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Examining Multiple Methods Of Analysis To Guide The Development Of A Postsecondary Institution Rating System

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EXAMINING MULTIPLE METHODS OF ANALYSIS TO GUIDE THE DEVELOPMENT OF A POSTSECONDARY INSTITUTION RATING SYSTEM

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This dissertation, submitted by Eddie G. Walker II in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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Eddie G. Walker II
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ABSTRACT

Rankings of higher education institutions have been developed as a method for evaluating universities and colleges as the competition for students, faculty, and financial support grew stronger (Shin & Toutkoushian, 2011). Historically these rankings relied mostly upon institutional reputation, but recently there has been a call for quantifiable data. US President Obama (2013) discussed the need for a postsecondary institution ratings system that holds universities accountable to provide accurate information related to accessibility, affordability, and educational outcomes. Once a method of rating institutions is developed, the ratings can be utilized to rank similar institutions, which results in a ranking system providing a rubric for comparison. Also, many policymakers within (i.e., administrators) and outside (i.e., legislators who control local, federal, and state budgets) higher education institutions use information provided in rankings to develop policies, thus it is essential that any postsecondary institution ratings system be developed using relevant and reliable data. Furthermore, appropriate statistical procedures must be used as well, to reduce the possibility of policymaker bias playing a role in how data is utilized in a ratings system.

The purpose of this proposed dissertation is to utilize publicly available data provided by the U.S. Department of Education to test competing models of rankings and comparing them to a current popular higher education ranking system: *U.S. News and World Report*. This comparison will seek to address two research questions: 1) What

institutional characteristics are associated with positive higher education outcomes (i.e., graduation rate and retention rate)? and 2) How does a ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

CHAPTER I

INTRODUCTION

There exists a plethora of information available for prospective students and their parents when making decisions but often an essential piece of information used is the *U.S. News and World Report's America's Best Colleges* issue published every year. Gnolek, Falciano, and Kunel (2014), stated that nearly one-quarter of first-time, full-time freshman identified "rankings in national magazines" as "very important" in deciding which college to attend. In addition, Bowman and Bastedo stated that with the increasing importance being placed on rankings, they can shape the students' views on institution quality and what is "better," thus affecting their perception of the possibility of acceptance to an institution. Griffith and Rask (2007) found that the admissions officers they interviewed stressed the importance of these rankings by revealing that many prospective students bring this issue along with them on visits. With that said, it appears prospective students and their parents are trusting that this ranking is summarizing all of the information they need when evaluating the best college to attend.

Since 2014, the U.S. Department of Education has been gathering information relating to a future college ratings system providing benchmarks for evaluating the performance of colleges and universities across the country. This Postsecondary Institutions Rating System (PIRS) was intended to rate institutions on three factors: access, affordability, and educational outcomes (Kelchen, 2014). Access refers to the

ability of people from varied socioeconomic status to gain admission to higher education institutions. According to Kelchin (2014), access is primarily identified through percentage of students receiving Pell grants, a federally funding needs-based grant program. Affordability refers to the ability of a student to afford attending a higher education institution. Affordability is primarily identified by net price, the total cost of attendance minus all need-based and merit-based grant aid (Kelchen, 2014). Graduation rate is the ultimate outcome measure in higher education and many policies are in place to improve this outcome, especially as it relates to financial aid (Kelly & Schneider, 2012). All of these factors, as well as many others, are publicly available through the Integrated Postsecondary Education Data System (IPEDS) on the National Center for Education Statistics website.

There are also different ways to interpret educational outcomes from a student progress standpoint. For example, junior colleges have argued holding their institutions accountable for decisions to transfer made by some students is unfair because said decisions are outside of the institutions' control (Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006). In other words, if the goal of a student is a four-year degree, then junior colleges will inevitably have that group of students leave to accomplish that goal. They offer multiple reasons for why using graduation rate as a positive outcome is unfair, but the one of interest in their study is the argument that many students attain degrees from institutions different from the one where the students initially enrolled. Bailey et al. point out that students leaving an institution such as a junior college who go on to get a degree from another institution would still show up as a student who dropped out and as such would be counted as an "institutional failure" of the junior college. Even with this recent

evidence, it became obvious in the early 1970s that institutions need to be categorized for comparison. Thus, this proposed study aims to investigate the validity of different rankings of higher education institutions.

Difference between Ratings and Rankings

A clear distinction must be drawn between a "rating" system and a "ranking" system. Usually ratings differ from rankings because there exists the possibility that once a metric is established for rating institutions all institutions could achieve the same rating. Conversely, rankings identify a hierarchy where there is a clear leader among institutions. Even though this difference between ratings and rankings exists, many use the terms interchangeably considering institutions must be rated before they can be ranked. Therefore, it is likely institutions will see them as one in the same as administrators find ways to improve their rating and move up a rankings list when compared to others. As a result, this study will use ratings and rankings interchangeably as appropriate.

Hazelkorn (2009) identifies this as a potential problem from a policy standpoint. She discusses how administrators might not explicitly state they make decisions because of their standing in the rankings, but the fact still remains that rankings are visible measures, and stakeholders (i.e., legislators and board members) would undoubtedly want to know how the institutions might improve their respective standing. She also concludes by saying that many decisions made in higher education institutions in Japan, Germany, and Australia (among others) are made with these rankings in mind.

Rankings and rating systems for institutions across the United States are readily available for prospective students and their parents to use in deciding where to continue their education. Janienne Studley, Deputy Undersecretary of Education, stated in a recent

Advisory Committee on Student Financial Assistance hearing that "colleges and universities are rated all of the time" (Assistance, S.F., 2014). Within these ratings, colleges and universities are identified in how they relate to one another in certain categories. For example, *USNWR* will provide a national ranking of the top 200+ universities as well as rankings for National Liberal Arts Colleges, Regional University Rankings, Regional College Rankings, as well as by program (i.e. Best Undergraduate Business Programs).

Statement of the Problem

According to Hazelkorn (2015), the groups interested in the rankings of higher education institutions has grown. What was once a small-scale endeavour utilized primarily by students and parents has become a tool for other groups, not the least of which are policymakers, employers, foundations, alumni, partners, and many other stakeholders (Hazelkorn, 2015). She even identifies organizations and consultant groups who provide new products and services designed to help institutions improve their rankings (e.g., World 100 Reputation Network and iPhone applications). The key element of the aforementioned products and services is to enhance the reputation of the institution, not the actual quality (which should be a goal of higher education institutional improvements). This leads into some of the issues with ratings or ranking systems.

Rating and ranking systems have some inherent problems. Most problems are associated with the information used to develop these rankings. While the *USNWR* rankings does a decent job of including as many inputs and outputs when ranking universities, it still uses a measure of reputation as a large component of its rankings (Shin & Toutkoushian, 2011). This is problematic for two reasons. First, some rankings

already have a perception of being a popularity contest so continuing to use reputation as an input for ranking an institution reinforces this perception. Second, reputation results from the performance (i.e., outcomes) of the institution. Using a logic model approach to program evaluation, outcomes are used as a method of altering future inputs (i.e., a formative assessment) intended to improve future outcomes. Therefore, reputation would be more appropriately discussed as a long-term outcome as opposed to an input.

The federal government is also examining the benefit of a ratings system by focusing on how institutions compare on three factors: access, affordability, and student outcomes. This rating system is incomplete because there is more information related to institutions available to consumers outside of the three factors the federal government is proposing. This section will focus on the methodological issues related to both of these models, the implications of the federal government's proposed model of ratings, and makes the distinction between a rating system and a ranking system.

USNWR Methodological Issues

Altbach's (2015) argues the biggest issue with any higher education ratings or rankings system is the perception that the rankings are simply a popularity contest:

> The problem with ranking concerns the practice, not the principle. How is it possible to accurately measure a nation's academic system, or for that matter the quality of a single institution? Or of academic institutions worldwide? Many rankings resemble "popularity contests"—asking groups in the academic community, especially administrators, their opinions about peer institutions (Altbach, 2015, p. 2).

The *U.S. News and World Report* (*USNWR*) does nothing to dispel this perception when it uses reputation as an element of the ranking and assigns reputation such a large weight (22.5%). *USNWR* assesses reputation using two surveys. The first is an academic peer assessment where top academic officials (i.e., presidents, provosts, and deans of admissions) will assess institutions on the factors that cannot be quantitatively measured (such as dedication to teaching). This assessment is assigned a weight of 15 percent. The second assessment comes from 2,200 high school guidance counselors who are employed at public high schools receiving a gold, silver, or bronze designation in a recent edition of the U.S. News best high school rankings. There are also responses from 400 counselors at the largest independent schools across the country.

Peer assessment is a problem because college administrators are rating competing institutions. For this reason, peer assessment can be used by some administrators unethically making this method of evaluation imprecise. One of the most egregious examples occurred when Clemson University's president ranked most other schools as below average (Watt 2009; Kelchen & Harris, 2013). In addition, Clemson and other institutions engaged in other questionable practices, such as directing potential students who were in the bottom of their graduating classes to technical or junior colleges for a year, lowered class sizes in courses that counted towards the rankings while at the same time raising class sizes in courses that did not count towards the rankings. This demonstrates the reason why great care should be taken if any rating or ranking system is to include peer assessment.

PIRS Methodological Issues

President Obama (2013) stated that his goal was to rate institutions on "who's offering the best value" as opposed to who has the nicest facilities or a better reputation. As a result, the U.S. Department of Education is proposing a variety of methods assessing access, affordability, and educational outcomes (PIRS). The President's proposal includes the following measures of access (percent of the students receiving Pell Grants, expected family contribution gap, family income quintiles, first generation student status), affordability (average net price, net price by quintile), and outcomes (graduation rates) (Klein, 2015). These categories are discussed in more detail in the definitions section.

A problem with this proposed Postsecondary Institution Rating System (PIRS) is that the information used in the ratings is not inclusive of all data available to prospective students and their parents. It is important to consider that the information utilized in any ratings system will affect where institutions fall on the list. Limiting the information utilized in a ratings system could negatively impact some institutions while inflating others. If a PIRS is going to influence possible federal funding resulting from institutional performance, then the data being utilized needs to be scrutinized.

Using publicly available information from the U.S. Department of Education (IPEDS), parents can get data related to all manner of institutional characteristics, such as admissions and test scores, student charges, student financial aid, net price, enrollment, completions, human resources, and institutional finances. This will provide them with much more beneficial information to use for making decisions in addition to the previously mentioned data on access, affordability, and outcomes.

Addressing Methodological Issues

Not everyone sees the immediate benefits of a federally approved rating of colleges and universities. Lewontin (2014) asked four questions he believes many people want to know as a federal ratings system is considered:

(1) Will these ratings turn into rankings?

(2) How will failing colleges be dealt with?

(3) Are the data flawed?

(4) Why the rush to develop such a rating system?

Answering all of these questions will be important as the discussion of developing a federal ratings system moves forward. This study focused on the question relating to data and addressing the methodological issues present in the two systems of rankings previously discussed. Specifically, how does the data used in the *USNWR* ranking, the proposed PIRS, and the publicly available data from IPEDS compare to one another? By seeing how the data within each model compares to one another, a statistically determined set of variables can make up a revised ranking system.

Implications of Proposed PIRS

One aspect of the PIRS that has been discussed is potentially linking federal financial aid with this rating system. A telling comment in President Obama's (2013) address at SUNY Buffalo was when he mentioned how over the next few years "we're going to work with Congress to use those ratings to change how we allocate federal aid for colleges". This can have profound consequences when evaluating institutions in this fashion. Federal Title IV funding has reached over $189 billion dollars with $113 of that aid considered "nonloan aid" (Dynarski & Scott-Clayton, 2013).

The first step in implementing the proposed PIRS is the development of the College Scorecard, which began this past academic year. The College Scorecard contains some of the metrics to be included in the PIRS: average annual cost, graduation rate, retention rate, salary after attendance, and students paying down their debt. As Roska (2015) mentioned, these characteristics are beneficial when examining how individual institutions compare to an average but may not be helpful when comparing institutions with one another. "A more complex approach would be to develop a weighting scheme that allowed some outcomes to contribute more than others to the overall rating" (Roska, 2015, p. 63).

Theoretical Framework

Students (and their parents) as consumers want to be sure they are investing in a quality institution when determining what institution to attend (Shin & Toutkoushian, 2011). At the same time, funding agencies want to be sure that the institutions receiving money are meeting certain objectives. As Table 1 demonstrates, depending upon the control of the institution (i.e., public, private-non-profit, and private-for-profit), different sources of funding exist. This table demonstrates the difference in types of funding with public institutions receiving more funding from government grants/contracts and state appropriations, as opposed to tuition and fees. Private institutions receive a majority of their funding from tuition and fees with for-profit institutions receiving more (81%) than private, non-profit institutions (63%).

Table 1. Average Percent of Revenues by Funding Source Reported by Institutions to U.S. Department of Education in 2013 by Public (N=2,036), Private Non-profit (N=1,933), and Private For-profit (N=3,519) Control.

Funding Source	Public	Private (NP)	Private (Profit)
Government grants and contracts	29.6	6.7	9.7
State appropriations	25.9	0.0	0.0
Tuition and fees	23.5	61.6	81.3
Other revenues	9.8	5.8	3.0
Local appropriations	8.5	0.0	0.0
Private gifts, grants, and contracts	1.9	15.2	0.0
Investment return	0.7	10.6	0.0
Sales and services of ed. services	0.0	0.0	6.1

Note. Data comes from the National Center for Education Statistics, Integrated Postsecondary Education Data System. Percentages may not add up to 100% due to rounding.

Funding from said agencies is also contingent upon available funds budgeted each year, so institutions are in essence competing for funds. In order to make this evaluation, funding agencies set benchmarks that play a role in determining the level of funding. For example, if universities have loan default rates that are deemed too high the federal government can withhold Title IV funding (i.e., Pell Grants and federal student loans) until the default rate of the universities' students come down to an acceptable level. A rating or ranking system provides an evaluation of institutions, compares them with one another, and determines how well they meet established objectives.

