (expenditures) in each model.

This study will also be beneficial for those involved in policy and planning for universities, from university leadership cabinets to state legislatures. Whether on the grounds of the university or at the state capitol, leaders in postsecondary education who are responsible for budget allocations are continually working to address cost issues and degree completion issues, while simultaneously defending spending decisions. Despite the fact that regional public universities are leaner and more efficient than their elite private and research university peers, cost and completion issues are still top priorities for those involved in macro level decision making. By adding to the literature and helping to inch the results toward congruence, decision makers will be able to use these results to help inform their budget practices with student success in mind. Although all administrators involved in macro-level budget planning could benefit from this study, state higher education agencies should pay special attention to the results. With a primary role of representing higher education to the legislature, while simultaneously representing the governor and legislature to university leadership teams (Thelin, 2017, p. 214), state higher education councils have the necessary role of mediator between higher education stakeholders as well as advocate for advancing higher education within their state; this includes addressing issues of affordability and accountability across the state system of higher education. Providing additional empirical support for how budget allocations can

impact persistence will help these councils fulfill their duties related to the advancement of policy recommendations that target affordability and completion.

### **Purpose Statement**

The purpose of this study is to examine the relationship between institutional expenditures/resource allocation and graduation rates of students at regional public universities in the United States, while controlling for certain entry characteristics. Importantly, regional public universities are described by their institutional membership association, the American Association of State Colleges and Universities (AASCU), as:

institutions of access and opportunity, believing that the promise of access and success should be real for all Americans. AASCU members are student-focused, committed to programs and policies that place students at the heart of their institution. And they are “stewards of place,” engaging faculty, staff and students with the communities and regions they serve—helping to advance public education, economic development and quality of life.

Sample selection of RPU’s for this study will follow Fryar’s (2015) contemporary definition for identifying RPU’s, which focuses strictly on Carnegie classification and includes: public 4-year institutions in the fifty states that are classified at Baccalaureate Institutions, Masters Institutions, or Doctoral/Professional Institutions. Bachelors-degree granting institutions that are not included in this definition are those categorized as Baccalaureate/Associates, Very High Research, High Research, or Special Focus institutions (McClure & Fryar, 2020).

The control variables for this study representing entry characteristics will be the percent of students admitted as well as demographic makeup of the selected universities. The control variable for percent admitted measures selectivity and is calculated by dividing the number of students admitted to the university by the total number of applicants. The demographic counts were broken out into three categories. The first category was race/ethnicity data, which was calculated as the percent of students that identify as someone from an ethnic minority group in aggregate, including Black or African American, Hispanic, Asian, American Indian, Native Hawaiian or Other Pacific Islander, and individuals who identify as having 2 or more races. The second category focused on gender<sup>1</sup> and was measured as the percent of female students who are enrolled for credit at the start of the fall semester. Finally, the percentage of students receiving Pell grants served as a proxy for socioeconomic status.

The independent variables of interest for the study were comprised of the functional area expenditure allocations per in instruction, research, public service, academic support, student services, and institutional support expenses. These variables were derived by taking the functional area of interests' expenditures per year divided by the total number of full-time equivalent students. Instructional expenses measured expenses incurred from teaching activity and various other instructional expenses, not including administration. Research expenses specifically account for research commissioned either externally or separately budgeted at the university level. This expense also includes technology fees associated with the research being conducted.

<sup>1</sup>Although gender is the listed variable, there is a recognition that IPEDS conflates sex and gender, despite their different concepts.

Public service expenditures represent non-instructional activities that are primarily beneficial to those outside of the organization. Academic support expenses consist of activity that supports the primary mission of teaching, research, and public service. It includes the retention, preservation, and display of educational materials (ex. Libraries). The student service expense measure includes activities whose primary purpose is to contribute to the students emotional and physical well-being and to their intellectual, cultural, and social development outside of the context of the formal instructional program (ex. Student activities, cultural events, student newspapers, intramural athletics, student organizations, supplemental instruction outside of the normal administration, and student records). The institutional support expense measured university expenses incurred for the general day-to-day operations of the university (ex. Administrative, executive, and attorney fees). Based on the theoretical framework and previous research, it is expected that expenditures directly related to the primary mission of teaching and supporting the student will be positively related to attainment. With that, I anticipate instructional, academic support, and student service expenditures to demonstrate a positive relationship with graduation rates. Further, I anticipate no relationship to exist between funding not related to student learning and development and graduation rates of students, and potentially even negative relationships for expenditure areas that may detract from the primary mission of teaching.

The criterion for this study was degree attainment. Degree attainment was operationalized through the 6-year graduation rate for full-time, first-time students seeking a bachelor's degree or equivalent degree for the first model, and then as a 4-year

graduation rate for full-time, first-time students seeking a bachelor's degree or equivalent degree in the second model.

### **Research Questions**

To achieve the purpose articulated above, this study asks the following questions:

RQ1: What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 6-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

RQ2: What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 4-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

RQ3: What differences exist at the model- and parameter estimate-level when comparing the 6-year and 4-year graduation rate models?

### **Summary**

This first chapter sought to introduce and provide perspective to the issue of expenditures and degree attainment in the postsecondary industry. In the chapter that follows, I will dive further into the literature that is currently out there, frame the research theoretically and conceptually, and discuss the implications for strategic management and leadership. From there, I will address the analytic approach of this study, the results of that analysis, and then recommendations and implications of the research.

## **Chapter 2: Frameworks and Literature Review**

The following chapter seeks to frame the research through 4 theoretical perspectives. The first perspective, productivity in postsecondary education, is discussed to clarify the importance of graduation rates being the criterion for this study. From there, Tinto's Interactionist Theory and Berger and Milem's (2000) model for researching organizational impact on student outcomes is discussed to frame this study of persistence at the postsecondary level. A resource dependency perspective is introduced to describe the nature of organizations as open systems, which are dependent on contingencies in the external environment (Pfeffer & Salencik, 1978). This perspective will then help frame the leadership lens, since a component of resource dependency theory (RDT) focuses on interdependencies and high-level budget decision making. In addition to RDT, House's (1996) Path-Goal theory of Work Unit Leadership will be utilized to help frame the leadership perspective. Framing the research within these 4 perspectives will help to ground this study in the greater social phenomenon that is postsecondary leadership. Finally, the chapter will close with a review of the literature most pertinent to this study.

### **Theoretical Framework**

#### **Productivity**

A natural place to start this theoretical overview is at the heart of the problem, which is organizational productivity. After all, with calls for greater productivity and increased efficiency in the postsecondary sector, that should be a relatively simple definition to explain. The reality of the conversation is that productivity means different things to different people involved in the postsecondary sector. In fact, it is a difficult

enough question that the National Research Council (NRC), put together a panel of experts on higher education, from university presidents to scholars/economists, and consultants to provide insight about how to measure productivity in higher education. The expert panel put out a report in 2012 that attempted to address the nuanced task of assessing productivity, and an overarching theme was that the higher education sector is “extraordinarily complex and heterogeneous and that universities produce multiple outputs in addition to education: research, clinical services, and public service” (Massy et al., 2013, p. 16). As the quote above clearly supports, this question of “what is productivity” has more than its fair share of complexities and caveats, including its relationship quality assurance. Although these complexities, and specifically the quality assurance piece, is incredibly worthy of study; it is beyond the purview of this study to specifically tease out that relationship. It should be noted though that by constraining the sample to a narrowly defined group of regional public universities, there is a fundamental assumption that all the schools in the sample meet the same minimum qualifications for delivering a quality education.

With all this information, the choice for using graduation rates as the productivity measure was nested in the mindset that institutions of higher education will continue to be pushed to “demonstrate that they are allocating resources in ways that result in positive student outcomes” (Gansemer-Topf et al., 2018, p. 175); as well as the mindset that an outcome that both postsecondary administrators and their constituents want to see their school have is acceptable graduation rates. Further, “researchers and practitioners cannot dismiss the personal, social, and financial costs incurred because so many students fail to achieve this goal” (Ryan, 2004).



Production has been studied quite heavily in the K-12 sector, with a hefty base of empirical research in studying the impact of expenditures on a variety of educational outputs dating back to the Coleman report in the 60's (Webber & Ehrenberg, 2010).; however, there are far fewer studies on expenditures and their impact on outputs within the context of higher education (Ryan, 2004). This relative lack of studies on expenditures and their relationship to production outcomes is surprising given the results of an Association of American Colleges and Universities (Finley, 2021) survey of postsecondary constituents that identified the top challenge for higher education being financial constraints, and the top priority for colleges and universities needs to be improving student retention and completion.

### **Student Departure Perspective**

Tinto's Interactionalist Theory of Student Departure (1975, 1993) has found itself to be one the most widely used theoretical perspectives when addressing issues of persistence and departure, to the point where it has reached "near-paradigmatic status" (Berger & Braxton, 1998, p. 104); and this study will continue that trend. Tinto's Interactionalist theory essentially posits that individual characteristics (such as student background, attributes, and pre-college experiences) directly influence a student's departure decision. These individual characteristics also impact a student's initial commitment to the university as well as to the goal of graduation. This level of initial commitment subsequently impacts the student's level of integration into the academic and social systems of the university, which then ultimately influences a student's departure decision as well. Additionally, Berger & Braxton (1998) sought to expand

Tinto's theory through "theory elaboration", which led to the sentiment that there was "strong support for the inclusion of organizational attributes as a potential source of social integration" (p. 116).

For this study, Tinto's (1975, 1993) student departure perspective, coupled with Berger & Braxton's (1998) theory elaboration, helps explain the relationship between the variables of interest. Student entry characteristics directly and indirectly impact a student's intent to persist, and consists of individual attributes such as a student's parental income, gender, race/ethnicity, and previous achievement. Since this study is using an organizational perspective, these entry characteristics will be aggregated and operationalized at the organizational level rather than at the individual level. These aggregate inputs, such as percent of students who are female/minority/receiving Pell, are expected to impact a student's departure decision, which is operationalized in this study at the organizational level as graduation rates. These entry characteristics also impact the level of social and academic integration students feel, which also impacts their departure decision. The more integrated a student feels, the more likely they are to persist. Once again, since this study is focused on the organizational rather than individual level, social and academic integration is operationalized through resource allocation to core functions of the university. Since academic and social integration gets at involvement and learning in and out of the classroom, it is expected that resources that are directly allocated to student learning/welfare/and socialization, will positively impact a student's departure decision. With that, the rationale is that higher levels of expenditures related to instruction/instructional support/ student services (student-facing expenditures) will result

in increased academic and social integration, which will positively impact graduation rates.

While Tinto focused more on the individual, Berger & Milem (2000) created a model for researching organizational impact on student outcomes. Their model posits that student entry characteristics (e.g. gender, race, sex, income, academic achievement), influences peer group characteristics (e.g. psychological, behavioral, structural), which impacts student outcomes. Additionally, organizational characteristics (structural demographic features, and organizational behavior), impacts the student experience (behaviors and perceptions), which also impacts student outputs. Importantly, although the criterion is stated as student outputs, the unit of analysis for this study is at the organizational level.

Working backward from the criterion for this study, which is student outputs; Berger and Milem (2000) utilized Astin's (1993) Typology of Student Outcomes to guide their work. Astin's work parsed student outcomes into four types of outcomes, Affective-Psychological, Affective Behavioral, Cognitive-Psychological, and Cognitive-Behavioral. Although all outcomes are important, the Cognitive-Behavioral is most pertinent in framing this research, because it encompasses things such as career development, educational attainment, income, and awards (Berger & Milem, 2000). Attainment as the output here is related to the departure decision with Tinto (1975, 1993), in that degree attainment represents students persisting through graduation.

Directly impacting student outcomes (including attainment), are student experiences. Student experiences include three general categories including, academic, social, and functional. Academic experiences get at formal and informal experiences that

contribute to educational objectives (Berger & Milem, 2000). This is obviously directly related to academic integration in Tinto's model, and will be modeled in this study by way of expenditures related directly to educating students. Social student experiences "contribute to psycho-social well-being and development" (Berger & Milem, 2000, p. 319), and is directly related to social integration in Tinto's model. Functional experiences are neither academic or social, but are necessary arts of campus life (Berger & Milem, 2000, p. 319). This functional component does not map well on Tinto's model, but it does help inform the addition of expenditure variables not related to academic or social integration.

Student entry characteristics in Berger and Milem's (2000) model map directly onto Tinto's student entry characteristics. Student entry characteristics are extraordinarily important in college impact models so that we can know the true nature of impact that the institution has, above and beyond the direct effect of the pre-existing characteristics of the student body (Berger & Milem, 2000, p. 309).

It should be noted that despite its near-paradigmatic status, Tinto's theory has received critical skepticism on a number of different fronts, including how generalizable the theory is. Tierney (1992) pointed out that Tinto's model was confined to traditional age college students and doesn't address the diversity that exists in higher education. Being that this is a study focused on regional public universities, which enrolls a high number of underrepresented and non-traditional students, there is obviously a need to recognize that criticism. Keeping the sample tightly defined to RPU's, controlling for race, and analyzing data at the system level (as opposed to student level), will help to alleviate those practical issues by controlling for them.

## **Leadership Perspective**

The leadership perspective for this paper is grounded in the perspective that regional public universities are complex organizations, that “drive regional economic mobility through student access and success” (American Association of State Colleges and Universities, n.d.). With that, effective leadership of these institutions requires actions that contribute to the fulfillment of the vision affordable and accessible education and student success. Resource dependency is introduced first for its open systems approach, and subsequently its recognition that the internal and external environment impact organizational behavior. From there, contingency theory is introduced because it views effective leadership through the lens of being adaptive to the situation being addressed, the task, and the people involved. This is especially pertinent in this study, because if we don’t empirically test expenditures on outcomes, we will continue to just assume that more money equals increased outputs. However, this study will add to the literature that seeks to understand the relationship between university spending and outputs, positive or not.

## ***Resource Dependency Theory***

When studying organizations and organizational leadership, it is important to understand that strategic decisions being made by organizations aren’t being made in a vacuum; they are actually very much dependent on the environment they are exposed to. Pfeffer and Salancik’s (1978) Resource Dependency Theory recognizes that fact by viewing organizations as an open-system, which is dependent on contingencies in the external environment. With that, Resource Dependency Theory “recognizes the influence

of external factors on organizational behavior” (Hillman et al., 2009). This is an important perspective within any industry, but especially so within the postsecondary industry due to the wide variety of external factors that can push and guide university decision making. From pressures by the state to promote access and attainment, to varying needs of constituents, changes in student demographics and needs, surviving times of financial hardship, competing university priorities, wavering state financial support, and everything in between; universities must make strategic decisions to adapt to external pressures to survive, as well as maintain their resources.

Resource dependency theory helps frame this study in that it helps explain internal expenditure patterns and reallocations within universities that help promote productivity or accountability (Titus, 2006). With public accountability for higher education mounting; from changes in the College Scorecard to include information about costs and graduation rates (U.S. Department of Education, 2022), to states rationing resources based on performance (Titus, 2006), strategic decisions must be made within the university to help manage these external dependencies. Managing these dependencies and adapting to these outside forces is necessary for institutional survival and sustainability. To sustain, an institution has to produce the product it says it will. As mentioned previously, a product that any regional comprehensive university is expected to produce is graduates. It is so important, that you will find graduation rates at the center of many (if not all) accountability and transparency efforts aimed at the postsecondary system. It is prudent then for universities to allocate money to areas that have a positive impact on graduation rates. Failing to do so can create increased pressure from external

environment. This could be through wavering state financial support, or even recruitment of new students (Powell & Rey, 2015).

From a strategic leadership perspective, this has implications for university leaders who are involved in the macro budget process, as well as the state legislatures. Legislatures have tremendous external power over public institutions in terms of accountability (including retention and degree completion) and funding (Li, 2017), which obviously makes them a major external dependency. With that, legislatures would be able to utilize results from expenditure research such as this to guide budgetary decisions at the universities in their respective states. Universities then will be able to assess the needs of the state and other external dependencies, and adapt their process to meet those needs (Powell & Rey, 2015). The obvious implication at the university will be to prioritize spending in areas that contribute to degree completion; including allocating new money toward those areas, refraining from budget cuts to those areas during times of financial hardship, and even potentially reallocating money when it makes sense to do so.

### ***Contingency Theory***

In tandem with Resource Dependency Theory, the idea of contingency theory also guides the strategic leadership perspective for university leaders involved in the budget process. At its most fundamental level, contingency theory views effective leadership through the lens of being adaptive to the situation being addressed, the task, and the people involved. A subset of contingency theory is Path-Goal theory, which suggests that the “major concern is how the leader influences the subordinates’ perceptions of their work goals, personal goals and paths to goal attainment” (House & Mitchell, 1975). Goal

attainment, or productivity, is achieved when the leader(s) are able to adequately define the goals, clarify their path, remove obstacles, and provide support for subordinates who ultimately deliver on the objectives (Olowoselu et al., 2019). In pursuit of these goals, leaders should exercise discretion with respect to their leadership style to ensure productivity and motivation. Four commonly described leadership styles in Path-Goal theory include directive, supportive, participative, and achievement oriented (House & Mitchell, 1974), with directive behaviors being most salient to this study. Directive leader behaviors include setting clear performance standards and performance expectations for subordinates, and is best suited for tasks that are complex or ambiguous (Olowoselu et al., 2019). As mentioned previously, complex and ambiguous are two perfect descriptors for productivity in postsecondary education; so when postsecondary leaders are trying to strategically improve the output of graduation rates, directive leader behaviors will help them achieve this goal. This framing helps provide context for how postsecondary leaders at the state and campus level can approach work facilitation toward the goal of increased graduation rates. By clearly articulating the goal of increasing graduation rates, clarifying areas that contribute to that, setting performance expectations, and then supporting them financially, leaders will be able to elevate the priority of graduation. At the state level that could include protecting funding that contributes to the goal of increased graduation through earmarking or even disincentivizing spending that does not enhance (or potentially detract from) graduation rates. For university leaders, this could mean strategically reallocating existing money to areas that enhance that outcome, or prioritizing new money to high impact areas.



In general, the leadership perspective for this study is concerned with strategic decision making by postsecondary leaders and decision makers, from the senior leadership teams at the university to the state legislatures, that promote student success and RPU mission fulfillment. Partial fulfillment of the mission for RPU's requires leaders to make decisions that empower the regional workforce and economy and expand student success. Student success in this study is conceptualized as being able to graduate the students that the school enrolls. An important caveat that is recognized is that the postsecondary industry is an open-system that is subject to external forces, and has relative goal ambiguity. Despite some ambiguity though, RPU's do share the goal of institutional survival and sustainability. From that point of view, leaders need to have access to information that will help promote the survival of the institution and then be able to make decisions with that information. Regional public universities rely heavily on steady enrollment of students to be able to survive and ultimately fulfill their mission, so leaders (across an RPU) should be focused on how they can attract, retain, and graduate students. This can be attained by getting actionable information to the appropriate people who ultimately provide preferential access to resources (Pfeffer & Salencik, 1978). This perspective is important for regional public universities because it gets at institutional survival and their ability to fulfill their mission. It is important for the students, past/present/future for a variety of reasons, but underscoring any foreseen or unforeseen implication is the fact that budgetary decisions impact the environment in which students will be. If the environment is structured in a way that doesn't promote student success, it will obviously be felt most acutely by the students.

## **Literature Review**

The following literature review is inclusive of studies that address the major theoretical underpinnings of the current study, as well as highlight the way in which university expenditures have been utilized as predictor variables in previous research. The review starts with the state of expenditure research. Because postsecondary outcomes can have different typologies, the review starts with examples for how expenditures have been utilized as predictors for non-graduation related outcomes. Next, it reviews the state of literature with respect to how expenditures impact the outputs of retention and attainment. From there, it addresses the impact of student entry characteristics, specifically race/ethnicity, gender, and socioeconomic status, on attainment at the individual and system level. I will conclude the review with an overview of some of the benefits associated with postsecondary degree attainment.

### **University Expenditure Research Not Related to Attainment**

University expenditures have been utilized as predictors for a variety of different outcomes within the university context. Griffith & Rask (2016) conducted a study that utilized expenditure data to predict labor market outcomes for students. It was found that instructional expenditures had a higher positive return for disadvantaged students when it came to labor market outcomes, while student service expenditures appeared to have more of an impact on labor market outcomes for high-achieving students (Griffith & Rask, 2016). Smart et al. (2002) utilized expenditures to predict self-perceived development of leadership capacity for students at over 300 universities, with results suggesting that higher spending on instruction and student services led to higher self-

perceived leadership competency. Another type of outcome studied by Kugelmass & Ready (2011) was that of higher-order cognitive gains in students. Results of that study suggested that “student-related expenditures were somewhat positively related to increased student learning, even controlling for total expenditures” (Kugelmass & Ready, 2011, p. 343). What these examples suggest is that regardless of the criterion, university expenditure patterns are predictive of student outcomes not related to persistence.

### **University Expenditure Research Related to Attainment**

The state of research that studied university expenditures impact on attainment has been relatively mixed and inconsistent over the years (Mayhew et al., 2016). However, generally speaking the literature suggests that expenditure patterns do impact graduation rates at 4-year institutions. For example, expenditures related to instruction have consistently shown a significant and positive relationship with attainment and retention rates (Gansemer-Topf & Schuh, 2006; Pike & Robbins, 2020; Powell et al., 2012; Ryan, 2004; Scott et al., 2006; Webber & Ehrenberg, 2010). Student service expenditures on the other hand have produced very inconsistent results and “murky” results, as mentioned by Mayhew et al. (2016) in their review of the current state of that literature. While some studies have found significant and positive relationships between student service expenditures and graduation/retention rates (Chen, 2012; Webber, 2012; Webber & Ehrenberg, 2010); others have found no significant relationship (Marsh, 2014; Pike & Robbins, 2020; Ryan, 2004; Titus, 2006). Further, other studies actually found a negative relationship (Dahlvig et al., 2020; Gansemer-Topf and Schuh, 2006).

Expenditures on research, academic support, and institutional support expenses are sparse and still conflicting. Most research suggests that expenditures on research are not significantly related to graduation rates (Dahlvig et al., 2020; Kim et al., 2003; Titus, 2006), while others suggest a negative relationship (Pike & Robbins, 2020; Webber & Ehrenberg, 2010). While some previous research suggests that academic support expenses positively and significantly impact graduation rates (Dahlvig et al., 2020; Gansemer-Topf, 2004; Gansemer-Topf & Schuh, 2006; Marsh, 2014; Pike & Robbins, 2020; Ryan, 2004), other studies found no significant relationship (Chen, 2012; Webber & Ehrenberg, 2010). Institutional support expenditures primarily showed no significant effect on graduation (Dahlvig et al., 2020; Marsh, 2014; Pike & Robbins, 2020; Ryan, 2004), however some studies did show a significant and positive relationship (Gansemer-Topf & Schuh, 2006), while others still showed a significant negative relationship (Gansemer-Topf, 2004).

The mixed results in this research line can be attributed (at least partially) to a number of different factors including sample selection, choice of covariates included, and choice of criterion. A brief overview of some of the aforementioned studies are included below to help shine a light on some of the key differences in the studies.

Chen (2012) utilized a multilevel event history model to identify institutional attributes related to student dropout risk. This study utilized Bean's (1983) causal model of student attrition, Tinto's (1987) interactionist approach, Berger & Milem's (2000) organizational framework, and Titus (2006) approach to resource dependence theory in higher education (originally presented by Pfeffer and Salencik (1978)), to form a

comprehensive conceptual model. The sample for this study consisted of 5,762 first-time, full-time, degree seeking undergraduate students from 400 different 4-year institutions.

Crisp, Doran, and Reyes (2017) used Bayesian modeling to predict graduation rates with the student body, structural-demographic, and financial variables. Crisp et al. (2017) utilized Berger and Milem's (2000) organizational effects model for framing the study and found that indicators such as location, control were less predictive of graduation rates for broad access schools as opposed to selective 4-year institutions. Additionally, their results suggested that religious affiliation, FTE student enrollment, student SES, enrollment, and institutional revenue and spending were strongly and positively associated with graduation rates for the general student population as well as for Latina/o and African American students.

Gansemer-Topf & Schuh (2006) examined the effect of institutional selectivity and expenditures on retention and graduation rates. The focus of their study was on 466 private Baccalaureate Liberal colleges and universities. This study also utilized Berger & Milem's (2000) conceptual framework of organizational behavior impacts student outcomes. Expenditure measures were captured two ways, first using raw dollar amounts, and subsequently as a percentage of the operating budget. Additionally, because expenditures over the course of a student's enrollment would impact graduation rates, a mean expenditure value was obtained by calculating summing up expenditures per student over 6 years, and dividing that number by 6.

Pike & Robbins (2020) used "panel data to identify the effects of institutional characteristics, cohort characteristics, and institutional actions on graduation rates". This research recognized the inconsistency of prior studies, and addressed it by utilizing a

within/between effects model to account for omitted variable bias. Additionally, this study was nested in the theoretical perspective of Principal-Agent theory, which suggests that a principal (in this case, Federal and State governments) seek to obtain a desired outcome (such as college completions) from an agent (postsecondary institutions) using either rewards or sanctions from a performance contract. This theoretical slant is somewhat novel in this research, and it worked nicely for this study because the main focus of the paper was on performance funding.

Powell et al. (2016) added to the literature with their study on “expenditures, efficiency, and effectiveness in U.S. undergraduate education.” Conceptually, this study was rooted in Bowen’s (1980) Revenue Theory of Cost, as well as Demand and Cost Curves. Bowen’s (1980) Revenue Theory of Cost posits that institutions raise as much revenue as possible, and spend as much money as they have available; whereas Bowen’s (1980) Demand and Cost Curves theory states that equilibrium exists at the point at which the demand curve and the cost curve intersect. Another great add to the literature was Powell et al’s (2016) approach to analysis, which was to employ structural equation modelling to examine the hypothesized model of effectiveness and efficiency.