The difficulty in developing a rating or ranking system is to determine what information should be used when evaluating higher education institutions. Shin and Toutkoushian (2011) suggest a logic model approach to ranking institutions, which assesses institution effectiveness by measuring a combination of inputs, throughputs, and/or outputs. Logic models are frequently used in program evaluation to go beyond determining if a program or institution is meeting predetermined objectives, but to also consider how they go about meeting the objectives (Fitzpatrick, Sanders, & Worthen,

2011). The benefit of using this approach is it provides context when determining if an organization or institution is meeting objectives by examining how the organization or institution go about meeting those objectives. Figure 1 displays a simplified logic model appropriate for higher education settings with some examples of items within each category in the logic model.

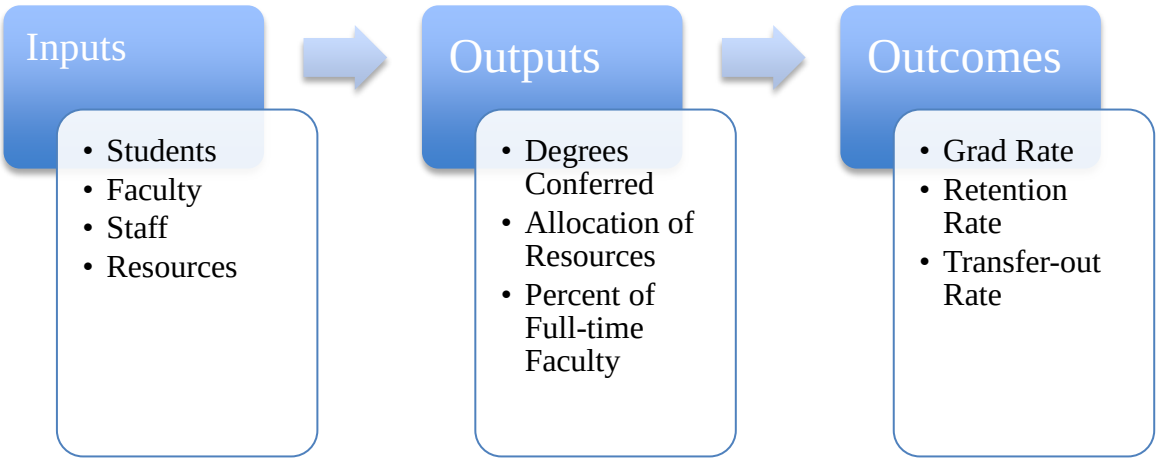


Figure 1. Simplified Logic Model.

A logic model approach to program evaluation not only determines if institutions are meeting objectives, but also helps to shape the future of the program. According to Fitzpatrick, et al. (2011), "logic models are often used by program managers and evaluators today to link program inputs, processes, outputs, and outcomes and can serve as the foundation for making decisions about program or evaluation activities" (p. 169). There are two primary categories of program evaluations: formative and summative. According to Fitzpatrick et al. (2011), formative evaluations are those that serve the primary purpose of providing information for program improvement while summative evaluations serve the primary purpose of providing information intended to aid in making

decisions related to program adoption, continuation, or expansion. In many cases, evaluations can be both formative and summative. Once policymakers are presented with information from a program evaluation, they then assess where to go from there. This results in possible changes to the program where activities and inputs are added or taken away, with the intent of improving the program.

Taking a logic model approach to evaluating higher education institutions is appropriate because there exists a variety of inputs/activities undertaken by these institutions. As mentioned earlier in this chapter, institutions are using information from rankings to determine if they have met their goals (such as making the top 25 of a list or graduation rate), but also how they measure up to similar institutions (i.e., comparing themselves to other institutions). When institutions are rated or ranked, changes will inevitably result, but are they in response to how the institutions are meeting their respective goals or where they fall in a ranking scheme?

One possibility of a rating or ranking system that could outline a standard goal toward which institutions may strive is the proposed PIRS system. The proposed PIRS system could possibly reward institutions who perform high on the metric (or punish those performing poorly) with the supplementation (or removal) of financial support from the federal government. As will be discussed later in this chapter as well in chapter two, the *USNWR* rankings have also played a role in the decision-making process of administrators as a means of moving up in the rankings.

Factors Influencing Higher Education Ranking

Meredith (2004) states colleges and universities are always waiting for the new *USNWR* rankings to come out to see how they stack up to others which are then used by

many parents and potential students to aid in making decisions on which college to attend. This leads to the use of questionable practices as "marketing strategies" (Stecklow, 1995). In one instance, Stecklow found that New College of the University of South Florida attained a number one ranking in Money magazine's version of a college rankings by using one of these "marketing strategies": dropping the bottom 6 percent of their students' SAT scores when reporting the student body average. This led to an inflation of the average SAT score by 40 points. Meredith (2004) found that admissions outcomes are impacted by *USNWR* ranking. Specifically, highly ranked private institutions may adjust net tuition to adjust for changes in *USNWR* ranking. The *USNWR* is one of many college ranking systems available for use by parents and students. This consumer-driven approach to education is a primary reason a federal college ratings system is under consideration.

A growing trend in the job market is the increase in positions requiring a bachelor's degree (at a minimum): "The bachelor's degree, the symbol of success and the ticket to the middle class for the post-World War II generations, has slowly become the new high school diploma" (Selingo, 2013, p. 7). This refers to this race for more and more credentials as a means of separating oneself from others in the job market. Selingo (2013) goes further to say that institutions of higher education saw the credential race as a way to benefit by creating new majors and trying to attract students.

For-profit institutions also saw this as a financial windfall, which resulted in more and more for-profit institutions were created. This resulted in for-profit institutions gaining larger numbers of students: approximately 7 percent of students enrolled in degree-granting institutions (Wilson, 2010). With for-profit institutions exhibiting higher

loan default rates, lower completion rates, and lower labor market outcomes than comparable not-for-profit and private institutions, there is an obvious need for policies to be implemented that provide information about the "worth" of a particular degree (Deming, Goldin, & Katz, 2013). There are those out there who believe some kind of rating system is one such policy that should be implemented (see President Obama's 2013 SUNY Buffalo address).

In public policy, certain courses of action are implemented with the intent of bring about change. However, some of these purposive forms of social action may bring about both intended and unintended consequences (Merton, 1936). As it relates to this study, a ratings system in higher education is a course of action intended to provide for accountability. However, the policies implemented can result in some unintended consequences. Hillman (2014) points out how other service sectors with quality information systems can have dire consequences. For example, he identified studies where cardiac surgeons turned away the sickest and most severely ill patients after adopting performance-based health report cards. The implication here is that if the surgeon's rating is based upon success rate and recovery of patients, then by refusing service to those they may not be able to help they can keep a favourable rating. This translates to providing educational access to marginal students in the hopes of keeping a high measure of outcomes, like retention and graduation rates.

Another consequence of using performance-based rating systems in the health sector is it can increase the health differential among Caucasian, African-American, and Hispanic patients. This same thing can be said for educational attainment differential among the different races and ethnicities. If minorities are already at a disadvantage when

it comes to attaining higher levels of education, then there exists the possibility that a performance based ratings system could further increase the disparity of educational outcomes among the different races. For example, *USNWR* uses SAT scores, acceptance rate, and percent of freshmen in the top 10 percent of their high school graduating class as a basis of selectivity when ranking institutions. Institutions could inadvertently (or intentionally) accept fewer minority applicants as a method to seem more selective and move up in the rankings as minority applicants are more at risk for poor academic achievement outcomes. Specifically, one study identifies factors responsible for making minority applicants more at risk for low academic achievement as identified by Ward (2006). These factors include: racial bias, peer group influence, parenting practices/involvement, inexperienced/unqualified teachers, limited school resources, less rigorous academic coursework, and lower teacher expectations of minority students.

Data for Use in Evaluating Higher Education Institutions

There are many sources of data available to assess how institutions are doing related to certain outcomes. As it relates to rankings, it is important to consider what information is relevant. Webber (2011) discusses the need for considering faculty productivity when evaluating different institutions. She recognizes the inherent problem in measuring faculty productivity as it lends itself to being analyzed more effectively in a qualitative way (i.e., it is hard to put a number on the effort faculty put into a class). With that said, she does provide ways that faculty productivity can be assessed quantitatively. Some of the variables she identifies included research grant funding, and mentoring of masters and doctoral students. Other variables relate to the number of publications and other services some faculty are expected to provide, such as reviewing journal articles.

While these variables are hard to measure (and are not valid as a tool of comparison across disciplines and institutions) without surveying every faculty member, these are the types of activities expected of tenured and tenure-track faculty members. As such, one way to compare institutions on these types of activities is to examine the percent of faculty who are tenured or tenure-track, which is reported by each institution to the U.S. Department of Education.

Longden (2011) summarized the relationship between the student and the university as it relates to evaluate and ranking institutions: good student + good faculty = good university (p. 81). If a highly desired outcome is graduation of the students, then what factors determine if a student is good or not? The primary indicator of good students (at least as they begin their college career) is ACT and SAT scores. While this is an indicator of performance prior to admission, what factors will help students succeed once they arrive on campus?

While good teaching will help students succeed, there are academic development programs made available to students that assist in helping them succeed. In 2004, Prebble and colleagues examined the effects of teacher training and student support on student success. What they found is that programs designed to help improve their teaching was influential in student success. They also found that student support services that help them adjust to college life, such as providing tutoring services, assist in establishing social networks, academic counseling, and a wide variety of institutional services and facilities contribute to student success. The U.S. Department of Education collects data from institutions related to the percent of expenses comprising some of these networks, such as expenses related to academic support, instruction, institutional support, and

student services. Other variables they identified as beneficial to student success is the approachability and availability of instructors to engage in academic discussions. This variable can be assessed by student-faculty ratio (i.e., if instructors have fewer students to interact with, they are more likely to be available for assistance when needed).

Purpose and Need for Study

The purpose of this study was to utilize publicly available higher education data provided by the U.S. Department of Education to test competing models of ratings and comparing them to a current popular higher education ranking system: *U.S. News and World Report*. Specifically, this study will take institutional characteristics related to admissions, financial aid, sources of revenues, expenses, degrees conferred, completions, and retention rate to determine which ones are associated with a new higher education outcome variable. Since this study focused on competing models with one current ranking system, the institutions included in this analysis will only be the institutions on the *USNWR* Best National Universities List. While accessibility and affordability are two factors the federally proposed PIRS is based on, the analysis within this study included other institutional characteristics such as resources, student-to-faculty ratio, revenues, and expenses. This purpose is important as it has implications for higher education policies developed resulting from the use of such a rating or ranking system. Some examples of policy that could be impacted by a federal PIRS are: recruitment of Pell eligible students to improve the "access" component of the ratings system or being more selective in admitting students if it is demonstrated that higher achieving students persist and are more likely to graduate.

Research Questions

Question 1: What institutional characteristics are associated with positive higher education outcomes? Specifically, what model would explain the most variance when using factors present in the *USNWR* ranking, the proposed PIRS, and the factors publicly available on the IPEDS website?

Question 2: How does a new ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

Hypotheses

Question 1: It is hypothesized that the factors available on the IPEDS website will fit the data the best (since it should explain more of the variance), with the *USNWR* rankings fitting the next best, and the factors proposed for the PIRS will fit the data the worst of the three models.

Question 2: Once the models for the proposed PIRS and IPEDS data are obtained, they will be used to rank each institution on the list. The rankings for each of the three models will be compared to the *USNWR* rankings. Due to using different factors to rank the institutions, it is hypothesized that all three rankings will be different from the current *USNWR* rankings.

Limitations

A major limitation of this study is relying on the accuracy of institutions self-reporting information to the U.S. Department of Education. As will be demonstrated in the literature review, some institutions will either not do an adequate job of collecting information or, in the worst case scenario, will fabricate information to be reported.

Related to this accuracy issue, not all institutions are required to provide the same information. For example, if an institution does not make use of federal Title IV funding, then they are not required to report information on institutional characteristics. Consequently, said institutions will report the information they choose.

Another limitation is the lack of teaching quality and faculty productivity as an aspect of any rating or ranking system. When administrations want to assess faculty, they use three elements: teaching, research, and service. All three aspects of are assessed in a variety of ways. Webber (2011) discusses the challenge present when assessing faculty productivity:

> Issues that affect all faculty members include tasks related to teaching, advising, faculty governance, and other committee work. Most of these tasks can be quantified in terms of number of students taught or committees served; yet, often the total time spent with a student or the amount of effort devoted to a new instructional technique or course are often hard to quantify and do not address the quality of effort at all (p. 106).

This proposed study attempts to get address this limitation by including factors that should lead to teaching quality. Examples of such factors include institutional resources devoted to academics and student-faculty ratio.

Definitions

The following are definitions related to the topics within this study:

Access: The ability of people from varied socioeconomic status to gain admission to higher education institutions identified through percentage of students receiving Pell grants, a federally funding needs-based grant program.

Affordability: The ability of a student to afford attending a higher education institution. Affordability is primarily identified by net price, the total cost of attendance minus all need-based and merit-based grant aid.

Average net price: This refers to the average net price of attendance calculated by subtracting the average amount of local, state, federal, and institutional grant/scholarship aid from the total cost of attendance.

Family income quintiles: This refers to the students' reported family income and is separated out in five categories: $0-$30,000, $30,001-$48,000, $48,001-$75,000, $75,001-$110,000, and $110,001 and more.

First generation student: This refers to students who did not have a parent who attended college. The issue with this particular measure is that it is currently only attained from information provided by students on the FASFA (Klein, 2015).