In a study looking specifically at the relationship between institutional expenditures and degree attainment at baccalaureate colleges, Ryan (2004) used log transformed expenditure data obtained from IPEDS to examine FY 1996 data. He found that SAT scores, Institutional Control (via private schools) AND Instructional Expenses all had a positive and significant effect on 6-year graduation rates. Conversely, Institutional Support and Student Services Expenditures both showed negative, yet insignificant relationships with 6-year graduation rates (Ryan, 2004).

Webber (2012) took a different approach and analyzed individual level data for students from all public universities in Ohio who started their enrollment between 1998-2000, resulting in a sample of 94,880 students. This individual-level approach allowed Webber to account for endogeneity and measurement issues, but still looked at university level expenditures and their impact on graduation rates. Results showed again that student service expenditures have a larger (positive) impact on students with lower entrance test score, than with higher scores. Additionally, instructional expenses are more positively related to graduation for students who have higher entrance scores as well as those majoring in scientific and quantitative fields.

In a study of 1161 institutions between the years of 2002-2006, Webber and Ehrenberg (2010) studied the relationship between non-instructional university expenditure categories and retention/graduation rates. The study utilized an education production function approach, and conceptualized it by saying that graduation rates can be modeled as a function of institutional inputs X, institutional characteristics Y, and student characteristics Z. The study utilized a variety of econometric analyses (including unconditional quintile regression); and had a novel finding that student service expenditures are more positively related to graduation at schools with lower entrance scores, than at schools with higher entrance scores.

Zhang (2009) took a different approach to using financial data to predict 6-year graduation rates, specifically, they took a look at state appropriations per FTE (log transformed) as well as undergraduate tuition and fees (log transformed). Results showed continued support for student input data having a significant relationship with 6-year graduation rates. Additionally, increases in state funding per FTE student showed a

positive and significant relationship with graduation rates. An important check that happened in this study was the positive relationship between tuition and fees and graduation rates being recognized as potentially confounding with institutional selectivity. As noted in the study, policy makers and administrators should not use increasing tuition as a retention strategy.

## **Student Entry Characteristics**

### ***Race/Ethnicity***

Student background characteristics such as race/ethnicity, gender, and aptitude have been studied for quite some time, and the results suggest that student background characteristics matter when it comes to issues of retention and persistence. The 6-year graduation rate for first-time, full-time undergraduates seeking a bachelor's degree in 2016 was 60% (National Center for Education Statistics, 2020). When you disaggregate that number by race/ethnicity, you can see that although the 6-year graduation rate is 60% overall, it is actually 64% for students who are White, 40% for students who are Black, 54% for students who are Hispanic, 74% for students who are Asian, 51% for students who are Pacific Islander, 39% for those who are American Indian, and 60% for those who identify as multi-racial (National Center for Education Statistics, 2020).

On an individual level, one can see that graduation rates are different for those in various racial/ethnic groups. With that, it only makes sense that research utilizing proportional demographic variables (i.e. percent of students at a university that identify with a certain race/ethnicity), should result in differing graduation rates based upon the



percent of students within each racial/ethnic category at an institution. Overall, there is a fair amount of empirical support that the percentage of minority students is negatively related to graduation rates (Ryan, 2004; Scott et al., 2006; Webber & Ehrenberg, 2010). However, as Mayhew et al. (2016) noted, “most studies that simply examine the percentage of students of color and attrition/graduation have found no association (Chen, 2012; Gross et al., 2013; Robbins et al., 2006), a negative association (Kim et al., 2003), or a mix between the two (Jaeger & Eagan, 2009; Schreiner & Nelson, 2013).”. This inconsistency around entering cohort race data may be due to a curvilinear relationship (Ryan, 2004), where graduation rates drop to a degree with increases in minority students; but at some point along the continuum of increasing the percent of minority students in a cohort, graduation rates turn to the positive. This relationship could be indicative sense of belonging, or more likely based on the population being served at the institution and the supports put in place for student success.

Despite the inconsistencies, modelling and controlling for the percent of minority students is an important aspect to this research, and will be a part of the final model. Further, constraining the sample to RPU’s should help with greater “consistency” with comparison.

### ***Gender***

Just as race/ethnicity is related to attainment on the individual level, but has mixed results when looking at the aggregate level, the same holds for gender as well. According to IPEDS provisional data (2019), the average 6-year graduation rate for men was 56.2% and 62.3% for women, and expectedly the research lines up with that stance

that being female is significantly and positively related to graduating (Astin & Oseguera, 2012; Cabrera et al., 2005). When looking at university level graduation rates then, one would assume that institutions with a higher percentage of women would have higher graduation rates. Some studies that utilized aggregate percent male/female data did find that schools with a higher percentage of men had lower graduation rates (Pike & Robbins, 2019; Scott et al., 2006; Webber & Ehrenberg, 2010), while others found no significant relationship (Ryan, 2004). Once again, constraining the sample to accredited regional public universities should help alleviate some of the variability that comes from studies that have a more broadly defined sample of schools.

### *Selectivity*

Although the focus of this study is on regional comprehensive universities which by their very nature are meant to be accessible and for some even open access, this study is still utilizing selectivity as a control variable since there is a well-documented relationship between institutional selectivity and retention as well as graduation rates (Gansemer-Topf & Schuh, 2006; Pike, 2013; Pike & Robbins, 2019; Ryan, 2004, Scott et al., 2006; Webber & Ehrenberg, 2010). However, this variable is not meant to be prescriptive for anyone using this research to improve graduation rates; but rather to control for a known between-institutional effect. Universities should not change their target market and population served to improve their own graduation rates.

### *Socioeconomic Status*

Socioeconomic status has shown relatively consistent and negative relationship with college attendance and persistence over the years. When (Cahalan et al., 2020) looked at family socioeconomic status and attainment rates for students 8-10 years after high school graduation using the Current Population Survey (CPS), they found that individuals from the top income quartile were about 3.9 times more likely to attain a bachelor's degree than individuals from the lowest quartile in 2018. Further, they found that about 70% of bachelor's degrees completed by age 24 were from families in the top two income quartiles (Cahalan et al., 2020). When looking at attainment differences for those who are enrolled in some form of postsecondary education, Cahalan et al. (2020) found that 69% of students from the highest quartile graduated within 5 or 6 years from a four- or two-year postsecondary institution, while only 26% of students from the lowest quartile made it to graduation four- or two-year postsecondary institution.

One way you see researchers model socioeconomic status when studying institutional level variables is to proxy it through Pell. In a study probing the effect of structural-demographic and financial characteristics impact on 6-year graduation rates, Crisp et al. (2018) utilized the average Pell grant awarded per student as a predictor for 6-year graduation rates. What they found was that SES (proxied by Pell) was negatively related to 6-year graduation rates. Morrison (2012) found the relationship, however Morrison proxied SES through the percent of undergraduates receiving Pell grant aid. Heck et al. (2014) found similar results in their study, however they utilized proportion of students receiving any type of federal aid.

## **Benefits Associated with Attainment**

The literature review thus far has focused on topics contributing to or detracting from attainment of a postsecondary degree, but has failed to address full why it is so important. As mentioned earlier in this paper, the benefits associated with completing college are numerous. To start, unemployment rates follow a very predictable and decreasing trend with higher levels of education. In 2020, the overall unemployment rate was 7.1%, with those having a high school diploma or less having unemployment rate of 9% and 11.7% respectively; while those with a bachelor's degree having an unemployment rate of 5.5% (Bureau of Labor Statistics, 2021). Further, median weekly earnings for those with a bachelor's degree are about \$1,305, while those with a high school diploma or less see usual weekly earnings of \$781 and \$619, respectively (Bureau of Labor Statistics, 2021). It is important to realize that this earning differential impacts the individual, but also the state as well. When people earn higher wages, they have higher income taxes and also more spending power. It was estimated that for students who started as full-time bachelor's seeking students in 2002, but who failed to finish their degree, cost the federal government \$566 million in lost federal income taxes and \$164 million in lost state income tax (Schneider & Yin, 2011).

It was also noted earlier in this paper that access to a quality education (including enrollment in higher education) is considered to be a social determinant of health, which means a condition in the environment where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks" (Healthy People 2030). Higher levels of educational attainment (secondary up through post baccalaureate work) increases a person's likelihood of overall

health and longevity in a very predictable order, and contributes to the likelihood of landing a safe, stable, and high paying job (Healthy People 2030). Educational attainment's connection to health includes higher levels of self-reported health, increased access to care and preventive services, decreased incidence of heart disease, high blood pressure, diabetes, anxiety, and depression (Healthy People 2030), decreased risk of dying from cancer, and increased health awareness and vaccination rates (Raghupathi, V & Raghupathi, W. 2020).

### **Chapter Summary**

This chapter sought to lay out the framework for this study. I started the chapter discussing institutional productivity, which explained why graduation rates can be used as a measure of productivity and therefore accountability. From there, I framed the study in Tinto's Interactionalist Theory of Student Departure (1975, 1993) and Berger and Milem's (2000) model of organizational impact on student outputs, which together connected how background characteristics impact a student's integration into a campus, which ultimately impacts their departure decision. Further it helps explain how the inclusion of organizational attributes, can explain integration which also impacts a student's departure decision. Resource Dependency Theory (Pfeffer & Salencik, 1978) and Path-Goal theory (House, 1996) was then introduced to provide an open-systems, strategic decision-making perspective. Finally, the chapter reviewed the state of the literature on expenditures as a predictor of student outputs, as well as how background characteristic impact student success and the overall benefit of postsecondary attainment.

### Chapter 3: Methods

The purpose of this study is to examine the relationship between institutional expenditures/resource allocation and graduation rates of students at regional public universities in the United States. This study was designed to better understand the relationship between institutional resource allocation and graduation rates, and further to probe this relationship controlling for institutional selectivity and socioeconomic status/demographic makeup of the universities. Because this study is probing between school differences in expenditures and graduation rates, the nature of the data collection will be cross-sectional.

#### Research Questions and Hypotheses

**RQ1:** What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 6-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

**H1:** There will be a positive, significant association between funding levels directly related to the primary mission of teaching and supporting the student (e.g., instructional, academic support, and student service expenditures) and 6-year graduation rates.

This research question gets at better understanding how individual functional area expenses related to 6-year graduation rates in the presence of all the other functional expenses as well as student entry characteristics. This question is important because universities have a responsibility to graduate their students, therefore we need to better understand financial behaviors that impact graduation rates. Because we typically see

graduation within 150% of intended time as the criterion in college impact research, 6-year graduation rates will be utilized in RQ1.

**RQ2:** What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 4-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

**H2:** There will be a positive, significant association between funding levels directly related to the primary mission of teaching and supporting the student (e.g., instructional, academic support, and student service expenditures) and 4-year graduation rates.

This research question is foundationally the same as RQ1, however the criterion variable was changed from 6-year graduation rates to 4-year graduation rates. This is an important addition because you do not often see 4-year graduation rates in college impact literature. There are good reasons for expanding the criterion, and one of the major reasons is that you capture more information related to the students enrolled. For example, students who began their bachelor's degree in 2010 had a 6-year graduation rate of 60%, while the 4-year graduation rate was 41% (NCES). Using the 4-year graduation rate will shed some light on functional expenses that may be more related to graduating on time.

**RQ3:** What differences exist at the model- and parameter estimate-level when comparing the 6-year and 4-year graduation rate models?

**H3:** Funding will differentially explain graduation rates and will be accompanied by differences at the parameter level.

This research question probes the differing relationship of functional expenditures on 6-year as opposed to 4-year graduation rates at the model (R2 and R2 Change) level, as well as parameter level (do individual expense relationships change between 4- and 6-year graduation rates).

### **Population of Interest and Sampling**

The population of interest in this study is Regional Public Universities in the United States. The sample for this study has been selected using Fryar's (2015) definition of regional comprehensive universities. Fryar's (2015) contemporary definition focuses strictly on Carnegie classification and includes: public 4-year institutions in the fifty states that are classified at Baccalaureate Institutions, Masters Institutions, or Doctoral/Professional Institutions. Bachelors-degree granting institutions that are not included in this definition are those categorized as Baccalaureate/Associates, Very High Research, High Research, or Special Focus institutions (McClure & Fryar, 2020). In all, 382 schools made met the sample criteria, which can be found in Appendix A.

### **Data Collection and Instrumentation**

The secondary dataset utilized for this study was the Integrated Postsecondary Data System (IPEDS), which is a system of interrelated surveys conducted annually by the National Center for Education Statistics. This survey gathers information from all postsecondary institutions that participate in the federal student financial aid programs (Title IV-eligible). Schools that participate in or receive Title IV funds, must report out on a variety of topics to IPEDS as prescribed by the Higher Education Act of 1965 including enrollments, completions and completers, graduation rates and other outcome



measures, human resources, finances, institutional characteristics, student financial aid, admissions, and academic libraries (NCES). Once the surveys are collected, they go through a series of quality control procedures that ensure the validity of the data collection effort. This study utilized final release IPEDS data that started with 12-month enrollment for 2013-2014 academic year through graduations rates for the 2018/2019 academic school year.