Full-time, first-time student: This refers to a student who enrolls in at least 12 credits per semester or quarter as a freshman. This also includes students who have enrolled in the fall and taken courses for the first time in the prior summer as well as students who have attained college credits prior to graduating from high school.

Graduation rates: This refers to the graduation rate of first-time, full-time students within one of three time frames (at 2 year and 4 year institutions): 100 percent time (2 years or 4 years), 150 percent time (3 years or 6 years), and 200 percent time (4 years or 8 years).\

League tables: This refers to a ranking of higher education institutions or programs of study. This phrase is mostly used in the United Kingdom.

Net price by quintile: This refers to the average net price paid by students at the various family income quintiles mentioned earlier.

Outcomes: This refers to the six-year graduation rate used in the PIRS model. Outcomes are considered positive or negative depending upon the perspective of the institution. For example, transferring to a four-year college could be a positive outcome for a junior college but a negative outcome for another four-year college.

Part-time student: This refers to any student who takes 11 or less credits per semester or quarter.

Percent of students receiving Pell Grants: This refers to the percent of the institution's enrolled students who receive Pell Grants due to financial need.

Total cost of attendance: This refers to the combined sum of published tuition and required fees (in-state if there is a difference in fees for out of state students), books and supplies, and weighted average for room, board, and other expenses.

Chapter I Summary

Institutional ratings or rankings have been a hotly contested topic. There have been a variety of rankings and ratings systems intended to provide information on the perceived value of attending an institution. The primary goal of using a federal college ratings system is to promote accountability. To that end, President Obama has presented a federal rankings system intended to connect accessibility, affordability, and outcomes in a PIRS initially in the form of the College Scorecard during the 2015-2016 school year (U.S. Department of Education, 2015a).

In addition, the Obama Administration has a goal of higher education partnerships working towards announcing over 600 actions intended to promote degree and credential completion, improving college readiness, investing in high school counselors, and increasing the number of science, technology, engineering, and mathematics (STEM)

graduates (U.S. Department of Education, 2015b). In order to develop a worthwhile ratings system, it is important to come up with factors that are important to outcomes like retention rates, graduation rates, and transfer-out rates. With the proposed system designed by President Obama's administration, this is an additional system potential students and their parents must interpret. This proposed study is intended to compare the proposed PIRS model with the model developed using the publicly available data provided to the U.S. Department of Education. Institutions included in the *USNWR*'s list of the top 203 national universities will be ranked based upon both of the resulting models and compared to said rankings.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to utilize publicly available higher education data provided by the U.S. Department of Education to test competing models of ratings and comparing them to a current popular higher education ranking system: *U.S. News and World Report*. Specifically, this study will take institutional characteristics and determine which ones are associated with the following outcomes: retention rate of first-time, full-time students, retention rate of part-time students, graduation rate, and transfer-out rate of four-year colleges. This literature summarizes the existing academic work related to higher education ranking systems. As such, the main focus of this chapter will be the following:

- The history of the *USNWR* Rankings, including empirical research examining the different factors within the ranking.
- A proposed PIRS system intended to promote higher education institution accountability by focusing on access, affordability, and outcomes.
- The history of the Carnegie Classification System and how it can be used to categorize higher education institutions to compare similar groups of institutions with one another in a ranking system.

The discussion related to ratings and rankings is a timely one. To further the discussion, this dissertation aims at answering two questions:

1. What institutional characteristics are associated with positive higher education outcomes?
2. How does a ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

In order to answer said questions, there are many issues to address. First, how have higher education institutions been ranked in the past? Second, what has been the purpose of those rankings? For example, have the rankings been used to differentiate among institutions within different groups (i.e., liberal arts colleges or graduate schools)? What method of categorization, if any, have the rankings systems used and what would that add to discussion? Finally, what are the policy implications of using any ranking system?

To outline how rankings will be addressed, the limited research on the PIRS, the history of the *USNWR* rankings, and the Carnegie Classification as a method of classifying institutions into separate rankings in the future will be discussed. Finally, the policy implications of a ratings or ranking system will be discussed as it relates to individual institutions and government policymakers who allocate and approve funding in the form of Title IV financial aid for students and institutional funding intended for infrastructure and administration.

U.S. News and World Report Ranking System

Ranking institutions traces back to 1925 when Professor Donald Hughes began ranking graduate programs based upon reputation (Shin & Toutkoushian, 2011). The initial purpose of rankings was to assess effectiveness of the institution. Using a logic model approach, evaluators can assess higher education institutional effectiveness

through evaluating inputs, activities, and outputs. Essentially, how does an institution of higher learning transfer a series of inputs into outputs? Ratings and rankings will take these inputs and outputs to determine how institutions are performing. Past research has identified inputs available to institutions include factors such as faculty resources, financial resources, and student selectivity while student outputs are typically identified as six-year graduation rate and retention Kelchen & Harris, 2013).

U.S. News and World Report (*USNWR*), which is published annually, produces one of the more popular higher education rankings. The popularity and impact of the *USNWR* is acknowledged by Gnolek, Falciano, and Kuncl (2014); "the college rankings calculated by *U.S. News & World Report* have an impact on the decisions of students and university leaders and are the most widely circulated scorecard of university performance" (p. 762). They first published their rankings in 1983 with the goal of providing some sense of institutional quality. Their ranking methodology changed to some degree in 1988 with peer reputation playing a smaller part in overall ranking than originally designed (Bastedo & Bowman, 2010).

Factors Included in *USNWR* Rankings

Currently, *USNWR* ranks colleges on the following factors (weighting in parentheses): undergraduate academic reputation (22.5%), retention (22.5%), faculty resources (20%), student selectivity (12.5%), financial resources (10%), graduation rate performance (7.5%), and alumni giving (5%). Other publications, like *Forbes*, *Newsweek*, and *Princeton Review* have followed *USNWR*'s lead and produced their own rankings based upon similar criteria. For the purposes of this study, the *USNWR* ranking system will be used as it has been the focus of research conducted on higher education rankings

(Alter & Reback, 2014; Webster, 2001). Table 2 displays the top 20 institutions in the 2016 USNWR rankings with their overall scores.

Table 2. 2016 USNWR Rankings-Top 20.

Rank	***Institution***	***Overall Score***
1	Princeton University	100
2	Harvard University	99
3	Yale University	97
4	Columbia University	95
4	Stanford University	95
4	University of Chicago	95
7	Massachusetts Institute of Technology	93
8	Duke University	92
9	University of Pennsylvania	91
10	California Institute of Technology	90
10	Johns Hopkins University	90
12	Dartmouth College	89
12	Northwestern University	89
14	Brown University	85
15	Cornell University	84
15	Vanderbilt University	84
15	Washington University in St. Louis	84
18	Rice University	82
18	University of Notre Dame	82
20	University of California-Berkeley	77

Undergraduate academic reputation. *USNWR* assesses reputation using two surveys. The first is an academic peer assessment where top academic officials (i.e., presidents, provosts, and deans of admissions) will assess institutions on the factors that cannot be quantitatively measured (such as dedication to teaching). This assessment is assigned a weight of 15 percent. The second assessment comes from 2,200 high school guidance counsellors employed at public high schools receiving a gold, silver, or bronze designation in a recent edition of the *USNWR* best high school rankings. There are also

responses from 400 counsellors at the largest independent schools across the country. This second survey comprises 7.5 percent of the total score.

Retention. *USNWR* assesses retention in two ways. First, they use the average six-year graduation rate for freshmen starting the fall of 2005 through the fall of 2008. Graduation rate comprises 80 percent of this retention score. Second, they use the average retention rate of freshmen who enroll in the fall of 2010 through the fall of 2013 and return the following fall. Freshman retention rate comprises 20 percent of this retention score.

Faculty resources. *USNWR* assesses faculty resources using six separate factors. First, they assess faculty salary as the average faculty pay, plus benefits, during the 2013-2014 and 2014-2015 academic years (adjusted for regional differences in cost of living). This factor comprises 35 percent of faculty resources. The next two factors consider class size. They include the proportion of classes with fewer than 20 students (30% of faculty resources score) and the proportion of classes with 50 or more students (10% of faculty resources score). The final three factors include proportion of professors with terminal degrees (15%), the student-faculty ratio (5%), and proportion of full-time faculty (5%).

Student selectivity. *USNWR* assesses student selectivity using three factors using 2014 data. The first factor is the performance of enrolled students on the SAT and ACT tests (65% of student selectivity score). The second factor is the percent of enrolled freshman who were in the top 10 percent of their respective high school graduating classes (25 percent of the student selectivity score). The final factor is the acceptance rate for the 2014 freshman class (10% of the student selectivity score).

Financial resources. *USNWR* assesses financial resources by using the average spending per student on instruction, research, student services, and other related educational expenses. Financial resources factor into what services are made available to students, how much is devoted to research, and how many faculty and staff are employed at the institution. All of these factors can impact the student experience. For example, more faculty allow for a lower student to faculty ratio and, therefore, more interactions among the faculty and students.

Graduation rate performance. *USNWR* assesses graduation rate performance as the difference between the actual six-year graduation rate and the predicted six-year graduation rate of students enrolling in college in 2008. Institutions are said to be enhancing achievement if the institution's actual six-year graduation rate is higher than the predicted six-year graduation rate.

Alumni giving. *USNWR* utilizes alumni giving rate as an indicator of student satisfaction (students who give back to their respective alma maters must be satisfied with the institution). They report the average percent of living alumni with bachelor's degrees who donated back to their alma mater during the 2012-2013 and 2013-2014 academic years.

Influence of the USNWR Ranking System

The *USNWR* rankings system has been the focus of much of the rankings related empirical research. As the weighting of factors was one of the positives of the *USNWR* rankings, researchers have sought to determine if the weightings used by the *USNWR* have statistical backing. Some examples of research also demonstrate the impact of institutional ranking on student decision making when selecting an institution. Finally,

the USNWR rankings have also demonstrated an impact on the institution's decision-making process as they aim to work their way up the rankings list.

As evidenced by the development of a weighting for the different factors used in the *USNWR* rankings, not all factors are equal when considering the quality of an institution. The question remains, how do we develop this weighting? Webster (2001) attempted at determining the validity of the weighting the *USNWR* provided for each factor using a principle components analysis. What he found is the reputation factor, which has the highest weight (22.5%) was the fourth most important factor with a new weight of 11 percent. Average SAT scores (11.8%), predicted graduation rate (11.7%), and actual graduation rate (11.3%) were weighted above reputation. This study only examined universities who reported SAT scores to the *USNWR*, which limited it to examining 145 institutions in the Best National Universities list. Changing the factor weightings could alter an institution's place on the rankings list. This movement up or down the rankings list can have an impact on the choices students make when deciding on a college.

Research conducted by Griffith and Rask (2007) found that *USNWR* rankings impact students who are paying full price for their education more so than students receiving some type of aid. Students are more likely to attend a higher ranked institution (even if only a few places higher in rank). The issue they present is one this study focuses on: other factors independent of ranking play a role in the quality of an institution, such as student-faculty ratio and expenses. Student-faculty ratio and expenses are the types of data available through the U.S. Department of Education. This research demonstrates the

importance of not only weighting the data used in rankings appropriately, but also ensuring that important data is not left out of a rankings model.

Not only do *USNWR* rankings influence some student decisions, they also influence the institutions desiring to move up the rankings. Bowman and Bastedo (2009) demonstrated this when they identified improvements seen when an institution moves up in rankings. For example, an institution receiving 20,000 applications per year would see an increase of 148 additional applications for each spot the institution moved in the rankings. Meredith (2004) found similar benefits of placing higher in the rankings with admission outcomes like average SAT scores and percent of students in the top 10 percent of their respective high school classes. This research shows the benefit of institutions moving up in the rankings, but neglects any actual improvement in quality of the institution. Meredith cited the previously mentioned Stecklow (1995) as one instance where data was falsified by institutions in the hopes of moving up the rankings (dropping the bottom 6% of student SAT scores to rise in the rankings).

Postsecondary Institutional Ratings System (PIRS)

A federally proposed PIRS aims to hold higher education institutions accountable by assessing access, affordability, and educational outcomes. This system is novel and has not yielded much empirical research as it relates to the variables proposed by the federal government. Rodriguez and Kelly (2014) conducted an early analysis of the PIRS factors to determine how selected institutions were performing on three metrics: percent of students receiving Pell grants (access), average net-price (affordability), and six-year graduation rate (completion).

Rodriguez and Kelly (2014) examined these factors by including percent Pell recipients on the Y-axis and average net-price on the Y-axis, then plotting six-year graduation rate to determine how institutions compared to one another. Ideally, they would find that high access and high affordability would be associated with high completion. What they found is very few institutions with a high percentage of students receiving Pell grants (high access) and low average net-price (high affordability) had high six-year graduation rates. In fact, many of the institutions they examined demonstrating the highest graduation rates enrolled a low percent of low-income students (as measured by percent of students receiving Pell grants). They found the converse to be true as well (institutions with low graduation rates enrolled more low-income students). These relationships were consistent across net-price indicating the net cost of attendance did not seem to affect graduation rates.

History of the Carnegie Classification

Ratings and rankings are important in evaluating institutional quality. One issue to consider when evaluating quality is that not all institutions serve the same groups nor do they all have the same mission. For ratings to be effectively used when comparing institutions, it is necessary for institutions to be classified so similar universities are compared to one another. The *USNWR* only includes a small number of institutions in their Best National Universities List as they limit the institutions to doctoral/research institutions. The universities included are similar in mission and other factors so this comparison make sense, however, there are many more institutions that are not included in this ranking. As a result, *UNSWR* also includes other types of lists, such as Best Liberal Arts College so similar comparisons can be made. The Carnegie Classification is

a system that can be utilized in further development of a large scale ratings system (such as the PIRS). This will allow for institutions with different missions to be categorized and ranked together.