### **Variables**

The dependent variables collected for this study were 4-year graduation rate (GRAD4) and 6-year graduation rate (GRAD6). Graduation rate data provided by IPEDS are collected for full-time, first-time degree and certificate-seeking students. The 4-year graduation rate represents students graduating in 100% of the normal time, while the 6-year graduation rate represents students graduating in 150% of normal time. By pulling the August 31, 2019 graduation rate data for both the 4- and 6-year graduation rate, the results are all derived from the 2013 start date cohort. Utilizing the 2013 cohort data allows this research to look at final release data from IPEDS for the 6-year graduation rates, which typically takes about 2 years after data collection to be released. Final release data goes through all National Center for Educational Statistics (NCES) data quality and control procedures, as well as the Prior Year Revision system (U.S. Department of Education, n.d.).

The independent variables utilized in this study were functional area expenditures per FTE for instruction, research, public service, academic support, student services, and institutional support. All financial variables listed were recorded according to Governmental Accounting Standards Board (GASB) 34/35 standards (U.S. Department

of Education, n.d.). Utilizing per FTE expenditures helps account for the fact these schools have very different student enrollment sizes. Once the expenditure variables were transformed to represent FTE, they were then divided by 1000 to improve the interpretability of the beta weights. Table 1 summarizes expenditures for a select regional public university to clearly show the expenditure transformation. Additionally, all expenses per FTE were averaged over the timeframe of interest 2013-2019 to provide a more accurate representation of money spent on each of the functional areas over the timeline of interest for the study. With that, an additional step taken in the data collection and aggregation stage was to index the expenditure budgets for each of the years collected (2013-2019). The index utilized for this study was the Higher Education Price Index (HEPI), which is the index that most appropriately adjusts for changes in costs for colleges and universities. The rationale for indexing the values was to account for the changes in the value of the dollar over the expenditure collection period, and ultimately be able to provide more accurate estimates of how dollar changes in spending impact graduation rates.

The instruction expenses per FTE (INSTR) variable represents a functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution. The sum of the total institutional instruction spending is divided by the 12-month FTE enrollment, to derive the instructional spending per FTE variable. For example, if a university had a total instructional expense of \$186,230,008 for a fiscal year, and a full-time equivalent enrollment of 20,887 students, the instructional expense per full-time equivalent student would be \$8,916.

The research expense per FTE (RSRCH) variable is a functional expense category that specifically produces research outcomes. This could include research centers, institutes, and individual and project research. The sum of the total institutional research spending is divided by the 12-month FTE enrollment, to derive the research spending per FTE variable. For example, if a university had a total research expense of \$4,161,519 for a fiscal year, and a full-time equivalent enrollment of 20,887 students, the research expense per full-time equivalent student would be \$199.

The public service expense per FTE (PUBSV) variable is a functional expense category that consists of primarily non-instructional services that are beneficial to individuals and groups external to the institution. This could include expenses for community services, cooperative extension services, public broadcasting services, and other services directed to the greater community. The sum of the total institutional public service spending is divided by the 12-month FTE enrollment, to derive the public service spending per FTE variable. For example, if a university had a total public service expense of \$16,155,634 for a fiscal year, and a full-time equivalent enrollment of 20,887 students, the public service expense per full-time equivalent student would be \$773.

The academic support expense per FTE (ACASP) variable is a functional expense category that consists of activities and services that support the institutions primary missions of instruction, research, and public service. The sum of the total institutional academic support spending is divided by the 12-month FTE enrollment, to derive the academic support spending per FTE variable. For example, if a university had a total academic support expense of \$51,588,152 for a fiscal year, and a full-time equivalent

enrollment of 20,887 students, the instructional expense per full-time equivalent student would be \$2,475.

The student services expense per FTE (STSRV) variable is a functional expense category that includes expenses that have a primary purpose to contribute to students emotional and physical wellbeing; and to their intellectual, cultural, and social development outside of the classroom. The sum of the total institutional student service spending is divided by the 12-month FTE enrollment, to derive the student support spending per FTE variable. For example, if a university had a total student service expense of \$20,989,363 for a fiscal year, and a full-time equivalent enrollment of 20,887 students, the instructional expense per full-time equivalent student would be \$1,005.

The institutional support expense per FTE (INSTSP) variable is a functional expense category that includes expenses for the day-to-day operational support of the institution. Expenses generally include administrative services, executive activities dealing with management and planning, legal and fiscal operations, space management, public relations, etc... The sum of the total institutional support spending is divided by the 12-month FTE enrollment, to derive the institutional support spending per FTE variable. For example, if a university had a total institutional support expense of \$38,842,834 for a fiscal year, and a full-time equivalent enrollment of 20,887 students, the instructional expense per full-time equivalent student would be \$1,860.

**Table 1**  
*Example Regional Public University Expenditures*

Expenditure	Total Expense	FTE Enrollment	Expense per FTE	Expense per FTE (in thousands)
Instruction	\$186,230,008	20,887	\$8,916	\$8.92
Research	\$4,161,519	20,887	\$199	\$0.20
Public Service	\$16,155,634	20,887	\$773	\$0.77
Academic Support	\$51,588,152	20,887	\$2,475	\$2.48
Student Services	\$20,989,363	20,887	\$1,005	\$1.01
Institutional Support	\$38,842,834	20,887	\$1,860	\$1.86

The control variable for selectivity was the percent of students admitted into the university (PERCAD). The percent admitted variable was calculated as the admissions total divided by the total number of applicants; for example, if a school admitted 14,394 students and had 22,648 applicants, then 64% of the students who applied were admitted. The control variable for race/ethnicity (RCETH) was calculated as the percent of students that identify as someone from an ethnic minority group in aggregate, including Black or African American, Hispanic, Asian, American Indian, Native Hawaiian or Other Pacific Islander, and individuals who identify as having 2 or more races. The control variable for gender was measured as the percent of female (FEMALE) students enrolled for credit at the start of the fall semester. Finally, the control for socioeconomic makeup of the university was measured as the percentage of undergraduate students who were awarded Pell grant aid. Table 2 provides descriptive statistics for all variables in the model.

**Table 2**  
*Descriptive Statistics for all Model Variables*

Variable	N	Mean	S.D.	Min.	Max.
4-Year Graduation Rate (%)	345	27.23	14.40	3.0	75.0
6-Year Graduation Rate (%)	345	47.07	14.28	10.0	86.0
Selectivity (% Admitted)	315	69.36	17.01	21.0	100
Race/Ethn (% Minority)	352	36.37	26.42	3.0	100
Gender (% Female)	352	57.18	9.10	10.0	89.0
SES (% Pell)	352	41.96	13.76	13.0	83.0
Instructional Per FTE (in thousands)	352	8.749	2.513	2.21	20.18
Research Per FTE (in thousands)	352	0.547	1.116	0.0	10.53
Public Service Per FTE (in thousands)	352	0.707	0.947	0.0	6.84
Academic Support Per FTE (in thousands)	352	2.223	0.998	0.59	8.27
Student Services Per FTE (in thousands)	352	2.335	1.058	0.22	7.0
Institutional Support Per FTE (in thousands)	352	3.023	1.899	0.33	18.75

## Analysis

This study conducted separate hierarchical/sequential multiple regression analyses using block-wise entry to answer the research questions. Using sequential procedures was necessary to account for the control variables of race/ethnicity, percent admitted, socioeconomic makeup, and gender. Using sequential procedures, entry of variables is important and improper ordering can produce misleading results. It is recommended that demographic variables hit the model first, then known known variables, and finally the variables of interest. Adding the new variables block-wise is advised because they must compete with all the other variables and each other, and thus will provide a more conservative estimate of their contribution.

To test the first research question, hierarchical/sequential multiple regression was utilized to control for the entry characteristics variables and the variance they explain in 6-year graduation rates. The first model included the race/ethnicity, percent of students admitted, socioeconomic makeup, and gender variables. The second model will add in all the expenditure variables of interest (instructional, research, public service, academic support, student services, and institutional support). This will allow for interpretations to be made about the relationship between the various expenditures and 6-year graduation rates, above and beyond the entry (control) characteristics. One practical issue that will need to be addressed in a model such as this is multi-collinearity. It is expected that the entry characteristics, and more so the financial indicators are going to be correlated with one another. To ensure that the model does not violate the assumption of the absence of multicollinearity, I will analyze the variance inflation factor (VIF) to ensure that VIF values do not exceed 10 (Alin, 2010).

To test the second research question, hierarchical/sequential multiple regression was utilized to control for the entry characteristics variables and the variance they explain in 4-year graduation rates. The first model included the race/ethnicity, percent of students admitted, socioeconomic makeup, and gender variables. The second model added in all the expenditure variables of interest (instructional, research, public service, academic support, student services, and institutional support). This allowed for interpretations to be made about the relationship between the various expenditures and 4-year graduation rates, above and beyond the entry (control) characteristics.

The third research question was addressed by visual inspection and comparison between the model with 4-year graduation rate as the criterion and the model with the 6-

year graduation rate as the criterion. First, a comparison of the overall model fit was compared between the 4-year and 6-year model via the total variance explained in the full models. Next values of the R<sup>2</sup> change were compared between the models to make inferences about the differences in predictive power that student input and expenditures have on 4- and 6-year graduation rates. From there, the comparison moved down to the individual contributions of each of the entry and expenditure predictor variables. Differences were noted in changes in unstandardized and standardized Beta weights as well as their associated significance tests, as those values represent the unique contribution of predictors to the criterion given the other variables in the equation.

### **Summary**

The purpose of this study is to examine the relationship between institutional expenditures/resource allocation and graduation rates of students at regional public universities in the United States. To answer the research questions, expenditures were broken out by functional area per FTE (instruction, research, public service, academic support, student services, and institutional support). Graduation rates were operationalized a couple of ways including: graduation within 150% of normal time (6-year graduation rates), and graduation within 100% of normal time (4-year graduation rates). This line of inquiry is incredibly important, timely, and will help inform postsecondary decision makers about organizational characteristics that can help or hurt graduation rates at their respective institutions.



## Chapter 4-Results

The purpose of this study was to examine the relationship between institutional expenditures/resource allocation and graduation rates of students at regional public universities in the United States, while controlling for select entry characteristics. In addition to anticipating significant relationships between the control variables and graduation rates, I also expected a differing effect of expenditures and graduation rates. Specifically, I hypothesized instructional, academic support, and student service expenditures to demonstrate a positive relationship with graduation rates; while I hypothesized no relationship or negative relationships to exist between funding not related to student learning/development/integration and graduation rates of students.

To achieve the above-mentioned purpose, three overarching research questions were addressed. Research question one (RQ1) sought to probe the relationship between each of the functional area expenditures per FTE (instructional, research, public service, academic support, student services, and institutional support) and 6-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics (selectivity, SES, race/ethnicity, and gender). Research question 2 (RQ2) sought to probe the relationship between each of the functional area expenditures per FTE (instructional, research, public service, academic support, student services, and institutional support) and 4-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics (selectivity, SES, race/ethnicity, and gender). Finally, research question 3 sought to probe model and parameter level differences when comparing the 4- and 6-year models. RQ's 1 and 2 were approached analytically using hierarchical/sequential multiple regression

analyses using block-wise entry, where block 1 consisted of the control variables (entry characteristics), and block 2 consisted of each of the expenditure variables. RQ3 was approached analytically by comparing overall fit between the two models via variance explained in the full models, R-squared change between the models, and also at the individual contribution of each of the predictors.

### **Results for RQ1 (Criterion- 6 Year Graduation Rate)**

Research Question 1 utilized a hierarchical/sequential multiple regression analysis using block-wise entry. Model 1 predictors consisted of the selected entry characteristics (e.g., selectivity, SES, race/ethnicity, and gender) that were operationalized at the organizational level. Selectivity for this study was operationalized as the percent of students admitted to the university, gender was operationalized as the percent of female students in the 2013 enrollment cohort, race/ethnicity was operationalized as the percentage of students who identify as someone from an ethnic minority group on campus, and socioeconomic status was operationalized as the percentage of students receiving Pell aid at the institution. Model 2 predictors consisted of functional area expenditures per FTE (e.g., instructional, research, public service, academic support, student services, and institutional support), indexed using the HEPI, averaged over the duration of the enrollment period of the cohort (2013-2019), and transformed into thousands to help with interpretation of the beta weights. With that, any interpretation of the expenditure regression coefficients would need to be the expected unit change in graduation rates, for every \$1000 spent per FTE, controlling for the other predictors. To fully account for the institutional-level variations and non-random reporting features at the institutional level, the model only consisted of cases that had complete financial

reporting for each fiscal year between 2013-2019. This screening removed 33 schools from the initial sample of 382 schools. All other institutions were removed via Listwise deletion, which resulted in a final sample size of 312 regional public universities.