The Carnegie Classification of Institutions of Higher Education was first developed in 1971 with a comprehensive list officially published in 1973 (Shulman, 2001). The Carnegie Classification operates by differentiating institutions on the basis of mission. This involves taking into consideration characteristics like degrees conferred, size, and enrollment profile (Carnegie Commission, 1971). Table 3 displays the initial Carnegie Classification system as designed in 1971.

Table 3. 1971 Carnegie Classification System.

Carnegie Classification
Doctoral-Granting Institutions
Research Universities I (Heavy research emphasis)
Research Universities II (Moderate research emphasis)
Doctoral-granting Universities I
Doctoral-granting Universities II
Comprehensive Colleges
Comprehensive Colleges I
Comprehensive Colleges II
Liberal Arts Colleges
Liberal Arts Colleges I
Liberal Arts Colleges II
Two-Year Colleges and Institutes
Professional Schools and Other Specialized Institutions
Theological seminaries, Bible colleges, and other institutions offering degrees in religion
Medical schools and medical centers
Other separate health professional schools
Schools of engineering and technology
Teachers colleges
Schools of business and management
Schools of art, music, and design
Schools of law
Other specialized institutions

The Carnegie Classification underwent revisions in 1976, 1987, 1994, 2000, 2005, 2010, and 2015 taking into consideration changes within institutions as well as

institutions closing, merging, opening, and changing missions. Table 4 identifies the most recent Carnegie Classification system. Using this Basic Classification System is one example of how the Carnegie Classification can aid in developing a rating and ranking system by ensuring institutions with similar missions are compared with one another. Coinciding with the theoretical framework of logic modeling discussed in Chapter 1, Carnegie Classifications provide the mission driving the different institutions as they are being evaluated.

Table 4. 2015 Basic Carnegie Classification System.

Carnegie Classification
Doctoral Universities
Highest research activity
Higher research activity
Moderate research activity
Master's Colleges and Universities
Larger programs
Medium programs
Smaller programs
Baccalaureate Colleges
Arts & Sciences focus
Diverse Fields
Baccalaureate/Associate's Colleges
Mixed Baccalaureate/Associate's Colleges
Associate's Dominant
Associate's Colleges
High-Transfer-High Traditional
High Transfer-Mixed Traditional/Nontraditional
High Transfer-High Nontraditional
Mixed Transfer/Career & Technical-High Traditional
Mixed Transfer/Career & Technical-Mixed Traditional/Nontraditional
Mixed Transfer/Career & Technical-High Nontraditional
High Career & Technical-High Traditional
High Career & Technical-Mixed Traditional/Nontraditional
High Career & Technical-High Nontraditional
Special Focus Institutions
Two-Year
Health Professions
Technical Professions
Arts & Design
Other Fields

Table 4. cont.

Carnegie Classification
Four-Year
Faith-related Institutions
Medical Schools & Centers
Other Health Professions Schools
Engineering Schools
Other Technology-related Schools
Business & Management Schools
Arts, Music, & Design Schools
Law Schools
Other Special Focus Institutions
Tribal Colleges

The Carnegie Commission on Higher Education initially created this classification system with the express purpose of developing a typology that would serve individual researchers' needs. Consequently, they made this typology available for others to use when researching higher education institutions (McCormick, 2013). Graham and Diamond (1997) state: "the Carnegie system was designed to pull the attention of policy makers away from the nation's research institutions, and to emphasize instead the variety and social importance of the vast majority of institutions that were not research oriented" (p. 53). Classification of any type can provide beneficial information for policy makers and politicians. As will be demonstrated later, classifications, ratings, or rankings of any kind can lead to administrators trying to "level up" to another category or ranking level if benefits of belonging to said categorization are demonstrated. Aldersley (1995) referred to this phenomenon as "upward drift" when he identified the dramatic increase in the Research I institutions between 1976 and 1994 (29 in 1976 to 45 in 1987 and 59 in 1994).

The Carnegie Classification places institutions with similar missions and goals into similar categories. To this point, only the basic Carnegie Classification system has been discussed (see Appendix A). There are more options for institution classifications

than just the basic classification. In addition to the basic classification, there are five other ways to classify institutions: undergraduate instructional program (Appendix B), graduate instructional program (Appendix C), enrollment profile (Appendix D), undergraduate profile (Appendix E), and size/setting (Appendix F) (Carnegie Institute, 2016). These particular classifications can be other ways to separate out institutions to be rated. For example, if the ratings system is intended for undergraduate programs, then those rating the institutions could use the undergraduate instructional program classification as opposed to the basic classification.

In comparison to the ranking of undergraduate institutions (which is the focus of this proposed study), Longden (2011) identifies ranking systems related to graduate and professional education. Audiences interested in this type of ranking will be potential investors and researchers. While both of these methods have their uses, the market audience could determine the approach to rating institutions. Since there is a constant issue with appropriately comparing institutions, the different types of Carnegie Classifications could provide a rubric for comparison. Not all institutions are research oriented, so it would be inappropriate to compare doctoral level institutions with tribal colleges as an example. Similar to how *USNWR* has different rankings for liberal arts colleges, regional colleges and other categories, the Carnegie Classification could be used to separate and compare similar institutions.

Higher Education Rankings and Policy

When President Barack Obama first proposed a plan for a federal college ratings system in 2013 in a speech to students and faculty at State University of New York (SUNY) Buffalo, it was the result of a number of policy issues (Klein, 2015). Klein

(2015) identified several key issues: the falling of the United States in the international rankings of postsecondary attainment, increasing student debt, quality assessment of the learning at institutions, and growing doubts about the value of a college degree.

Access to higher education is a goal of any potential federal higher education rating system, yet at the same time increase of access has also been "supplemented with much greater attention to improving the chances that students complete their degree" (Hauptman, 2012, p. 17). Hauptman (2012) includes key indicators in the performance of any higher education system: participation rate (percent of population enrolled in higher education), completion rate (percent of entering students who earn a degree), and attainment rate (percent of working population who earn a degree). Educational attainment is a measure collected by the U.S. Census Bureau and is a function of the participation rate and completion rate, which Hauptman (2012) quantifies in the following equation: high school attainment X higher education participation rate X higher education completion = higher education attainment. This higher education attainment value is available for any regional breakdown, such as by city, county, state, or country. Ward (2006) provides a detailed description of a policy implemented to achieve higher educational attainment is an initiative called GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs), which is intended to focus on accessibility of lower and middle socioeconomic status students.

In order to achieve higher educational attainment, policies have been implemented to meet that end. According to Ward (2006):

> Connecticut's model shows promise in that it offers both a "topdown approach and bottom-up approach to addressing the educational inequities that exist for

> disadvantaged and minority youth— comprehensive systemic school reform coupled with culturally competent programs that empower parents and youth" (p. 65).

Although this program is in the K-12 academic setting, the results of this program indicate some positive benefits. One example is related to academic expectations parents have of their children (Standing, Judkins, Keller, & Shimshak, 2008):

> Attending a GEAR UP school as measured near the end of eighth grade was positively associated with parents' having higher academic expectations for their children. However, there was no evidence of an association between attending a GEAR UP school and the strength of student intentions to attend college, expectations for postsecondary education or overall orientation toward college (p. xix).

While at the time the final report was written the program could not speak towards intentions to attend college, higher expectations of parents at least plant the idea in a child's mind that college is a realistic and important option. This should translate to determining if the student will decide to attend college or not.

Ratings/Rankings and Policy Implications

When it is established that schools are "ranked" in some form, it is a natural impulse to use this information to dictate certain policies, especially financial policies. Hillman, Kelchen, and Goldrick-Rab (2013) highlight that 14 states use a "pay for performance" approach to distributing appropriations to state institutions. Appropriations are tied to higher education outputs like degree production, graduation rates, retention rates, research productivity, job placement, and enrollment rates/completions for

traditionally disadvantaged students. The danger with using this approach is the extent to which legislature's perceptions of the appropriate metrics related to higher education outcomes to determine funding match the missions or perceptions of each individual institution. Should the institution sacrifice or change its mission for fear of losing state appropriations? This has even larger ramifications if this concept reaches the federal level.

Klein (2015) describes the proposed PIRS system as well as discussing the policy implications of this proposed ratings system. The postsecondary institutions rating system as currently proposed would use the following metrics: percentage of students receiving Pell grants, expected family contribution gap, family income quintiles, first-generation student status, average net price, net price quintile, completion rates, transfer rates, labor market success, graduate school attendance, and loan performance outcomes. While these metrics are important, the quality of learning is almost impossible to measure. Some of the policy implications identified by Klein include the difference between providing consumer information and a system of accountability as well as mission differentiation (which speaks to the importance of using a classification system like the Carnegie Classification in such a ratings system).

The U.S. Department of Education (2015a, 2015b) details how the PIRS is a ratings system, not a rankings system, yet identify how benchmarks will likely be created that would separate high performing institutions from low performing institutions. They even go so far as to say this could change the way financial aid is distributed with high performing institutions receiving additional Title IV funding for students. Even though the proposed PIRS rating system is intended to be ratings as opposed to rankings like the

USNWR, the possibility exists that institutions will use them within marketing strategies as a comparison to peer institutions. When you factor in the possible impact an institution's rating could have on financial funding, administrators at institutions are likely to utilize any type of marketing strategy in an effort to move up the rankings. One concern is if improving teaching quality is not a part of this marketing effort, will institutions be making policy decisions that aim to only improve rating or ranking or will they aim to improve quality as well?

Chapter II Summary

The ultimate goal of a ratings system is accountability. This chapter has outlined the proposed PIRS as well as the *USNWR* rankings. It also outlined some of the influences of the USNWR on student decision making as well as institution decision making. Currently, the USNWR separates groups of institutions as a means of making fair comparisons of similar universities. As a federal PIRS is developed, it will be essential to follow this same framework. The Carnegie Classification system was a suggested means of categorizing similar institutions. Finally, it cannot be said enough how a federal PIRS must take differing missions of institutions serving minorities into account when making comparisons. It might also be appropriate to separate HBCUs when rating institutions as they appear in multiple Carnegie Classifications. While there are many methodological issues present when examining rankings, the following chapter will demonstrate how this proposed dissertation will address a few key issues.

CHAPTER III

METHODS

The purpose of this study was to compare different models of rankings to determine what information is explaining the most variance in higher education outcomes. The research questions are:

> *Question 1:* What institutional characteristics are associated with positive higher education outcomes? Specifically, what model would explain the most variance in higher education outcomes when using factors present in the *USNWR* ranking, the proposed PIRS, and the factors publicly available on the IPEDS website?
>
> *Question 2:* How does a new ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

In order to accomplish this task, the sources of the data will be identified with the specific variables used in the model described below. The different analyses will also be described for each of the three models: USNWR, PIRS, and a new model based upon institutional information on IPEDS. Finally, the comparison of the rankings list from each model will be described.

Data Sources

Data collection for information used in rankings was an important consideration for this study. Longden (2011) identifies three sources of data available for using in

developing a ranking system: primary data from the university, survey data from ranking developers, and data collected from independent third parties. The *USNWR* uses survey data they generate based upon what is presented by the universities (the second method of data collection). In some instances, this method is problematic in that universities are not motivated to be completely truthful when reporting data to an outside researcher. Usher and Savino (2007) made this argument when they stated, "there is no guarantee that institutions will actually report the data to the rankers on a consistent basis, as all have a clear incentive to manipulate data in a manner which will benefit them" (p. 8). However, government agencies provide an excellent audit of information produced by institutions by requiring "clear precise definitions of the data used, specific dates around which data is collected, recorded, and transmitted" (Longden, 2011, p. 83). Agencies such as the U.S. Department of Education can provide a strict audit Longden (2011) argues is missing in U.S. ranking systems.

Collecting publicly available data from a government agency addresses the problem of institutions providing only information they wish to share with a rankings developer. As a way to gather and record information about tertiary education institutions, the U.S. Department of Education requires said institutions to report a variety of information every year. This data is made available to anyone with a desire to find out more information and also compare different institutions. Within this data, the U.S. Department of Education identifies the Carnegie Classification for each institution. It includes all classifications for each institution: Basic, Undergraduate Instructional Program, Graduate Instructional Program, Enrollment Profile, Undergraduate Profile, and Size and Setting Classifications. Institutional characteristics for the 203 institutions used

in this analysis were downloaded from the U.S. Department of Education's National Center for Education Statistics (NCES, 2015).

The data within the analysis will be from the 2014 provisional release so as to reflect the data obtained from *USNWR* for their rankings, which reported 2014 institutional values related to graduation rate and SAT/ACT scores. This is different from an initial analysis using 2013 information from IPEDS where four separate regressions were calculated to determine significant predictors of graduation rate, retention rate of full-time students, retention rate of part-time students, and transfer-out rate (Walker, 2016). The variables used within the PIRS model will come from the U.S. Department of Education information as well. The *USNWR* rankings list will come from the 2016 Best National Universities list with only the first tier universities being used (203 universities). All data used is publicly available data downloaded from the U.S. Department of Education IPEDS website or obtained from the most recent USNWR rankings. With that said, Institutional Review Board (IRB) approval from the University of North Dakota was sought and deemed exempt from full IRB review as it utilized publicly available data.

Plan for Analysis

In order to make a comparison of *USNWR* rankings and ratings/rankings within this study, weights were calculated for all variables that will be included in the final models. Graduation rate will be included in these models in order to be consistent with the *USNWR* list of best national universities. With that said, the first step was to examine the data and determine which variables would be options to use in the analyses by determining the amount of missing data, normality, and correlations. Following data

cleaning, it will be necessary to calculate a Higher Education Outcome Index for universities included in the analyses using the traditional outcome measures: graduation rates, retention rates, and transfer out rates.

Using SPSS version 23, three separate linear regressions using the ENTER method were calculated to determine relationships among the institutional characteristics included in each model and the composite higher education outcome dependent variable. Any missing data within the predictor variables will be handled using listwise deletion. Missing data included in the Higher Education Outcome Index will be addressed differently and will be described later in this chapter. For each analysis, $p<.05$ was set as the threshold for significance and standardized β coefficients were calculated to be used as weights. All three of the models will then be used to rank the universities based upon the independent variables associated with the Higher Education Outcome Index to be described in detail within the following section.

Developing a Composite Higher Education Outcome Index

Each institution has to report three separate graduation rates, two retention rates, and one transfer-out rate to the U.S. Department of Education, which is presented in IPEDS data. The *USNWR* rankings include graduation rate as a weighted factor when ranking institutions. In order to determine the validity of including graduation rate as a factor in ranking, another higher education outcome index needs to be developed. A composite index will be calculated using all reported graduation, retention, and transfer-out rates to be consistent with the development of a rating system similar to the *USNWR* rankings. The Higher Education Outcomes Composite Index will be calculated the following way:

1) Actual six-year graduation rate and predicted six-year graduation rate (calculated by *USNWR*) will be added together. Since higher values for each will indicate better outcomes adding all values will ensure those who have higher rates will score higher in the composite index.
2) The sum of actual and predicted graduation rates will be divided by the percent of students who transfer from the institution. Dividing the value by transfer-out rate will reduce the graduation and retention rates proportionally where institutions with higher transfer-out rates will result in lower values.

The resulting index will be correlated with the variables comprising said index to make sure there are no issues with multicollinearity (Warner, 2013). If multicollinearity does exist, then the highly correlated independent variables may be removed from the analysis.

Graduation rates. All institutions are required to report graduation rates for full-time, first-time students (i.e., stayed with their original institution throughout their college career) who graduate with four years (100% time), six years (150% time), and eight years (200% time) to the U.S. Department of Education. To maintain consistency with other rankings and the proposed PIRS, six-year graduation rate was included in the IPEDS model.

Retention rates. All institutions are also required to report retention rates of first-time bachelor's degree seeking undergraduates. Retention rate is defined as the number of first-time bachelor's degree-seeking undergraduates who attend the fall semester for one year and return the fall semester of the next year. Retention rates are reported for both full-time (enrolled in 12 or more credits) and part-time (enrolled in 11 or fewer

credits) students. Retention rate was included in two of the three models being tested (*USNWR* and IPEDS).

Transfer-out rates. Transfer-out rates refer to the 'total number of students who are known to have transferred out of the reporting institution within 150% of normal time to completion divided by the adjusted cohort' (NCES, 2015). While two-year institutions use transfer-out rates as an indicator of preparing students for attaining a baccalaureate degree, students transferring out is not desirable for four-year institutions (Townsend, 2002). Two-year colleges have an interest in seeing their students go on to attain degrees at four-year institutions, but four-year institutions have an interest in making sure their respective students remain and work towards graduation. This difference between perceptions of transfer-out rates is another rationale for only including four-year institutions in this study.

Institutional Characteristics

The predictor variables for this analysis were institutional characteristics reported to the U.S. Department of Education by each institution. These predictor variables are separated into eight categories available on the IPEDS website: admissions and test scores, student charges, student financial aid, net price, enrollment, completions, human resources, and finance. Not all possible predictors were included in the models. Some were included to maintain consistency with all models while others were included for their predictive value. Some of the variables present on IPEDS will be included as predictor variables to create weightings for all three rating/rankings models.

Admissions and test scores. Each institution reports the numbers of people who applied, the number of people admitted, and the number of people who enrolled in the

reporting year (full-time and part-time) at each institution. Full-time students are those who are registered for 12 or more credits in a given semester. Part-time students are those who are registered for 11 credits or less. SAT and ACT scores for students who apply are also listed. The 25th and 75th percentiles for the SAT subscale scores (critical reading, math, and writing), ACT composite score, and ACT subscale scores (English, math, and writing) for applying students are reported. The SAT subscale components will be added together to determine the 25th and 75th percentile for the total SAT. These values and the ACT composite scores for the 25th and 75th percentile will be included in analyses.

Student charges. Each institution reports the charges an average student incurs during an academic year and separates them into total cost of attendance from on-campus, off-campus (not living with family), and off-campus (living with family). The fees are also itemized by: required tuition and fees, books and supplies, room and board (both on and off-campus not with family), and other expenses. Tuition and required fees are also available for both undergraduate and graduate students. Total cost of attendance will be included in analyses as one indicator of affordability.

Student financial aid. Information regarding financial aid for students is reported as both a percent of students receiving aid and the average amount of aid received. This is itemized by the following: any grant or scholarship aid, Pell grants, and federal student loans for all undergraduate students. Aid received is also itemized for full-time, first-time degree/certificate-seeking undergraduate students by the following: any student financial aid, grants or scholarship aid, federal grants, Pell grants, other federal grants, state or local grants/scholarships, institutional grants/scholarship, student loan aid, federal student loans, and other student loans. The percentage of students receiving Pell grants, grants or

scholarship aid, federal grants, other federal grants, state or local grants/scholarships, and institutional grants/scholarships will be included as an indicator of access.

Net price. Institutions are also required to report the average net price of attendance for full-time, first-time, degree/certificate-seeking undergraduate students who paid the in-state or in-district tuition rate and were awarded grant or scholarship aid. This is identified as a total average net price as well as the average net price by household income levels: $0-$30,000, $30,001-$48,000, $48,001-$75,000, $75,001-$110,000, and $110,001 and more. Total average net-price and the average net-price for each of the five levels of household income ($0-$30,000, $30,001-$48,000, $48,001-$75,000, $75,001-$110,000, and $110,001 and more) will be included as a measure of affordability.

Enrollment. Total student enrollment is reported by gender, student level, and full/part-time status. Specific breakdowns of enrollment include: undergraduate, graduate, degree/certificate seeking, non-degree seeking, transfer-ins, and continuing students. Enrollment is one institutional characteristic collected by the U.S. Department of Education that while not directly related to educational outcomes, is necessary in calculating the student to faculty ratio of an institution. It is this student to faculty ratio that is related to educational outcomes.

Completions. The number of degrees and certificates awarded for each institution by level, gender, and race. The types of degrees recorded include: certificates below bachelor's, certificates above bachelor's, associate's, bachelor's, master's, doctor's research/ scholarship, doctor's professional practice, doctor's other. The graduate and professional level completions will be included as a potential measure of faculty

productivity (as faculty members mentor students who successfully completing graduate degrees).

Human resources. Each institution records the number of full and part-time faculty, staff, and graduate assistants employed. In addition, faculty and instructional staff are separated by rank: tenured, tenure track, not on tenure track, multi-year contract, annual contract, less than annual contract, and those without faculty status. The average salary for each rank is also recorded. The percent of tenured faculty, tenure-track faculty, full-time faculty, as well as the average salary for professors, associate professors, instructors, and lecturers will be included as indicators of faculty expertise and resources devoted to instruction.

Finance. Institutions report the core revenues and core expenses per full-time equivalent enrollment for the fiscal year as a dollar amount and a percent of revenues or expenses. Core revenues tracked include: tuition/fees, state appropriations, local appropriations, government grants/contracts, private gifts/grants/contracts, investment return, and other core revenues. These variables will serve as institutional resources. Core expenses tracked include: instruction, research, public service, academic support, institutional support, student services, and other core expenses. All of these expense variables will serve as measures of student support and instructional support. Each of the revenue and expenses are reported as percentages of revenues and expenses, respectively.

Models Tested

The regressions conducted focused on three separate models with the Higher Education Outcome Composite Index operating as the dependent variable: *USNWR* Model, PIRS Model, and a more comprehensive model from additional IPEDS data.

These models represent possible ranking systems for higher education institutions. The first two models are based upon theoretical models. The first model is based upon the variables used within the popular *USNWR* ranking system. The second model is based upon a proposed model for ranking institutions: the PIRS model. The final model combines these theoretical models as well as considers other institutional characteristics that have been shown to be related to educational outcomes.

Since there are theoretical models already in existence for the first two models, the standard, or simultaneous, regression was used to analyze all three models to maintain consistency. According to Warner (2013), all predictors are added to the model at the same time with the predictive nature of each variable assessed controlling for any linear association of individual variables with all other variables in the model. Depending upon the R^2 of each model, a forward multiple regression was also considered to develop the largest explanation of variance within the HEOI as possible before creating a new ranking list. This method is not the ideal situation, due to the inflated risk of a Type I error. The specific variables included in each model are listed below.

***UNSWR* Model**

The independent variables for the *USNWR* model came from the published data used to produce their rankings of the top 203 institutions. All data are from the most recent academic year with institutional data relating to class size, graduation rate, retention rate, SAT/ACT scores, Freshman in top 10% of high school class, and acceptance rate coming from 2014. For the purposes of this regression analysis, the weighting used by the USNWR is not factored into calculations. *Peer assessment score* comes from a survey of higher education administrators who rank institutions on a scale

of 1 to 5 with a score of 5 being the highest. *High school counselor assessment score* comes from a similar survey on a scale of 1 to 5 within a score of 5 being the highest. *Average freshman retention rate* measures the percent of students who enroll their freshman year and return the following fall of their sophomore year. There are two measures of graduation rate: *predicted six-year graduation rate* and *actual six-year graduation rate*.

PIRS Model

Keeping in line with Rodriguez and Kelly's (2014) analysis, the PIRS model will contain three independent variables representing the three factors of interest. The first variable is *percent of students receiving Pell grants*. This variable will represent the access component of the PIRS model. The second variable will be *average net-price*. This will represent the affordability component of the model. The final variable is *six-year graduation rate*. This will represent the completions/outcomes component of the model.

IPEDS Model

While the factors included in the first two models are important, other factors have been identified as important when examining the effectiveness of a higher education institution. The final model to be tested will include additional measures important to the quality of an institution. The variables to be included in this model are separated into three categories proposed by the PIRS with two additional categories identified as faculty expertise/resources/productivity and student and instructional support.

Access. To indicate the access component, the *percentage of students receiving Pell grants, grants or scholarship aid, federal grants, other federal grants, state or local*

grants/scholarships, and *institutional grants/scholarships* will be included in the analysis. Access is an important characteristic for the proposed PIRS system. As such, access was also be an important characteristic of the IPEDS model. While Pell grants will be an important funding source for students, there are other forms of grant aid that can provide the same access to higher education.

Affordability. To indicate the affordability component, *total cost of attendance*, *average net-price*, and the *average net-price for each of the five levels of household income ($0-$30,000, $30,001-$48,000, $48,001-$75,000, $75,001-$110,000, and $110,001 and more)* was included in the analysis. Affordability is part of the PIRS model and will be included in the IPEDS model as well. In addition to total average net-price, the average net-price at the various household income levels was also included. The reason for this is it could be determined if lower income households differ from higher income households in their relationship to educational outcomes.

Student Outcomes. Keeping in line with other models, the *six-year graduation rate* will be the only graduation rate measure included in the model as a measure of student outcomes. *Retention rate* and *transfer-out rate* will also be included in the model as measures of student outcomes. Ideally, these different outcomes would have actually been dependent variables in the analysis. In an effort to keep consistent with the other model of rankings, the IPEDS model will include these outcomes.

Faculty Expertise/Resources/Productivity. Faculty play an extensive role in the success of an institution. As such, this additional category is included as a way of identifying the role of faculty in the success of an institution. The *percent of tenured faculty*, *tenure-track faculty*, *full-time faculty*, as well as the *average salary for*

professors, *associate professors*, *instructors*, and lecturers will be included as measures of expertise and resources devoted to instruction. The number of *master's degrees*, *doctor's degrees (research/scholarship)*, and *doctor's degrees (professional practice)* conferred will be included as measures of faculty productivity.

Student and Instructional Support. Institutions report their revenues and expenses to the U.S. Department of Education. The following variables will be included in the analysis as an indicator of resources available for student and instructional support: the percentage of revenues that come from *tuition/fees*, *state appropriations*, *local appropriations*, *government grants/contracts*, *private gifts/grants/contracts*, *investment return*, and *other core revenues*. The following variables will be included in the analysis as an indicator of expenses related to student and instructional support: the percentage of expenses spent on *instruction*, *research*, *academic support*, *institutional support*, *student services*, and *other core expenses*.

Ranking List Analysis

The *USNWR* ranking list will be used as the comparison ranking for the PIRS and IPEDS ranking lists. To develop a ranking for the PIRS and IPEDS models, the standardized β coefficients for each predictor will be used to estimate the predicted higher education outcome index. Universities will then be ordered from highest to lowest higher education outcome index values. A table will be included with each university and their respective deviations from the *USNWR* ranking for both models. This analysis will be used to demonstrate how much deviation in a university's ranking can occur when different factors are included in the rating or ranking. If all three models reproduce

similar rankings to the original Best National Universities list, then the results would seem to indicate there is little difference in the rankings produced by the three models.

Summary

This chapter summarized the analysis utilized to statistically determine significant predictors of a newly developed higher education outcome variable and develop statistically appropriate weights for each predictor. Follow-up analyses utilizing a statistically driven regression method was used to refine models intended to develop three new ranking models. After determining significant predictors, each competing model were used to develop three different rankings and compared them to the original *USNWR* rankings.

The variables for this study came from publicly available data from the U.S. Department of Education and the *USNWR* Best National Universities List. Some variables included relate to currently existing models of rankings, while other variables included in the third model are expected to have some predictive value when assessing positive higher education outcomes. Once the significant variables in each of the models were determined, three new rankings were calculated and compared to the original Best National Universities list.