Results of the multiple regression analysis for RQ1 indicated that Model 1 (entry characteristics) accounted for a significant percentage of 6-year graduation rate variance  $R^2=.339$ ,  $F(4, 307) = 39.37$ ,  $p < .001$ . As expected, selectivity ( $b = -.121$ ,  $p = .002$ ,  $sr^2 = .02$ ), gender ( $b = -.295$ ,  $p < .001$ ,  $sr^2 = .04$ ) and SES ( $b = -.537$ ,  $p < .001$ ,  $sr^2 = .11$ ) are contributing to the model (See Table 3 below for model summary); however, race/ethnicity did not contribute ( $b = .043$ ,  $p = .288$ ) which was not expected. When all the expenditure variables were added to the model in Model 2, the variance accounted for in 6-year graduation rates increased to  $R^2=.395$ ,  $F(10, 301) = 19.65$ ,  $p < .001$ , which was significantly more than the variance accounted for by the smaller model ( $R^2\text{change} = .056$ ,  $F\text{-change}(6, 301) = 4.635$ ,  $p < .001$ ). As expected, instructional expenses further contributed to the model ( $b = 1.152$ ,  $p = .001$ ,  $sr^2 = .024$ ); however, student services expenditures ( $b = .454$ ,  $p = .522$ ) and academic support expenditures ( $b = 1.049$ ,  $p = .149$ ) did not contribute to the model as expected. Research expenditures ( $b = -.403$ ,  $p = .584$ ), and institutional support expenditures ( $b = -.603$ ,  $p = .213$ ) both failed to reach significance, while public service expenditures did negatively contribute to the model ( $b = -1.885$ ,  $p = .018$ ,  $sr^2 = .011$ ). See Table 4 below for a summary of parameter estimates for RQ1.

**Table 3**  
*Model Summary for Predicting 6-year Graduation Rates (RQ1)*

	R	R <sup>2</sup>	F-Change	df1	df2
Model 1	.58	.34	39.37***	4	307
Model 2	.63	.40	4.64***	6	301

\*\*\*p<.001

**Table 4**  
*Parameter Estimates for RQ1 Regression Models (n=312)*

Variable	<u>Model 1</u> <i>b [Beta]</i> ( <i>S.E.</i> )	<u>Model 2</u> <i>b [Beta]</i> ( <i>S.E.</i> )
Selectivity (% Admitted)	-0.121 [-0.16]** (0.04)	-0.08 [-0.11]* (0.04)
Race/Ethn (% Minority)	0.043 [0.09] (0.04)	0.037 [0.07] (0.04)
Gender (% Female)	-0.295 [-.21]*** (0.07)	-0.262 [-0.18]*** (0.07)
SES (% Pell)	-0.537 [-0.56]*** (0.07)	-0.458 [-0.48]*** (0.07)
Instructional Per FTE (in thousands)		1.152 [.21]** (0.33)
Research Per FTE (in thousands)		-0.403 [-0.03] (0.74)
Public Service Per FTE (in thousands)		-1.885 [-0.13]* (0.79)
Academic Support Per FTE (in thousands)		1.049 [0.07] (0.73)
Student Services Per FTE (in thousands)		0.454 [0.04] (0.71)
Institutional Support Per FTE (in thousands)		-0.603 [-0.08] (0.48)

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

In summary, RQ1 sought to explore the relationship between expenditure levels in each functional area per FTE and 6-year graduation rates in the presence of pertinent

entry characteristics. It was hypothesized that expenditures would significantly predict graduation rates. Specifically, expenditures directly related to the primary mission of teaching and supporting the student (e.g., instructional, academic support, and student service expenditures) were expected to positively and significantly predict 6-year graduation rates; while expenditures that are not directly related to the primary mission of teaching or supporting students (e.g., research, public service, and institutional support expenses) were expected to not add predictive utility to 6-year graduation model. Results partially supported the expectation that all of the entry characteristics would significantly contribute to the model.

When expenditure variables were added to the model, there was only partial support for the hypothesis that expenditures directly related to the primary mission of teaching and supporting the student would contribute positively to 6-year graduation rates. Of the expenditures expected to positively increase graduation rates (instructional, student services, and academic support), only instructional expenses positively and significantly contributed to 6-year graduation rates. Results for expenditures not directly related to the primary mission of teaching and supporting the student were generally as expected, with institutional support and research expenditures not contributing to the model in a significant way, while increasing levels of public service expenditures significantly contributed to lower graduation rates.

### **Results for RQ2 (Criterion- 4 Year Graduation Rate)**

Research Question 2 also utilized a hierarchical/sequential multiple regression analysis using block-wise entry. Model 1 predictors consisted of the selected entry characteristics (e.g., selectivity, SES, race/ethnicity, and gender). Model 2 predictors consisted of functional area expenditures per FTE (e.g., instructional, research, public service, academic support, student services, and institutional support), indexed using the HEPI, averaged over the duration of the enrollment period of the cohort (2013-2019), and transformed into thousands to help with interpretation of the beta weights. As with the 6-year criterion, each of the expenditure predictors needed to be transformed prior to analysis. To fully account for the institutional-level variations and non-random reporting features at the institutional level, the model only consisted of cases that had complete financial reporting for each fiscal year between 2013-2019. This screening removed 33 schools from the initial sample of 382 schools. All other institutions were removed via Listwise deletion, which resulted in a final sample size of 312 regional public universities.

Results of the multiple regression analysis for RQ2 indicated that Model 1 (entry characteristics) accounted for a significant percentage of 4-year graduation rate variance  $R^2=.447$ ,  $F(4, 307) = 61.96$ ,  $p < .001$ . As expected, selectivity ( $b = -.168$ ,  $p < .001$ ,  $sr^2 = .03$ ), gender ( $b = -.20$ ,  $p < .004$ ,  $sr^2 = .02$ ), SES ( $b = -.454$ ,  $p < .001$ ,  $sr^2 = .07$ ), and race/ethnicity ( $b = -.127$ ,  $p = .001$ ) are contributing to the model (See Table 5 below for model summary). When all the expenditure variables were added in Model 2, the variance accounted for in 4-year graduation rates increased to  $R^2=.518$ ,  $F(10, 301) = 32.37$ ,  $p < .001$ , which was significantly more than the variance accounted for by the smaller

model ( $R^2_{\text{change}} = .071$ ,  $F\text{-change} (6, 301) = 7.445$ ,  $p < .001$ ). As expected, instructional expenses further contributed to the model ( $b = 1.036$ ,  $p = .001$ ,  $sr^2 = .017$ ); however, student services expenditures ( $b = .27$ ,  $p = .69$ ) and academic support expenditures ( $b = 1.242$ ,  $p = .07$ ) did not contribute to the model as expected. Research expenditures ( $b = -.156$ ,  $p = .824$ ), and institutional support expenditures ( $b = .708$ ,  $p = .125$ ) both failed to reach significance, while public service expenditures did negatively contribute to the model ( $b = -1.925$ ,  $p = .011$ ,  $sr^2 = .01$ ). See table 6 below for a summary of parameter estimates for RQ2.

**Table 5**  
*Model Summary for Predicting 4-year Graduation Rates (RQ2)*

	R	R <sup>2</sup>	F- Change	df1	df2
Model 1	.67	.45	61.96***	4	307
Model 2	.72	.52	7.45***	6	301

\*\*\* $p < .001$

**Table 6**  
*Parameter Estimates for RQ2 Regression Models (n=312)*

Variable	<u>Model 1</u> <i>b [Beta]</i> <i>(S.E.)</i>	<u>Model 2</u> <i>b [Beta]</i> <i>(S.E.)</i>
Selectivity (% Admitted)	-0.168 [-0.2]*** (0.04)	-0.113 [-0.14]** (0.04)
Race/Ethn (% Minority)	-0.127 [-0.24]** (0.04)	-0.14 [0.26]*** (0.04)
Gender (% Female)	-0.20 [-.13]** (0.07)	-0.115 [-0.08] (0.07)
SES (% Pell)	-0.454 [-0.44]*** (0.07)	-0.399 [-0.39]*** (0.07)
Instructional Per FTE (in thousands)		1.036 [.18]** (0.32)
Research Per FTE (in thousands)		-0.156 [-0.01] (0.70)
Public Service Per FTE (in thousands)		-1.925 [-0.12]* (0.76)
Academic Support Per FTE (in thousands)		1.242 [0.08] (0.69)
Student Services Per FTE (in thousands)		0.27 [0.02] (0.68)
Institutional Support Per FTE (in thousands)		0.708 [0.09] (0.46)

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

In summary, RQ2 sought to explore the relationship between expenditure levels in each functional area per FTE and 4-year graduation rates in the presence of pertinent entry characteristics. It was hypothesized that expenditures would significantly predict graduation rates. Specifically, expenditures directly related to the primary mission of teaching and supporting the student (e.g., instructional, academic support, and student service expenditures) were expected to positively and significantly predict 6-year graduation rates; while expenditures that are not directly related to the primary mission of



teaching or supporting students (e.g., research, public service, and institutional support expenses) were expected to not add predictive utility to 4-year graduation model. Results supported the expectation that all the entry characteristics would significantly contribute to the model. When expenditure variables were added to the model, there once again was only partial support for the hypothesis that expenditures directly related to the primary mission of teaching and supporting the student would contribute positively to 6-year graduation rates. Of the expenditures expected to positively increase graduation rates (instructional, student services, and academic support), only instructional expenses positively and significantly contributed to 4-year graduation rates. Results for expenditures not directly related to the primary mission of teaching and supporting the student were as expected again, with institutional support and research expenditures not contributing to the model a significant way, while increasing levels of public service expenditures significantly contributed to lower graduation rates.

### **Results for RQ3**

Research Question 3 was addressed by comparing the model and parameter level estimates between the 4- and 6-year graduation rate models. First, a comparison of the overall model fit was compared between the 4-year and 6-year model via the total variance explained in the full models. Next values of the R<sup>2</sup> change were compared between the models to make inferences about the differences in predictive power that student input and expenditures have on 4- and 6-year graduation rates. From there, the comparison moved down to the individual contributions of each of the entry and expenditure predictor variables.

When comparing the overall model fit between the 4- and 6-year graduation rates, there are differences in variance explained for both the entry characteristics as well as expenditures (see table 7). As displayed below, entry characteristics explain 34% of the variance in 6-year graduation rates while they explain 45% of the variance in 4-year graduation rates; meaning there is 11% more variance explained in entry characteristics on 4-year graduation rates than in the model predicting 6-year graduation rates. When expenditure variables were added into the model, the total variance explained increased to 40% for the 6-year graduation rate model, while the overall model explained 52% of the variance in 4-year graduation rates; meaning that the full model of entry characteristics and expenditures explains 12% more variance in the 4-year model than for the 6-year graduation rate model.

**Table 7**

*Model Summary for 4- and 6-Year Graduation Rates*

	R	R <sup>2</sup>	F-Change	df1	df2
<u>6-Year Graduation Rate Criterion</u>					
Model 1 (Entry Characteristics)	0.58	0.34	39.37***	4	307
Model 2 (Expenditure Variables)	0.63	0.4	4.64***	6	301
<u>4-Year Graduation Rate Criterion</u>					
Model 1 (Entry Characteristics)	0.67	0.45	61.96***	4	307
Model 2 (Expenditure Variables)	0.72	0.52	7.45***	6	301

\*\*\*p<.001

In addition to entry characteristics and the full model explaining more variance in the 4-year graduation model, there were slight differences in how just the addition of expenditures impacted the model overall. As can be seen in the R<sup>2</sup>-change values, there was an increase of 7.1% variance explained with the addition of expenditure variables to the 4-year model, while there was a 5.6% increase in variance explained by expenditures

in predicting 6-year graduation rates. Although expenditures only add an additional 1.5 percent to the variance explained to the 4-year model, this is in addition to the better overall model fit of the 4-year model. This finding partially supports H3, that funding will differently explain graduation rates at the model level.

At the parameter level, differences can be seen in the predictive utility of the entry characteristics as well as the expenditure variables. In the 4-year graduation rate model, all four entry characteristics were statistically significant predictors to the model; while in the 6-year model selectivity, gender, and SES were significant contributors, but the variable for race/ethnicity was not.

As can be seen below in table 8, the individual regression coefficients for entry characteristics had differing slopes between the two models. In the 6-year model, for every one unit increase in percent of students admitted, there was a decrease of .12 percent in graduation rates in the presence of the other entry characteristics. For the 4-year model, there was a .168 percent decrease in graduation rates for every one unit increase in the percent of students admitted in the presence of the other entry characteristics.

In the 6-year model, the percent of students who identified as diverse showed a positive, albeit insignificant, relationship with graduation rates. In the 4-year model, for every one unit increase in the percent of diverse students, there was a .127 percent decrease in the 4-year graduation rate in the presence of the other predictors, which was a significant result.

The percent of female students did significantly contribute to both models; however, it was expected that increases in the percent of female students would lead to increased graduation rates, not decreased graduation rates as can be seen in table 7 below.

Socioeconomic status as proxied by the percent of students receiving Pell aid, showed a significant and negative relationship as expected. In the 6-year model, for every one unit increase in the percent of students receiving Pell, there was a .537 percent decrease in 6-year graduation rates in the presence of the other expenditures and entry characteristics. In the 4-year model, for every one unit increase in the percent of students receiving Pell, there was a .537 percent decrease in 4-year graduation rates.