CHAPTER IV

RESULTS

The purpose of this study was to utilize publicly available higher education data provided by the U.S. Department of Education in addition to information from the *U.S. News and World Report* rankings to test competing models of higher education institution rankings. The models tested are a current popular higher education ranking system (*U.S. News and World Report*), a proposed method of rating higher education universities (Postsecondary Institution Ratings System), and a new model utilizing theoretically determined variables predicting higher education outcomes. In order to accomplish this goal, data from the top 203 national universities in the *USNWR* rankings (comprised of very high research activity, high research activity, and doctoral/research universities) was used to develop a Higher Education Outcome Index as a means of developing a multifaceted educational outcome variable. Multiple regressions were used to test three competing models for higher education institution rankings. The models developed from the data would then be used to re-rank the universities, with said rankings being compared to the original *USNWR* 2016 Best National Universities list. This methodology was used to answer the following research questions:

1) What institutional characteristics are associated with positive higher education outcomes? Specifically, what model would explain the most

variance when using factors present in the *USNWR* ranking, the proposed PIRS, and the factors publicly available on the IPEDS website?

2) How does a new ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

Research Questions

Question 1: What institutional characteristics are associated with positive higher education outcomes? Specifically, what model would explain the most variance when using factors present in the *USNWR* ranking, the proposed PIRS, and the factors publicly available on the IPEDS website?

The first research question was addressed by conducting multiple linear regressions examining the predictors of higher education outcomes. There are certain higher educational outcomes that are considered positive within higher education, one of which is graduation rate (Kelly & Schneider, 2012). When factoring in potential performance of higher education institutions, an institution's six-year graduation rate is frequently included in the evaluation (see the USNWR ranking system described in Chapter 2 and Shin & Toutkoushian, 2011). In order to analyze different models of ranking higher education institutions, six-year graduation rate will need to be included in the model. As a result, six-year graduation rate alone cannot be the dependent variable for the analyses. Therefore, a Higher Education Outcome Index was developed to be the dependent variable.

Higher Education Outcome Index. The Higher Education Outcome Index (HEOI) was intended to be an outcome variable based upon actual six-year graduation rate, predicted six-year graduation rate and transfer-out rate. The resulting HEOI will be the dependent variable in each regression analysis. To determine if there were any issues

with the variables to be included in the HEOI, descriptive statistics were calculated. Table 5 displays the sample size, mean, standard deviation, and range of all three variables. When first examining the data, there was a problem with missing data within the transfer-out rate variable. Only 89 out of the 203 institutions (44%) reported their transfer out rate.

Table 5. Descriptive Statistics of Variables to be used in Higher Education Outcome Index.

Variable	N	Mean	SD	Min	Max
6-year Graduation Rate for 2008 Freshman Class (actual)	203	72.36%	14.05	36	98
6-year Graduation Rate for 2008 Freshman Class (predicted)	203	70.75%	14.51	27	97
Transfer-out Rate for 2014	89	17.79%	8.93	2	37

Note. * $p < .05$, ** $p < .01$ (two-tailed).

In order to create a viable HEOI, missing data had to be imputed as a means of estimating transfer-out rate. It was necessary to determine if there is a difference among the institutions who reported transfer-out rate and those who did not to determine if the data was missing completely at random or not missing at random. The USNWR Best National Universities list focuses on three Basic Carnegie Classifications: research universities (very high research activity), research universities (high research activity), and doctoral/research universities. Table 6 displays a cross-tabulation of the universities within each classification and the number of universities who reported transfer-out rate.

Table 6. Number of Institutions Reporting Transfer-out Rates from 2014 by Carnegie Classification.

	Research Universities (VH)	Research Universities (H)	Doctoral/Research Universities
Reported Transfer-out Rate for 2014	41	31	17
Missing	62	34	18
% of missing data	60%	52%	51%

Note. VH-Very High Research Activity, H-High Research Activity

There appear to be similarities in the amount of missing data from each of the three Basic Carnegie Classifications used, however research universities with very high research activity seem more likely to omit transfer-out rates when reporting data to the U.S. Department of Education. The primary issue is 56 percent of the transfer-out data is missing and this data is necessary to create the HEOI. If the values are treated as missing, then only 89 of the institutions would be used in any analysis (i.e., the formula would have a 0 in the denominator and therefore, would be 0 for all institutions missing the data). Therefore, the missing data was handled by calculating the HEOI using three different values: the lowest reported transfer-out rate, the mean reported transfer-out rate, and the highest reported transfer-out rate. This resulted in a total of nine regression analyses (3 *USNWR*, 3 PIRS, and 3 IPEDS).

After calculating the three different HEOI variables, correlations with the predictor variables were calculated to make sure there were no issues with multicollinearity. Table 7 displays the correlations among each of the three HEOI variables, the six-year graduation rate for the 2008 freshman class, and the reported transfer-out rates for 2014. Using Cohen's (1988) threshold for correlation sizes, most fall in the medium size correlation range (.30 to .50) and do not justify removing either of the two predictor variables from further analysis. The reported transfer-out rates (excluding missing data) has the largest correlation and the relationship between transfer-out rate and the HEOI values explains 50 percent of the variance in the HEOI variables.

Table 7. Intercorrelations Among Higher Education Outcome Index Variables, 6-year Graduation Rate for the 2008 Freshman Class, and Reported Institutional Transfer-out Rate.

Variable	1	2	3	4	5
1. 6-year Graduation Rate for 2008 Freshman Class	—		.574**	.406**	.298**
2. Transfer-out Rate for 2014	-.757**	—	-.713**	-.713**	-.713**
3. HEOI (Low Transfer-out Rate Imputation)	.574**	-.713**	—	.140*	-.053
4. HEOI (Mean Transfer-out Rate Imputation	.406**	-.713**	.140*	—	.981**
5. HEOI (High Transfer-out Rate Imputation)	.298**	-.713**	-.053	.981**	—

Note. * $p < .05$, ** $p < .01$ (two-tailed).

In addition to making sure the correlations of the HEOI variables and six-year graduation rate are not problematic, another assumption that must be met by the dependent variables is they are normally distributed. Criteria for normality within this study were as follows: criteria for normal kurtosis-less than 7.0 (Byrne, 2010) and criteria for normal skewness, normal-less than 1.0; moderately nonormal-1.0 to 2.3; severely nonnormal-more than 2.3 (Lei & Lomax, 2005). Table 8 displays the mean, standard deviation, skewness, and kurtosis of the HEOI depending upon the method of imputation used in the creation of the variables.

Table 8. Descriptive Statistics for the Higher Education Outcome Index Variables by Imputation Method.

Variable	*M*	*SD*	Skewness	Kurtosis
HEOI (Low Transfer-out Rate Imputation)	47.87	34.2	-0.1	-1.62
HEOI (Mean Transfer-out Rate Imputation	10.54	10.97	5.08	31.13
HEOI (High Transfer-out Rate Imputation)	8.09	11.59	4.86	28.32

Figures 1 through 3 demonstrate the distribution of all three HEOI variables. Figure 1 displays the bimodal nature of the HEOI based upon using the lowest reported transfer-out rate of 2 percent for missing values. While it does not match the normal distribution curve, the skewness and kurtosis demonstrate normally distributed data. Figure 2 displays normality of the HEOI (although it is positively skewed) based upon

using the mean reported transfer-out rate of 17.79 percent for missing values. Finally, Figure 3 displays the normality of the HEOI (which is even more positively skewed than Figure 2) based upon using the highest reported transfer-out rate of 37 percent for missing values. Based upon the skewness and kurtosis values, it makes sense to use only the HEOI variable developed using the lowest value for transfer-out rate as a method of imputing missing data. Conceptually, this also makes sense because the six-year graduation rate is in the 90 percent range for the institutions who did not report transfer-out rate. As a result, it is unlikely that a high percent of students would be transferring from these institutions.

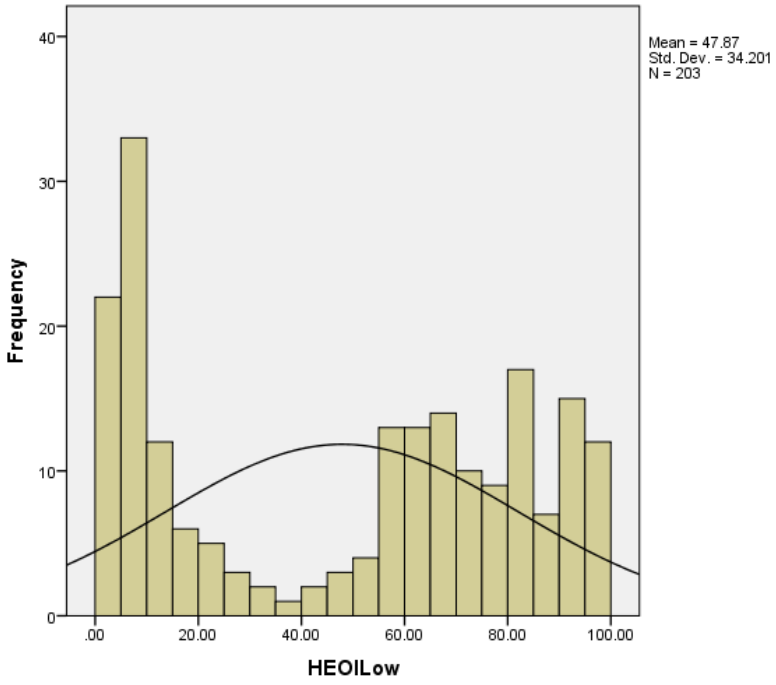


Figure 2. Histogram Demonstrating the Distribution of Higher Education Outcome Index Values Imputing the Lowest Reported Transfer-out Rate for Missing Data (Includes Normal Distribution Curve for Reference).

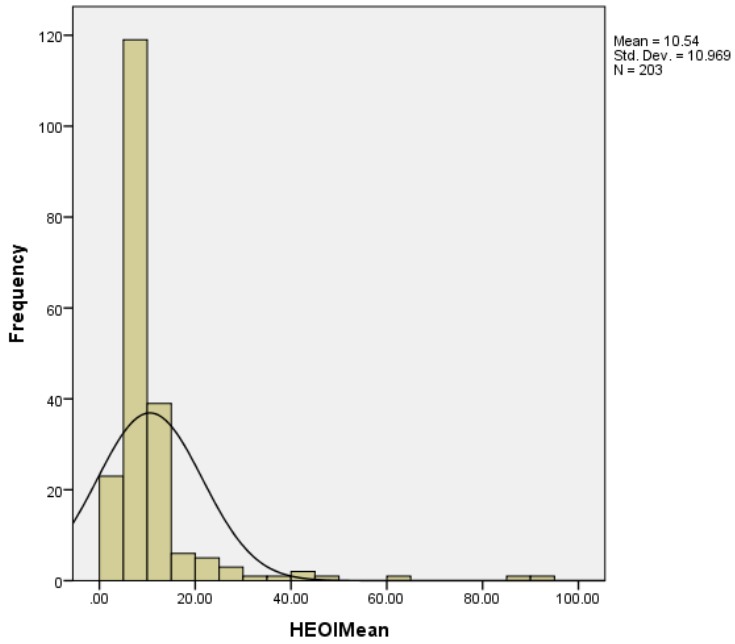


Figure 3. Histogram Demonstrating the Distribution of Higher Education Outcome Index Values Imputing the Mean Reported Transfer-out Rate for Missing Data (Includes Normal Distribution Curve for Reference)

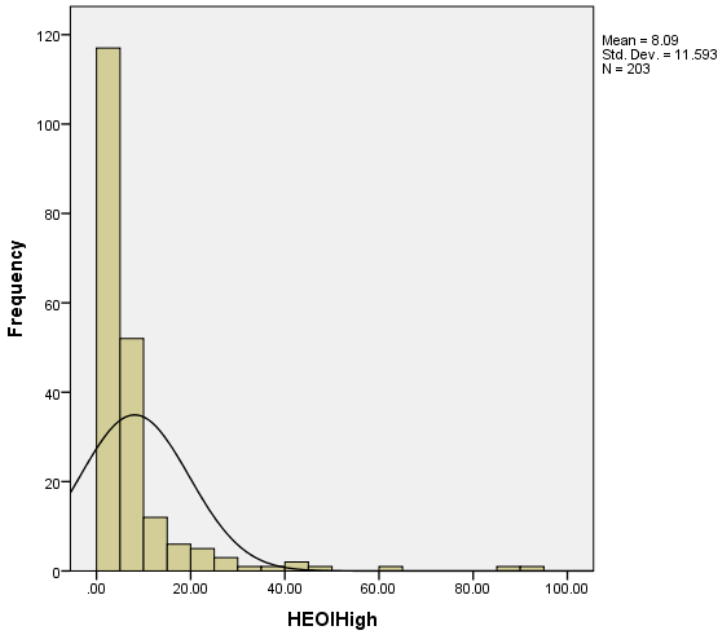


Figure 4. Histogram Demonstrating the Distribution of Higher Education Outcome Index Values Imputing the Highest Reported Transfer-out Rate for Missing Data (Includes Normal Distribution Curve for Reference)

Regression Analysis

***USNWR* Model.** The first model to be tested involves using the 17 variables included in the popular *USNWR* ranking system. As described in Chapter 2, this ranking system assigns weights to the different variables within seven categories. The purpose of this analysis is to determine if the variables included in the current *USNWR* rankings are predictive of higher education outcomes and statistically identify the appropriate weights for each variable. Figure 4 displays all variables to be included as predictors of the Higher Education Outcome Index. Since missing data was handled in three different manners, there were three separate regressions including each HEOI variable. A forward regression was conducted to determine the highest amount of variance explained using the simplest model (i.e., fewest number of predictors). The statistical power of all three analyses will be adequate as the sample size exceeds the accepted threshold of $N > 104 + k$ (121 cases) and $N > 50 + 8k$ (186 cases) (Warner, 2013). In this situation, k refers to the 17 variables within the analysis.