**Table 8**

*Regression Coefficients and Squared Semi-Partials for Entry Characteristics*

	<i>B</i>	Beta	SE	sr <sup>2</sup>
<u>6-Year Graduation Rate Model (1)</u>				
Selectivity (% Admitted)	-0.121**	-0.16	0.04	0.02
Race/Ethn (% Minority)	0.043	0.09	0.04	0.002
Gender (% Female)	-0.295***	-0.21	0.07	0.038
SES (% Pell)	-0.537***	-0.56	0.073	0.114
<u>4-Year Graduation Rate Model (1)</u>				
Selectivity (% Admitted)	-0.168***	-0.20	0.04	0.034
Race/Ethn (% Minority)	-0.127**	-0.24	0.04	0.019
Gender (% Female)	-0.200**	-0.13	0.07	0.016
SES (% Pell)	-0.454***	-0.44	0.07	0.072

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

When comparing the individual contributions of the two significant expenditure variables, differences were really minimal (see table 9). For the 6-year model, every \$1,000 per FTE spent on instruction was associated with a 1.152 percent increase in graduation rates, and for the 4-year model every \$1,000 per FTE resulted in an increased graduation rate of 1.036 percent. Similar outcomes were obtained with public service

expenditures as well. In the 6-year model, for every \$1000 per FTE spent on public service, there was a 1.885 percent decrease in graduation rates; while in the 4-year model, there was a 1.925 percent decrease in graduation rates for every \$1,000 per FTE spent on public service.

Although insignificant, there were interesting differences in the other functional expenditure areas as well. In the 6-year model, every \$1,000 per FTE spent of student services resulted in an .454 percent increase in graduation rate; while for the 4-year model a \$1,000 increase per FTE resulted in a .27 percent increase in graduation rate. Every \$1,000 spent per FTE on institutional support resulted in a .63 percent drop in the 6-year graduation rate, which differs from the .708 percent increase associated with the 4-year model.

**Table 9**

*Regression Coefficients and Squared Semi-Partials for Expenditure Variables*

	<i>B</i>	Beta	SE	sr <sup>2</sup>
<u>6-year Graduation Rate Model (2)</u>				
Instructional Per FTE (in thousands)	1.152**	0.21	0.33	.024
Research Per FTE (in thousands)	-0.403	-0.03	0.74	.001
Public Service Per FTE (in thousands)	-1.885*	-0.13	0.79	.011
Academic Support Per FTE (in thousands)	1.049	0.07	0.73	.004
Student Services Per FTE (in thousands)	0.454	0.04	0.71	.001
Institutional Support Per FTE (in thousands)	-0.603	-0.08	0.48	.003
<u>4-year Graduation Rate Model (2)</u>				
Instructional Per FTE (in thousands)	1.036**	0.18	0.32	.017
Research Per FTE (in thousands)	-0.156	-0.01	0.70	.000
Public Service Per FTE (in thousands)	-1.925*	-0.12	0.76	.010
Academic Support Per FTE (in thousands)	1.242	0.08	0.69	.005
Student Services Per FTE (in thousands)	0.27	0.02	0.68	.000
Institutional Support Per FTE (in thousands)	0.708	0.09	0.46	.004

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

In summary, RQ3 sought to explore what differences exist at the model and parameter level when comparing 6-year and 4-year graduation rate models. It was hypothesized (H3) that funding would differently explain graduation rates at the model and parameter level. Results at the model level supported this hypothesis, in that the overall model fit was much higher for the 4-year model as opposed to the 6-year model. At the parameter level, there was partial support for the hypothesis that the IV's would differently predict graduation rates between the models. Interestingly, all four entry characteristics significantly contributed to the 4-year model, while only selectivity, gender, and SES contributed significantly in the 6-year model. When probing the expenditure variables there were no differences in significance, however there were differences in weight and even direction between functional expenditures and 4- and 6-year graduation rates.

## Chapter 5- Discussion

This study was conducted to examine the relationship between institutional expenditures/ resource allocation and graduation rates of students at regional public universities in the United States, while controlling for entry characteristics including selectivity, gender, race/ethnicity, and SES. Beyond the expectation that each of the control variables would significantly contribute to the model, it was hypothesized that instructional, student service, and academic support expenditures would positively impact graduation rates due to their direct fulfillment of the mission to teach and support students. To examine the relationship between entry characteristics, expenditures, and graduation rates, the study addressed three major research questions:

RQ1: What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 6-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

RQ2: What is the relationship between levels of expenditure in each functional area per FTE (instructional, research, public service, academic support, student services, and institutional support) and 4-year graduation rates for full-time first-time students at regional public universities after accounting for students' entry characteristics?

RQ3: What differences exist at the model- and parameter estimate-level when comparing the 6-year and 4-year graduation rate models?

## Review of Results

### Entry Characteristics

Both the 4- and 6-year graduation models supported the relationship between entry characteristics and their impact on graduation rates ( $R^2=.45$ ,  $p<.001$  &  $R^2=.34$ ,  $p<.001$ ., respectively). Below is a review of how individual entry characteristics impacted the model in the presence of each of the other entry characteristics.

### *Selectivity*

Selectivity, operationalized as the percent of students admitted, showed a statistically significant relationship in the 6-year model ( $b = -.121$ ,  $p=.002$ ) as well as the 4-year model ( $b = -.168$ ,  $p<.001$ ). Admitting a higher percentage of applicants indicates lower selectivity, while admitting a lower percentage of applicants is associated with higher selectivity. With that, having an unstandardized beta of  $-.121$  indicates that a one unit increase in the percent of students admitted to a university (indicating lower selectivity), results in a  $.121$  unit decrease in 6-year graduation rates. The beta of  $-.168$  indicates that a one unit increase in the percent of students admitted to a university, results in a  $.168$  unit decrease in 4-year graduation rates. As can be seen in the coefficients above, selectivity appears to have more of a negative impact on 4-year graduation rates than it does for 6-year graduation rates.

Results for selectivity supported previous findings (Gansemer-Topf & Schuh, 2006; Pike & Robbins, 2019; Ryan, 2004, Scott et al., 2006; Webber & Ehrenberg, 2010) that more selective universities graduate students at a higher rate than less selective universities. There are a number of reasons for why this finding might occur, one is that



more selective schools are able to “enroll students with higher standardized test scores, high school grade point averages and high school rank than institutions with lower selectivity” (Gansemer-Topf & Schuh, 2006, p. 614), which positively promotes retention and graduation.

### *Gender*

Gender, operationalized as the percent of female students in the 2013 enrollment cohort, showed a statistically significant relationship in the 6-year model ( $b = -.295$ ,  $p < .001$ ) as well as the 4-year model ( $b = -.200$ ,  $p < .01$ ). In the 6-year model, a one unit increase in the percent of females enrolled resulted in a .295 unit decrease in graduation rate (%); while in the 4-year model, a one unit increase in the percent of females enrolled resulted in a .200 unit decrease in graduation rate (%). As can be seen in the coefficients above, higher proportions of female students appear to have more of a negative impact on 6-year graduation rates than it does for 4-year graduation rates.

Based on most of the previous research (Pike & Robbins, 2020; Scott et al., 2006; Webber & Ehrenberg, 2010), it was expected that a higher proportion of female students would lead to higher graduation rates; which, interestingly was not the case in this study. Although this finding runs counter to what most previous research has supported, it does align with results of a study on community college attainment (Bailey et al., 2006) and another study on low-income student achievement at 4-year institutions (Muraskin & Lee, 2004). One possible reason for this finding is that regional public universities are institutions of access, who enroll a higher proportion of under-represented racial/ethnic groups and non-traditional students than their flagship or elite private peers (Schneider & Deane, 2014), which are more often the focus of attainment research. This finding further

supports the need for conducting studies specifically on regional public universities, as they are fundamentally different than other four-year institutions.

### ***Race/Ethnicity***

Race/ethnicity, operationalized as the percentage of students who identify as someone from an ethnic minority group in aggregate, including Black or African American, Hispanic, Asian, American Indian, Native Hawaiian or Other Pacific Islander, and individuals who identify as having 2 or more races, had more of a nuanced relationship with graduation rates than the other controls. In the 6-year model, the percentage of students who identified as someone from an ethnic minority group failed to reach significance in the presence of the other entry characteristics. However, in the 4-year model the percentage of students who identified as an ethnic minority did reach significance ( $b = -.127$ ,  $p < .01$ ); meaning that every one unit increase in the percentage of minority students in the cohort, results in a .127 unit decrease in the graduation rate.

This mix of no or negative relationships between aggregate race/ethnicity and graduation rates falls right in line with what was expected from the organizational literature (Chen, 2012; Gross et al., 2013; Robbins et al., 2006; Kim et al., 2003; Jaeger & Eagan, 2009; Schreiner & Nelson, 2013); however, it runs counter to the overwhelming evidence that students from different backgrounds have different outcomes when it comes to retention and persistence. A potential reason for the mismatch between the individual and organization level is that “students of color may particularly benefit from attending college with a critical mass of fellow students so that they are less likely to feel isolated or tokenized” (Mayhew et al., 2016, p. 373). Although this study

didn't address that relationship specifically, it is certainly a great opportunity for future research.

### *SES*

Socioeconomic status, operationalized as the percentage of students receiving Pell aid at the institution, displayed the strongest relationship with both 4- and 6-year graduation rates. The percentage of students receiving Pell proxy's SES (Crisp et al., 2018; Heck et al., 2014; Morrison, 2012), in that having a higher percentage of students who get Pell aid suggests that the university has a higher proportion of low-income students. With that, the 6-year model had an unstandardized beta of  $-.537$ , which indicates that a one unit increase in the percent of students at the university receiving Pell aid, results in a  $.537$  unit decrease in graduation rates. The 4-year model had an unstandardized coefficient of  $-.454$ , which still indicates a strong negative relationship with the criterion, just not quite as strong as with the 6-year criterion.

This result was expected since students from low-income backgrounds don't always come to college with the same advantages as their more affluent peers. Students from low-SES families are less likely to get a quality K-12 education, quality college/financial information, encouragement, and financial help than their more affluent peers, which leads to lower retention and persistence (Muraskin & Lee, 2004). Therefore, when schools have higher enrollments of low-SES students, there is a need to recognize that lower graduation rates are to be expected, but also that more supports need to be present to help promote attainment.

As mentioned previously, these entry characteristics were expected to impact graduation rates, and that is why they were accounted for in the model. Regional public universities should continue to live up to their mission of access, so there is no insinuation to strategically change the cohort characteristics to better promote attainment. Results should be used to understand how these entry characteristics impact success specifically at regional publics, and further, how the different functional expenditures impact graduation in the presence of these entry characteristics.

### **Functional Expenditures per FTE**

Both the 4- and 6-year graduation models supported the relationship between expenditures and their impact on graduation rates above and beyond what could be accounted for by entry characteristics ( $R^2$ -change=.071,  $p<.001$  &  $R^2$ -change=.056,  $p<.001$ ., respectively). Below is a review of how individual expenditures per FTE impacted the model, in the presence of each of the entry characteristics as well as the other expenditures.

### ***Instructional Expenses***

Instructional expenses, operationalized as the average instructional expense per FTE (in thousands), showed a statistically significant relationship in the 6-year model ( $b = 1.152$ ,  $p = .001$ ) as well as the 4-year model ( $b = 1.036$ ,  $p = .001$ ). This functional expense category includes expenses of the colleges, schools, departments, and other instructional divisions of the institution, and results supported the hypothesis that instructional expenses would positively impact graduation rates. As can be seen in the 6-year coefficient above, a \$1000 increase per FTE in instructional funding, results in a 1.142

unit increase in the 6-year graduation rate (%). The instructional expense coefficient of 1.036 still represents a positive and significant relationship with the criterion, however it appears (based on the weights) that spending on instruction has more of a positive impact on 6-year graduation rates than it does for the 4-year criterion.

Results for instructional expenses supported previous findings (Gansemer-Topf & Schuh, 2006; Pike & Robbins, 2020; Powell et al., 2012; Ryan, 2004; Scott et al., 2006; Webber & Ehrenberg, 2010) that greater monetary resources dedicated to instruction positively impacts retention and graduation rates. There are a number of reasons for why this finding might occur, one reason is that higher expenditures in this category tends to be related to employee compensation and benefits. Higher levels of compensation could certainly include higher salaries, but more likely that there are more faculty, or proportionally more full-time faculty at schools with higher instructional expenditures per FTE than part-time or adjunct faculty. This (full-time faculty) is often used as a measure of quality and intensity of faculty/student interaction, where higher proportions of full-time faculty indicate higher quality and greater academic integration, which supports overall persistence.

### ***Research Expenses***

Research expenses, operationalized as the average research expense per FTE (in thousands), did not have a statistically significant relationship in the 6-year model ( $b = -.403, p > .05$ ) or the 4-year model ( $b = -.156, p > .05$ ). This functional expense category includes expenses specifically related to producing research outcomes. As can be seen in the 6-and 4-year coefficients above there is negative, albeit insignificant relationship between spending on research and graduation rates. This result supported the hypothesis

that research expenses would not positively impact graduation rates, due to the fact that expenditures in this category are independent from the social or academic integration of students on campus. This result has been supported in the literature as well (Dahlvig et al., 2020; Kim et al., 2003; Titus, 2006).

### ***Public Service Expenses***

Public service expenses, operationalized as the average public service expense per FTE (in thousands), showed a statistically significant relationship in the 6-year model ( $b = -1.885$ ,  $p < .05$ ) as well as the 4-year model ( $b = -1.925$ ,  $p < .05$ ). This functional expense category consists of primarily non-instructional services that are beneficial to individuals and groups external to the institution (ex. community services, cooperative extension services, public broadcasting, conferences, institutes), and therefore results supported the hypothesis that expenses not directly related to the teaching and supporting of students would not positively impact graduation rates. As can be seen in the 6-year coefficient above, a \$1000 increase per FTE in public service funding, results in a 1.885 unit decrease in the 6-year graduation rate (%). The public service expense coefficient for the 4-year criterion of -1.925 represents a more negative relationship with the 4-year criterion than for the 6-year criterion (albeit a small difference), suggesting that spending associated with this functional expense more negatively impacts on-time graduation than 6-year.

Results for public service expenditures supported the hypothesis that expenses not directly related to the teaching and supporting of students would not positively impact graduation rates. As can be seen in the variable description, public service expenditures not only aren't directly related to the student, they actually specifically benefit those

external to the institution. If a school is dedicating money externally, that still likely means that faculty and/or staff within the institution are having to dedicate time and energy to these external happenings. Referring back to productivity in higher education, one possible output for universities (including regional publics) is to build external partnerships that help the community, which is certainly important. However, with results that suggest it can negatively impact student success, care needs to be taken to not drift too far away from the core mission of teaching and graduating students of the university.

### *Academic Support Expenses*

Academic support expenses, operationalized as the average academic support expense per FTE (in thousands), did not have a statistically significant relationship in the 6-year model ( $b = 1.049$ ,  $p > .05$ ) or the 4-year model ( $b = 1.242$ ,  $p > .05$ ). This functional expense category consists of activities and services that support the institutions primary missions of instruction, research, and public service, so it was expected to show a positive and significant relationship with each criterion (due to its instructional connection). As can be seen in the 6-and 4-year coefficients above there is a positive, yet insignificant relationship between spending on academic support and graduation rates. This result did not support the hypothesis that spending directly related to the mission of teaching would positively impact graduation rates, however it does align with some previous research (Chen, 2012; Webber & Ehrenberg, 2010) suggesting no significant relationship between academic support and graduation rates. However, it should be noted that most previous research on the impact of academic support expenses on graduation rates shows a significant and positive result (Dahlvig et al., 2020; Gansemer-Topf, 2004; Gansemer-Topf & Schuh, 2006; Marsh, 2014; Pike & Robbins, 2020; Ryan, 2004).

### *Student Services Expenses*

Equally surprising, student service expenses, operationalized as the average student service expense per FTE (in thousands), did not have a statistically significant relationship in the 6-year model ( $b = .454, p > .05$ ) or the 4-year model ( $b = .27, p > .05$ ). This functional expense category includes expenses that have a primary purpose of contributing to students emotional and physical wellbeing; and to their intellectual, cultural, and social development outside of the classroom, so it was expected to show a positive and significant relationship with each criterion. As can be seen in the 6-and 4-year coefficients above there is a positive, yet insignificant relationship between spending on student services and graduation rates. This result did not support the hypothesis that spending directly related to the mission of teaching and supporting the student would positively impact graduation rates, however it does align with some previous research (Marsh, 2014; Pike & Robbins, 2020; Ryan, 2004; Titus, 2006) suggesting no significant relationship between student services expenditures and graduation rates. Despite the insignificant finding, the regression coefficients suggest that spending on student services is more (positively) impactful for 6-year graduation rates than for 4-year graduation rates. One potential reason for this null finding is what potentially gets included under student services in IPEDS. In addition to supporting departments and activities that contribute to emotional and physical well-being, student services expenditures also include admissions and registrar activities, neither of which impact current student social or academic integration. Further, depending on the school and its operating structure, it may also include information technology related to student services as well as intercollegiate athletics and student health services. Once again, this is dependent on the operating



structure of the university, so some schools in the sample may include these hefty expenditures in student service, while others may have them separately reported as a self-supporting auxiliary enterprise.

### ***Institutional Support Expenses***

Institutional support expenses, operationalized as the average institutional support expense per FTE (in thousands), did not have a statistically significant relationship in the 6-year model ( $b = -.603, p > .05$ ) or the 4-year model ( $b = .708, p > .05$ ). This functional expense category includes expenses for the day-to-day operational support of the institution, such as administrative services, executive activities dealing with management and planning, legal and fiscal operations, space management, and public relations, so it was not expected to positively impact graduation rates. Results supported this hypothesis, and therefore added to the sparse and conflicting results for institutional support expenses impact graduation rates. Interestingly, although the results were not significant, institutional support spending had a negative relationship with 6-year graduation rates, but a positive relationship with 4-year graduation rates.

### **Implications**

As quoted earlier, approaching the problem of persistence from “an organizational perspective reminds us that colleges and universities are organizations and organizational behavior does affect students” (Berger & Milem, 2000, p. 273), for which the results of this study support. With that, there are actionable implications for leaders in higher education.

## **Institutional Leaders**

There are several takeaways from this study that can assist institutional leaders who are directly involved in macro-level budget development for the university. First, with a call for financial accountability and productivity (Heck et al., 2012), leaders at regional public universities are going to need to make difficult budgetary decisions and justify those decisions to their stakeholders. It would behoove them to make these decisions based upon their unique operating structure and constraints, but also with a data-informed perspective focused on graduation rates, as they are a prominent accountability indicator (Heck et al., 2012; Titus, 2009). Results of this study once again supported that increased spending on instruction is the most impactful budget allocation a university has on the graduation of its students. This result aligns with the previous research (Gansemer-Topf & Schuh, 2006; Pike & Robbins, 2020; Powell et al., 2016; Ryan, 2004; Scott et al., 2006; Webber & Ehrenberg, 2010), that has shown a significant and positive relationship between instructional expenditures and graduation rates. Further, it supports Tinto's (1975, 1993) position that higher levels of academic integration positively impacts persistence. Although student-level integration was not directly measured in this study, higher levels of instructional spending is associated with higher personnel costs. These costs typically result from higher numbers of full-time faculty, which helps promote integration and persistence. University leaders should consider this when budget planning as well as advocating for funding.

In the budget development process, there are obviously basic operating needs across every division of the university, and many of these needs support other outputs of the university. Leaders need to remember that one of the outputs that is universally

expected (once again, due to its prominence as an accountability measure as well as core function of the mission) is to graduate their students, and so there needs to be budgetary decisions that help support that output. In times where there may be influxes of financial support to the university, consideration should start in academic affairs due to their centrality to the mission, as well as their positive impact on graduation rates. With the largest line-item in a postsecondary budget being personnel, the recommendation would be to increase full-time teaching lines and/or provide more support to current faculty. In times of reduced support to the university, leaders must protect their strategic core of teaching and graduating students. That could come in the form of shielding instructional budgets from the pain-sharing that tends to happen when budget cuts occur, or in advocacy by university leaders to the state when there are budget-cut considerations. Importantly, university leaders need to be adaptive to the environment and be directive and clear about the priority of attainment, especially when there are other competing outputs with graduation. This ties back to the leadership perspective with Path-goal theory, where the goal (or productivity), is best achieved through clearly defining the goals (graduating students), clarifying the path (prioritizing high impact practices), removing obstacles, and providing support (financial support here) (Olowoselu et al., 2019).

Another implication for university leaders is to understand how cohort characteristics of the student-body potentially impacts the output of graduation rates. As mentioned before, this paper has no intent on suggesting universities change their demographics to improve their outputs; regional public universities are stewards of student access and success (AASCU Strategic Plan - Vision and Mission, n.d.), and they

should continue to fill that critical role. However, it is prudent that leaders of these institutions understand how these characteristics impact graduation rates (Berger & Milem, 2000; Tinto, 1993). Year to year fluctuations in the makeup of the student body can positively or negatively impact the graduation rate for a given year, so proper understanding and planning can help create a better environment for success of the students. Further, with competition for students increasing, universities may see their demographics shift over time. Once again, understanding how these shifts will impact outputs, will be critical for university leaders who need to plan and prepare for these changes.

### **State Leaders**

Leaders of higher education at the state level, whether that be the state higher education councils or the legislature, would also benefit from considering the results of this study. From a resource dependency perspective, these two bodies are major external levers that institutions are dependent on in terms of accountability and funding. State councils have the important job of mediation between the state and the university leadership teams (Thelin, 2017), with a focus on advocating for higher education within their state. A part of that advocacy includes addressing issues of affordability and accountability. Understanding the differential impact of expenditures on outputs would assist these councils in addressing these issues through strategic planning as well as policy recommendations to the legislature. This could come through recommendations for E & G appropriations, or recommendations for earmarking and protecting instructional funds at institutions. The legislature, who ultimately approve state budgets, should appreciate the impact that budgets and spending have for universities and

students, and use their status as an external dependency for institutions to guide their actions. Protecting and preserving funding that supports the graduation of students helps perpetuate an educated citizenry, which ultimately elevates incomes, incomes taxes, spending power, and the health of the state's population.

### **Higher Education Scholars**

This study added to the literature on university expenditure patterns and their impact on student success and made small gains toward creating consistency among the results. Further, it added to this research line by way of focusing on regional public universities, which has been generally lacking up to this point. Scholars, particularly those focused on regional publics, can use these results to help inform their perspective on the impact of university expenditures on graduation rates for this specific population. Further, they can use the results to compare how entry cohort characteristics differently impact graduation rates at regional public universities compared to other populations studied. This is particularly salient when considering the vast difference between the general populations served. Finally, replicating and expanding on studies like this will help tell the story of our incredibly productive, inclusive, undervalued, yet critically important part of the higher education sector, our regional public universities.

### **Limitations**

As with any study, there were limitations associated with this research project. First, although the narrow sample selection to only RPU's was considered a value add for this research, it is also a limitation in that results should not get generalized beyond that. With that, we would benefit from future research continuing the trend of narrow sample

selection. Replication on regional publics would obviously be helpful to help substantiate any claims made here; but also conducting this type of research for all different types of postsecondary institutions would help researchers and practitioners see the similarities and differences that may exist between the type of institution, expenditure patterns, and graduation rates.

Another limitation of this research includes variable selection. There are certainly other entry and environmental characteristics that could impact graduation rates but were not included in the model for reasons related to the sample and parsimony. For example, entry scores are a typically used variable in models like this (and were originally considered for the model), but it was expected and then realized through a preliminary screening, that many of the schools in the sample didn't require entry scores (SAT, ACT) from students. This makes sense when you refer back to the mission of the AASCU, which generally revolves around RPU's being institutions of access and opportunity. Further, all variables selected were selected due to their availability on IPEDS for the timeframe of this study. One notable limitation of the cohort data used during this timeframe, was that it was all based on full-time, first-time students. Once again, due to the nature of RPU's and their mission of access, there was likely a loss of important nuance of any/all of the students that might not fit the full-time, first-time criteria. Another limitation associated with the IPEDS variable selection has to do with the expenditures. There is a lot of latitude afforded to universities in reporting out on each of the functional categories (Pike & Robbins, 2020), and so it is difficult to truly provide value statements about the impact of each functional area on graduation rates. Beyond that, the expenditures were not adjusted for geographic and cost of living differences

between schools. That means comparisons were being made between schools who may be offering the same exact physical and personnel resources to the students but may have vastly different expenditures simply due to the location.

Additionally, this study is not meant to serve as a means to build the perfectly allocated budget, but more as a resource to show how schools can make central shifts that can improve graduation rates. Budgets are moral documents that show where priorities are within an organization, and so concentrating efforts and resources to areas that have an impact on graduation rates is the point; not simply reallocating funds but approaching the work the same way.

This study also is cross-sectional in nature, and therefore it will not capture change over time with changing resources, even with averaging the expenditures over the timeframe of interest in this study. Further, because of its correlational nature, no causal statements can be inferred from the results. Future research should certainly approach the question longitudinally.

### **Future Research**

In addition to replicating this study on different types of institutions and including other contributing variables to graduation rates, a future approach this question should address the problem from the macro organizational perspective as well as the individual level simultaneously. Collecting macro-level variables from federal level, through the state, and down through the university, capturing how strategic decisions are made between them, and then ultimately understanding how they impact students at the

university, would add a much deeper and more nuanced perspective that would help fill in some of the assumptions that are typically made in organizational research

### **Conclusion**

This study was conducted to examine the relationship between institutional expenditures/ resource allocation and graduation rates of students at regional public universities in the United States, while controlling for selectivity, gender, race/ethnicity, and socioeconomic status. Results suggested once again that entry characteristics matter when it comes to graduation rates at universities. Further, this study suggests that spending on instruction will positively impact graduation rates at universities, while spending on public service will negatively impact graduation rates. This supports Berger & Milem's (2000) assertion that universities exhibit patterns of behavior, that have differing effects on students. With that, institutional and state leaders of higher education would be wise to consider the implications and recommendations listed above, due to their ability to impact all the students under their purview. Further, in a time where higher education is facing concurrent calls for accountability and productivity, this study can help guide leadership teams to make cost-conscious decisions that promote arguably the most important output of a university, the graduation of its students.