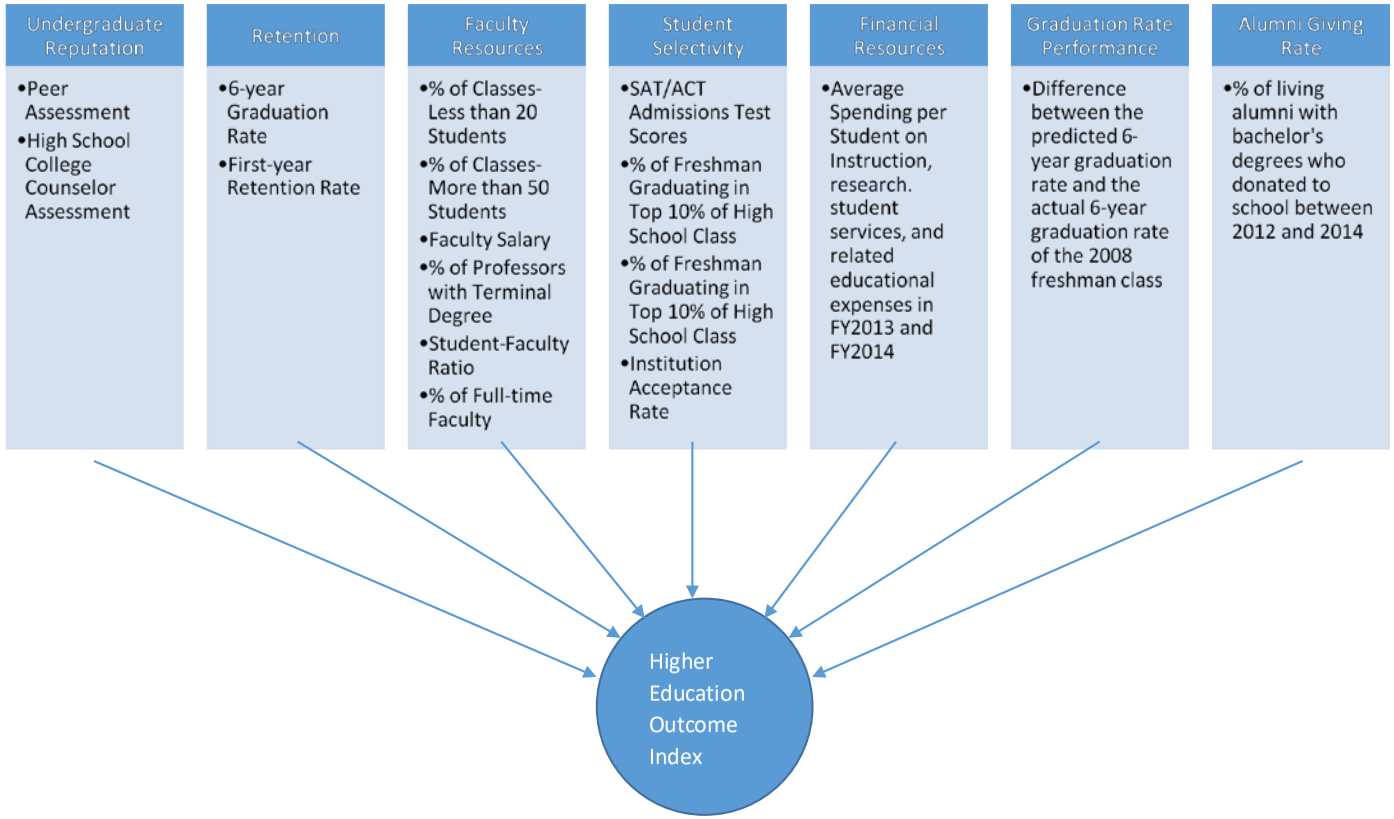


Figure 5. *USNWR* Model with the Relationship to the Higher Education Outcome Index to be Tested.

Table 9 displays the three steps to arrive at the final model with three variables explaining 47 percent of the variance in the HEOI (R^2 = .47, $F_{(22, 161)}$ = 7.05, p < .05). The regression indicates that the percent of freshman who graduated in the top 10 percent of their high school class (β = 0.45, p < .05) and the percent of the institution's classes with more than 50 students (β = -0.50, p < .05) were predictive of the HEOI. These results indicate a smaller percentage of classes with more than 50 students is associated with higher values of the HEOI. In addition, a higher percent of freshmen who graduated in the top ten percent of their graduating high school class is also associated with higher HEOI values.

Table 9:. Summary of Enter Regression Analysis for *USNWR* Variables Predicting HEOI Using Lowest Transfer-out Rate to Replace Missing Data (N = 203).

Variable	*β*	*t*	*Sig. (p)*
Percent of classes with more than 50 students	-0.50	-2.19	.030
Percent of freshmen graduating in the top 10% of high school class	0.45	2.06	.041

Note. R^2=.467 (p < .05)

PIRS Model. The second model to be tested involves using the three variables included in the proposed PIRS system. As described in Chapter 2, this ranking system includes variables within three categories. The purpose of this analysis is to determine if the variables included in the proposed rankings are predictive of higher education outcomes and statistically identify the appropriate weights for each variable. Figure 8 displays all variables to be included as predictors of the Higher Education Outcome Index. Since missing data was handled in three different manners, there were three separate regressions including each HEOI variable. A forward regression was conducted to determine the highest amount of variance explained using the simplest model (i.e., fewest number of predictors). The statistical power of all three analyses will be adequate

as the sample size exceeds the accepted threshold of $N > 104 + k$ (107 cases) and $N > 50 + 8k$ (74 cases) (Warner, 2013). In this situation, k refers to the 3 variables within the analysis.

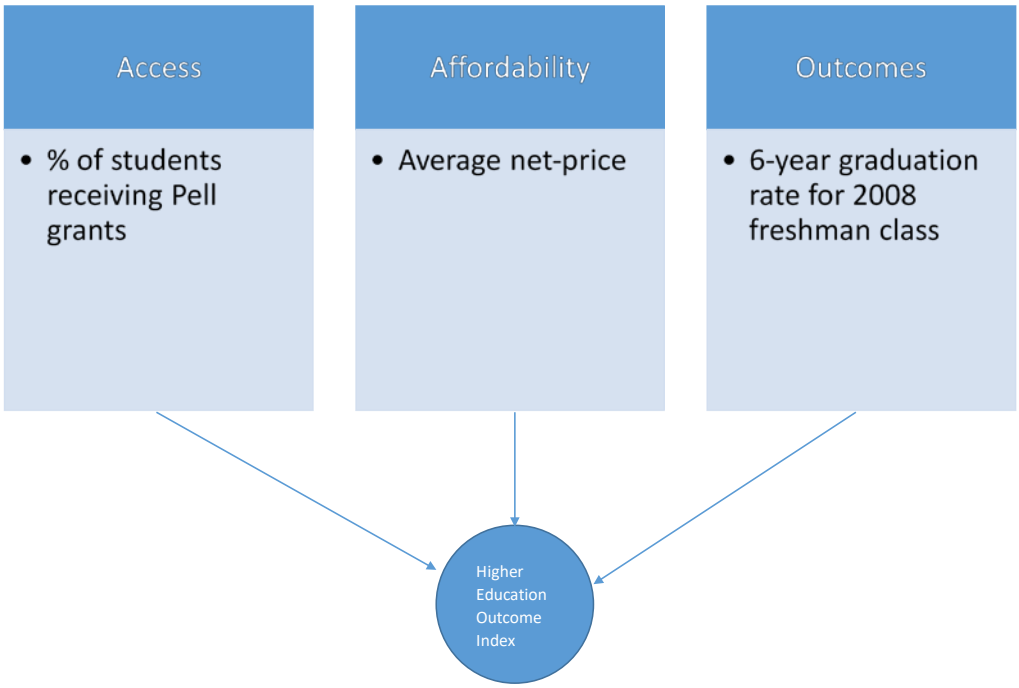


Figure 6. PIRS Model with the Relationship to the Higher Education Outcome Index to be Tested.

Table 4 displays the three steps to arrive at the final model with three variables explaining 35 percent of the variance in the HEOI ($R^2 = .35$, $F_{(3, 199)} = 35.84$, $p < .05$). The regression indicates that the six-year graduation rate for the 2008 freshman class ($\beta = 0.56$, $p < .05$) and the average net-price ($\beta = 0.16$, $p < .05$) were predictive of the HEOI. These results indicate that a higher six-year graduation rate and a higher average net-price is associated with higher HEOI values.

Table 10. Summary of Enter Regression Analysis for PIRS Variables Predicting HEOI Using Lowest Transfer-out Rate to Replace Missing Data (N = 203).

Variable	*β*	*t*	*Sig. (p)*
6-year graduation rate for 2008 freshman class	0.56	8.01	.000
Average Net-price for 2014	0.16	2.57	.011

Note. R^2=.351 ($p < .05$)

IPEDS Model. The final model to be tested involves using 36 variables included from data publicly available from IPEDS system. As described in Chapter 2, this ranking system contains variables within five categories. The purpose of this analysis is to determine if the variables included in the proposed rankings are predictive of higher education outcomes and statistically identify the appropriate weights for each variable. Figure 12 displays all variables to be included as predictors of the Higher Education Outcome Index. Since missing data was handled in three different manners, there were three separate regressions including each HEOI variable. A forward regression was conducted to determine the highest amount of variance explained using the simplest model (i.e., fewest number of predictors). The statistical power of all three analyses was adequate as the sample size exceeds the accepted threshold of $N > 104 + k$ (140 cases). However, using the second standard of $N > 50 + 8k$ (338 cases) this sample size is smaller than suggested by 134 cases (Warner, 2013). In this situation, *k* refers to the 36 variables within the analysis.

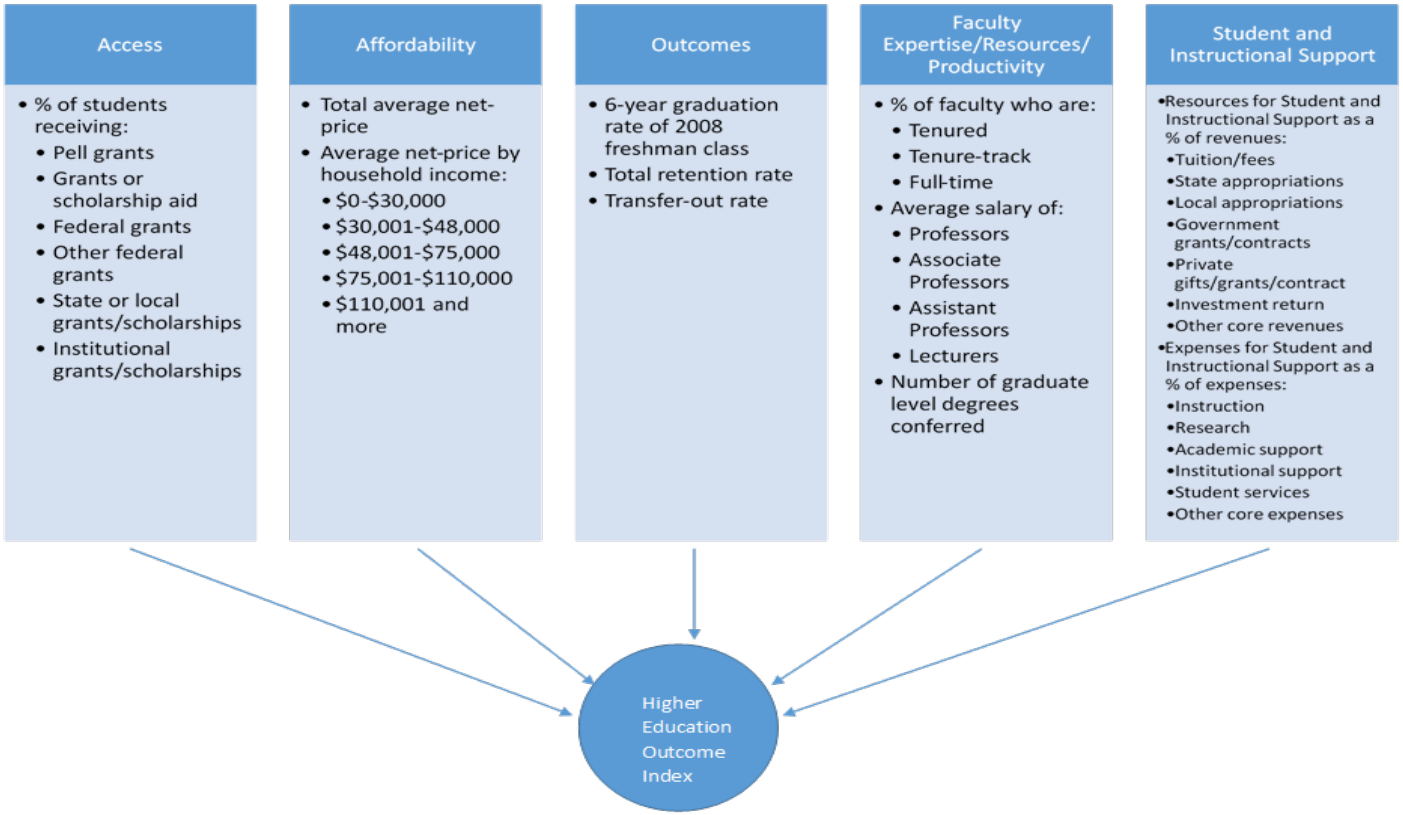


Figure 7. IPEDS Model with the Relationship to the Higher Education Outcome Index to be Tested.

Table 11 displays the three steps to arrive at the final model with three variables explaining 54 percent of the variance in the HEOI (R^2 = .54, $F_{(36, 153)}$ = 4.97, p < .05). The regression indicates that the percent of faculty who are tenure-track (β = -0.12, p < .05) was predictive of the HEOI. Interestingly, after all the variables that were entered into the model, results indicate that only a lower percentage of faculty who are tenure-track is associated with higher HEOI values.