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**Appendix A**

## Regional Public Universities

<u>Unit ID</u>	<u>Institution Name</u>
126182	Adams State University
100654	Alabama A & M University
100724	Alabama State University
138716	Albany State University
175342	Alcorn State University
222831	Angelo State University
197869	Appalachian State University
420574	Arizona State University-Polytechnic
407009	Arizona State University-West
106467	Arkansas Tech University
100812	Athens State University
100830	Auburn University at Montgomery
482149	Augusta University
219602	Austin Peay State University
173124	Bemidji State University
219046	Black Hills State University
211158	Bloomsburg University of Pennsylvania
237215	Bluefield State College
162007	Bowie State University
165024	Bridgewater State University

110422	California Polytechnic State University-San Luis Obispo
110529	California State Polytechnic University-Pomona
111188	California State University Maritime Academy
110486	California State University-Bakersfield
441937	California State University-Channel Islands
110538	California State University-Chico
110547	California State University-Dominguez Hills
110574	California State University-East Bay
110556	California State University-Fresno
110565	California State University-Fullerton
110583	California State University-Long Beach
110592	California State University-Los Angeles
409698	California State University-Monterey Bay
110608	California State University-Northridge
110617	California State University-Sacramento
110510	California State University-San Bernardino
366711	California State University-San Marcos
110495	California State University-Stanislaus
211361	California University of Pennsylvania
206914	Cameron University
230834	Castleton University
128771	Central Connecticut State University
201690	Central State University

234827	Central Washington University
180948	Chadron State College
128780	Charter Oak State College
211608	Cheyney University of Pennsylvania
144005	Chicago State University
231712	Christopher Newport University
217864	Citadel Military College of South Carolina
211644	Clarion University of Pennsylvania
139311	Clayton State University
218724	Coastal Carolina University
241720	Colegio Universitario de San Juan
217819	College of Charleston
190558	College of Staten Island CUNY
127556	Colorado Mesa University
128106	Colorado State University Pueblo
476975	Colorado State University-Global Campus
139366	Columbus State University
237330	Concord University
162283	Coppin State University
190512	CUNY Bernard M Baruch College
190549	CUNY Brooklyn College
190594	CUNY Hunter College
190600	CUNY John Jay College of Criminal Justice

190637	CUNY Lehman College
190664	CUNY Queens College
190691	CUNY York College
219082	Dakota State University
139463	Dalton State College
175616	Delta State University
200059	Dickinson State University
207041	East Central University
212115	East Stroudsburg University of Pennsylvania
129215	Eastern Connecticut State University
144892	Eastern Illinois University
156620	Eastern Kentucky University
187648	Eastern New Mexico University-Main Campus
208646	Eastern Oregon University
235097	Eastern Washington University
212160	Edinboro University of Pennsylvania
198507	Elizabeth City State University
155025	Emporia State University
237367	Fairmont State University
196042	Farmingdale State College
191126	Fashion Institute of Technology
198543	Fayetteville State University
169910	Ferris State University

165820	Fitchburg State University
433660	Florida Gulf Coast University
482936	Florida Polytechnic University
155061	Fort Hays State University
127185	Fort Lewis College
139719	Fort Valley State University
165866	Framingham State University
218061	Francis Marion University
162584	Frostburg State University
139861	Georgia College & State University
447689	Georgia Gwinnett College
139764	Georgia Southwestern State University
237385	Glenville State College
145336	Governors State University
159009	Grambling State University
170082	Grand Valley State University
183257	Granite State College
177551	Harris-Stowe State University
107071	Henderson State University
115755	Humboldt State University
151324	Indiana State University
213020	Indiana University of Pennsylvania-Main Campus
151388	Indiana University-East

151333	Indiana University-Kokomo
151360	Indiana University-Northwest
151342	Indiana University-South Bend
151379	Indiana University-Southeast
101480	Jacksonville State University
232423	James Madison University
185262	Kean University
183062	Keene State College
157058	Kentucky State University
213349	Kutztown University of Pennsylvania
170639	Lake Superior State University
226091	Lamar University
218229	Lander University
207209	Langston University
142328	Lewis-Clark State College
177940	Lincoln University
213598	Lincoln University
213613	Lock Haven University
232566	Longwood University
159382	Louisiana State University-Alexandria
159416	Louisiana State University-Shreveport
161299	Maine Maritime Academy
213783	Mansfield University of Pennsylvania



167288	Massachusetts College of Liberal Arts
166692	Massachusetts Maritime Academy
200226	Mayville State University
159717	McNeese State University
174020	Metropolitan State University
127565	Metropolitan State University of Denver
204006	Miami University-Hamilton
204015	Miami University-Middletown
482158	Middle Georgia State University
220978	Middle Tennessee State University
226833	Midwestern State University
214041	Millersville University of Pennsylvania
174358	Minnesota State University Moorhead
173920	Minnesota State University-Mankato
200253	Minot State University
176035	Mississippi University for Women
176044	Mississippi Valley State University
178341	Missouri Southern State University
179566	Missouri State University-Springfield
178387	Missouri Western State University
180179	Montana State University Billings
180522	Montana State University-Northern
180416	Montana Technological University

157386	Morehead State University
157401	Murray State University
441900	Nevada State College
262129	New College of Florida
185129	New Jersey City University
187897	New Mexico Highlands University
187967	New Mexico Institute of Mining and Technology
159966	Nicholls State University
232937	Norfolk State University
199157	North Carolina Central University
147776	Northeastern Illinois University
207263	Northeastern State University
157447	Northern Kentucky University
171456	Northern Michigan University
219259	Northern State University
230913	Northern Vermont University
178624	Northwest Missouri State University
207306	Northwestern Oklahoma State University
160038	Northwestern State University of Louisiana
207351	Oklahoma Panhandle State University
209506	Oregon Institute of Technology
214801	Pennsylvania State University-Penn State Abington
214689	Pennsylvania State University-Penn State Altoona

214698 Pennsylvania State University-Penn State Beaver  
214704 Pennsylvania State University-Penn State Berks  
214731 Pennsylvania State University-Penn State Brandywine  
214591 Pennsylvania State University-Penn State Erie-Behrend College  
214759 Pennsylvania State University-Penn State Fayette- Eberly  
214607 Pennsylvania State University-Penn State Great Valley  
214786 Pennsylvania State University-Penn State Greater Allegheny  
214713 Pennsylvania State University-Penn State Harrisburg  
214768 Pennsylvania State University-Penn State Hazleton  
214670 Pennsylvania State University-Penn State Lehigh Valley  
214625 Pennsylvania State University-Penn State New Kensington  
214810 Pennsylvania State University-Penn State Schuylkill  
214652 Pennsylvania State University-Penn State Scranton  
214634 Pennsylvania State University-Penn State Shenango  
214643 Pennsylvania State University-Penn State Wilkes-Barre  
214829 Pennsylvania State University-Penn State York  
181534 Peru State College  
155681 Pittsburg State University  
183080 Plymouth State University  
227526 Prairie View A & M University  
151102 Purdue University Fort Wayne  
490805 Purdue University Northwest  
233277 Radford University

186201	Ramapo College of New Jersey
217420	Rhode Island College
207661	Rogers State University
172051	Saginaw Valley State University
174783	Saint Cloud State University
167729	Salem State University
163851	Salisbury University
227881	Sam Houston State University
122597	San Francisco State University
122755	San Jose State University
140960	Savannah State University
205443	Shawnee State University
237792	Shepherd University
216010	Shippensburg University of Pennsylvania
216038	Slippery Rock University of Pennsylvania
123572	Sonoma State University
218733	South Carolina State University
179557	Southeast Missouri State University
160612	Southeastern Louisiana University
207847	Southeastern Oklahoma State University
107983	Southern Arkansas University Main Campus
130493	Southern Connecticut State University
149231	Southern Illinois University-Edwardsville

210146	Southern Oregon University
160621	Southern University and A & M College
160630	Southern University at New Orleans
230603	Southern Utah University
175078	Southwest Minnesota State University
207865	Southwestern Oklahoma State University
163912	St. Mary's College of Maryland
196176	State University of New York at New Paltz
228431	Stephen F Austin State University
186876	Stockton University
228501	Sul Ross State University
196158	SUNY at Fredonia
196219	SUNY at Purchase College
196121	SUNY Brockport
196130	SUNY Buffalo State
196167	SUNY College at Geneseo
196237	SUNY College at Old Westbury
196194	SUNY College at Oswego
196246	SUNY College at Plattsburgh
196200	SUNY College at Potsdam
196033	SUNY College of Agriculture and Technology at Cobleskill
196015	SUNY College of Technology at Canton
196149	SUNY Cortland

196264	SUNY Empire State College
196291	SUNY Maritime College
196185	SUNY Oneonta
196112	SUNY Polytechnic Institute
228529	Tarleton State University
226152	Texas A & M International University
224554	Texas A & M University-Commerce
483036	Texas A&M University-Central Texas
459949	Texas A&M University-San Antonio
224545	Texas A&M University-Texarkana
229179	Texas Woman's University
187134	The College of New Jersey
235167	The Evergreen State College
180692	The University of Montana-Western
221740	The University of Tennessee-Chattanooga
221768	The University of Tennessee-Martin
228802	The University of Texas at Tyler
229018	The University of Texas Permian Basin
233897	The University of Virginia's College at Wise
138354	The University of West Florida
187046	Thomas Edison State University
164076	Towson University
102368	Troy University

178615	Truman State University
102553	University of Alaska Anchorage
102632	University of Alaska Southeast
487296	University of Arizona-Sierra Vista
106485	University of Arkansas at Monticello
106412	University of Arkansas at Pine Bluff
108092	University of Arkansas-Fort Smith
161873	University of Baltimore
106704	University of Central Arkansas
176965	University of Central Missouri
206941	University of Central Oklahoma
484473	University of Florida-Online
240754	University of Guam
141565	University of Hawaii at Hilo
141981	University of Hawaii-West Oahu
225414	University of Houston-Clear Lake
225432	University of Houston-Downtown
225502	University of Houston-Victoria
148654	University of Illinois Springfield
159993	University of Louisiana at Monroe
161217	University of Maine at Augusta
161226	University of Maine at Farmington
161235	University of Maine at Fort Kent

161244	University of Maine at Machias
161341	University of Maine at Presque Isle
232681	University of Mary Washington
163204	University of Maryland Global Campus
171137	University of Michigan-Dearborn
171146	University of Michigan-Flint
174075	University of Minnesota-Crookston
174233	University of Minnesota-Duluth
174251	University of Minnesota-Morris
101709	University of Montevallo
181215	University of Nebraska at Kearney
183071	University of New Hampshire at Manchester
101879	University of North Alabama
199111	University of North Carolina at Asheville
199281	University of North Carolina at Pembroke
136172	University of North Florida
482680	University of North Georgia
484905	University of North Texas at Dallas
127741	University of Northern Colorado
154095	University of Northern Iowa
215266	University of Pittsburgh-Bradford
215275	University of Pittsburgh-Greensburg
215284	University of Pittsburgh-Johnstown



243106	University of Puerto Rico-Aguadilla
243115	University of Puerto Rico-Arecibo
243133	University of Puerto Rico-Bayamon
243142	University of Puerto Rico-Carolina
243151	University of Puerto Rico-Cayey
243179	University of Puerto Rico-Humacao
243197	University of Puerto Rico-Mayaguez
243212	University of Puerto Rico-Ponce
207722	University of Science and Arts of Oklahoma
218645	University of South Carolina Aiken
218654	University of South Carolina Beaufort
218742	University of South Carolina-Upstate
451671	University of South Florida-Sarasota-Manatee
448840	University of South Florida-St Petersburg
151306	University of Southern Indiana
161554	University of Southern Maine
131399	University of the District of Columbia
243665	University of the Virgin Islands
377555	University of Washington-Bothell Campus
377564	University of Washington-Tacoma Campus
101587	University of West Alabama
141334	University of West Georgia
240268	University of Wisconsin-Eau Claire

240277	University of Wisconsin-Green Bay
240329	University of Wisconsin-La Crosse
491288	University of Wisconsin-Milwaukee Flex
240365	University of Wisconsin-Oshkosh
240374	University of Wisconsin-Parkside
240462	University of Wisconsin-Platteville
240471	University of Wisconsin-River Falls
240480	University of Wisconsin-Stevens Point
240417	University of Wisconsin-Stout
240426	University of Wisconsin-Superior
240189	University of Wisconsin-Whitewater
230737	Utah Valley University
141264	Valdosta State University
200572	Valley City State University
234085	Virginia Military Institute
234155	Virginia State University
156082	Washburn University
181783	Wayne State College
230782	Weber State University
216764	West Chester University of Pennsylvania
237932	West Liberty University
229814	West Texas A & M University
237899	West Virginia State University

237950	West Virginia University Institute of Technology
200004	Western Carolina University
128391	Western Colorado University
130776	Western Connecticut State University
149772	Western Illinois University
157951	Western Kentucky University
188304	Western New Mexico University
210429	Western Oregon University
237011	Western Washington University
168263	Westfield State University
187444	William Paterson University of New Jersey
175272	Winona State University
199999	Winston-Salem State University
218964	Winthrop University
168430	Worcester State University
206613	Wright State University-Lake Campus
206695	Youngstown State University