Table 11. Summary of Enter Regression Analysis for IPEDS Variables Predicting HEOI Using Lowest Transfer-out Rate to Replace Missing Data (N = 203).

Variable	*β*	*t*	*Sig. (p)*
Percent of faculty who are tenure-track	-0.12	-1.99	.048

Note. R^2=.539 (p < .05)

Alternate Regression Model Testing

The results of the initial regressions provided no more than two predictors of HEOI. Using so few variables in a ranking system would be problematic in that we cannot use so little information as an indicator of institutional effectiveness. As a result, a different approach was also used to gain more information. Since the IPEDS model does not have a theoretical model associated with the variables included, another regression procedure is a forward regression to determine the predictors associated with the HEOI. According to Warner (2013), this is not the ideal situation but can come up with higher percent of the variance explained in the model. Considering the largest percent variance explained was just over 50 percent in the initial regressions, using the forward method might explain more of the variance in HEOI. Explaining more of the variance in the dependent variable is beneficial when determining a higher education ranking system. Therefore, all three models were analyzed using the forward regression method.

***USNWR* Model 1 (HEOI Using Low Transfer-out Rate Imputation).** The first multiple regression analysis was used to determine if the variables included within the *USNWR* rankings are predictive of the HEOI variable calculated using the lowest value method of imputation. Table 12 displays the three steps to arrive at the final model with three variables explaining 44 percent of the variance in the HEOI (R^2 = .44, $F_{(3, 178)}$ = 46.24, $p < .05$). The regression indicates that the percent of freshman who graduated in the top 10 percent of their high school class (β = 0.53, $p < .05$), the percent of the institution's classes with more than 50 students (β = -0.15, $p < .05$), and the average spending per student on instruction/research by rank relative to other institutions (β = -0.17, $p < .05$) were predictive of the HEOI. As with the initial analysis, a higher percentage of freshmen graduating in the top ten percent of their graduating class and a lower percentage of classes with less than 50 students is associated with higher HEOI values. An additional finding is that a lower average spending per student is associated with higher HEOI values.

Table 12. Summary of Forward Regression Analysis for *USNWR* Variables Predicting HEOI Using Lowest Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Percent of freshman graduating in top 10%	0.78	0.07	0.63**	0.81	0.71	0.65**	0.66	0.10	0.53**
Percent of classes with more than 50 students				-0.85	0.28	-0.17**	-0.73	0.28	-0.15*
Average spending per student on instruction/research							-0.08	0.04	-0.17*
R^2		.39			.42			.44	
F for change in R^2		116.98**			8.95**			4.82*	

*Note. * p < .05, ** p < .01 (two-tailed).*

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure

8). There does not seem to be any outliers in this regression. There does appear to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

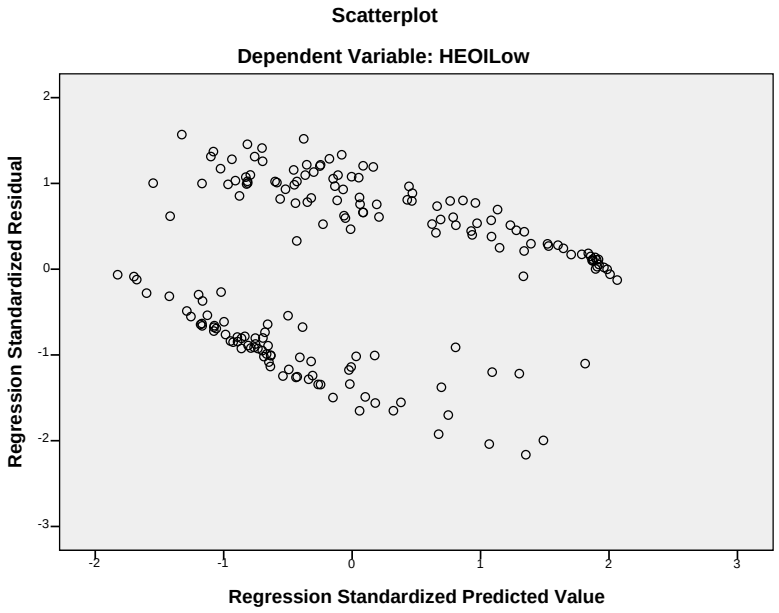


Figure 8. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (Low) from the Predictors Within the USNWR Model.

***USNWR* Model 2 (HEOI Using Mean Transfer-out Rate Imputation).** The second multiple regression analysis was used to determine if the variables included within the *USNWR* rankings are predictive of the HEOI variable calculated using the mean method of imputation. Table 13 displays the three steps to arrive at the final model with three variables explaining 20 percent of the variance in the HEOI (R^2 = .20, $F_{(3, 178)}$ = 14.96, p < .05). The regression indicates that the six-year graduation rate for the 2008 freshman class (β = 0.32, p < .05), the student to faculty ratio (β = 0.23, p < .05), and institutional acceptance rate (β = -0.24p < .05) were predictive of the HEOI. These results indicate that a higher six-year graduation rate and a higher student to faculty ratio is associated with higher HEOI values. Another finding is that a lower acceptance rate (i.e., greater selectivity) is associated with higher HEOI values. One interesting finding here is

that three different variables are predictive of HEOI when using mean transfer-out rate in place of missing data as opposed to the first analysis. In addition, a smaller percent of the variance is explained using this second method of imputation.

Table 13. Summary of Forward Regression Analysis for USNWR Variables Predicting HEOI Using Mean Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
6-year graduation rate for 2008 freshman class	0.32	0.05	0.40**	0.38	0.06	0.48**	0.25	0.09	0.32**
Student to faculty ratio				0.43	0.19	0.18*	0.56	0.20	0.23**
Institution acceptance rate							-0.12	0.06	-0.24*
R^2		.16			.18			.20	
F for change in R^2		33.76**			5.28*			4.29*	

Note. * $p < .05$, ** $p < .01$ (two-tailed).

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 9). There are some outliers in this particular regression. Specifically, there are three outliers more than four standard deviations from the mean. Future analyses could remove these outliers to determine if this would change the results of the regression. There also appears to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

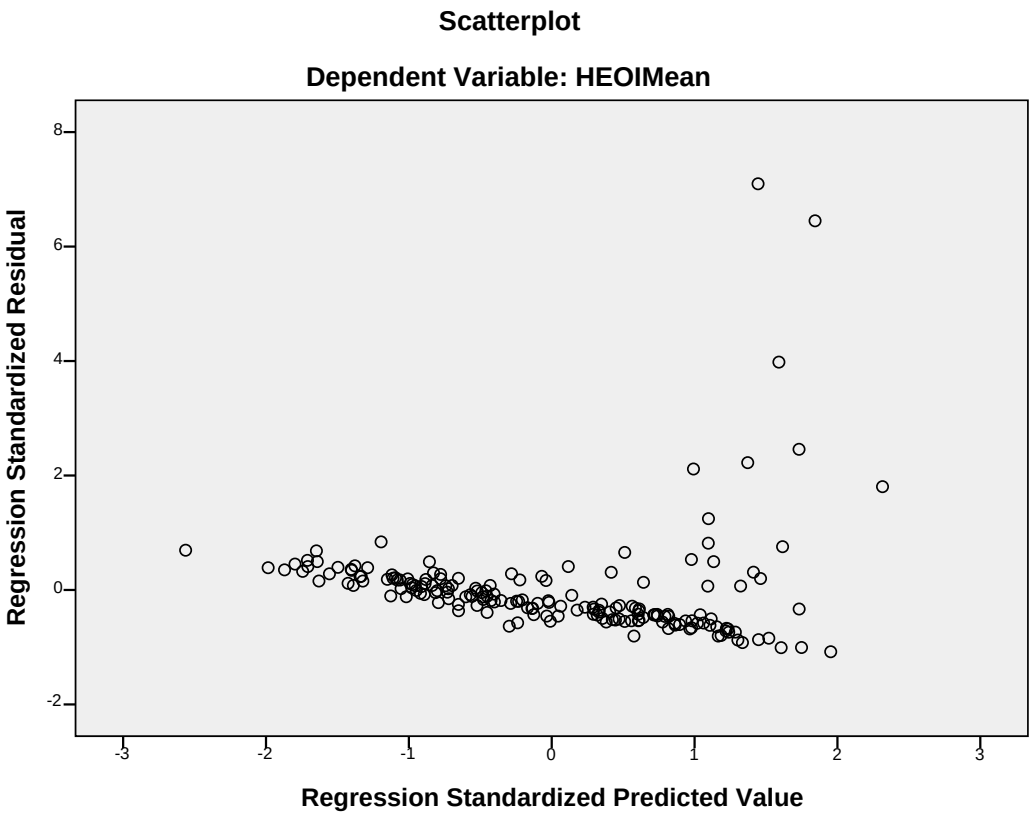


Figure 9. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (Mean) from the Predictors Within the USNWR Model.

***USNWR* Model 3 (HEOI Using High Transfer-out Rate Imputation).** The final multiple regression analysis for the *USNWR* model was used to determine if the variables included within the *USNWR* rankings are predictive of the HEOI variable calculated using the high transfer-out method of imputation. Table 14 displays the three steps to arrive at the final model with three variables explaining 13 percent of the variance in the HEOI (R^2 = .13, $F_{(3, 178)}$ = 8.99, p < .05). The regression indicates that the first year retention rate (β = 0.46, p < .05), the student to faculty ratio (β = 0.17, p < .05), and the percent of faculty who have a terminal degree (β = -0.17, p < .05) were predictive of the HEOI. As with the second *USNWR* model, a higher student to faculty ratio was associated with higher HOEI values. Another two different variables were predictive of

HEOI. Higher first year retention rate and a lower percentage of faculty with a Ph.D. or terminal degree was associated with higher HEOI values. Once again, the percent of variance explained in this model is less than the other two models.

Table 14. Summary of Forward Regression Analysis for USNWR Variables Predicting HEOI Using Highest Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
First year retention rate	0.48	0.12	0.30**	0.59	0.12	0.36**	0.75	0.15	0.46**
Student to faculty ratio				0.43	0.20	0.17*	0.43	0.20	0.17*
Percent of faculty with terminal degrees							-0.28	0.14	-0.17*
R^2		.09			.11			.13	
F for change in R^2		17.29**			4.74*			4.18*	

*Note. * p < .05, ** p < .01 (two-tailed).*

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 10). There are some outliers in this particular regression. As with the previous analysis, there are three outliers that are more than four standard deviations from the mean. Future analyses could remove these outliers to determine if this would change the results of the regression analysis. There also appears to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

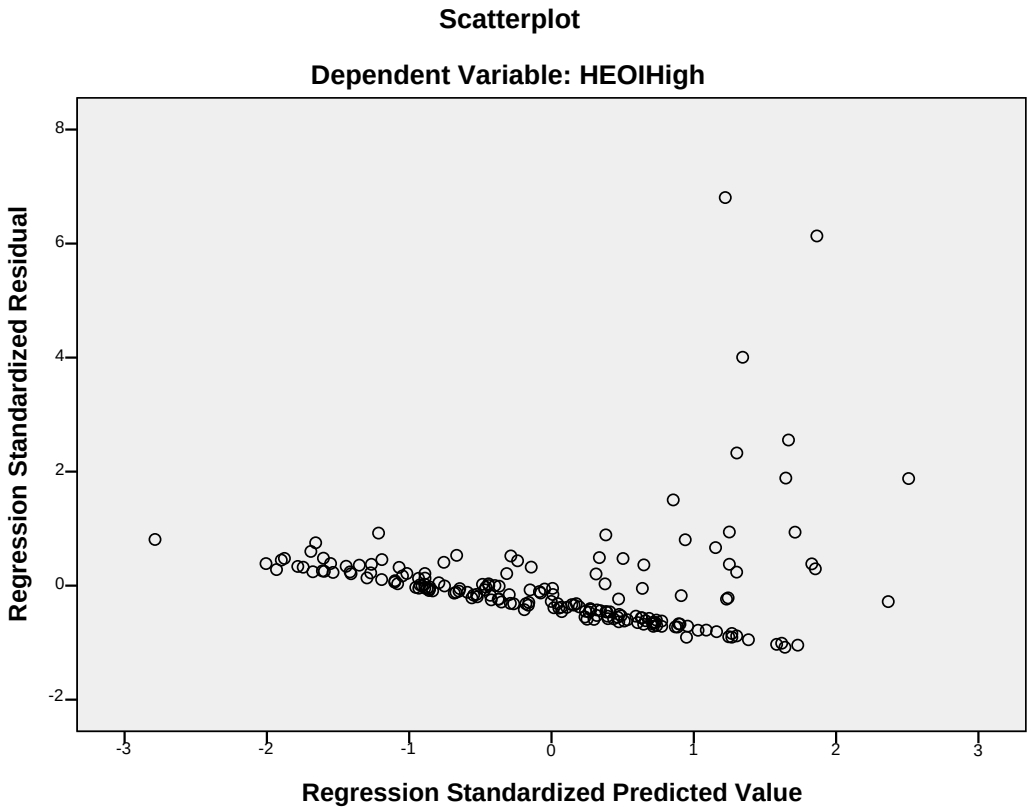


Figure 10. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (High) from the Predictors Within the USNWR Model.

PIRS Model 1 (HEOI Using Low Transfer-out Rate Imputation). The first multiple regression analysis was used to determine if the variables included within the PIRS rankings are predictive of the HEOI variable calculated using the lowest value method of imputation. Table 15 displays the two steps to arrive at the final model with three variables explaining 35 percent of the variance in the HEOI (R^2 = .35, $F_{(2, 200)}$ = 53.6, p < .05). The regression indicates that the six-year graduation rate for the 2008 freshman class (β = 0.57, p < .05) and the average net-price for 2014 (β = 0.15, p < .05) were predictive of the HEOI. The results indicate a higher six-year graduation rate and a higher average net-price is associated with higher HOEI values.

Table 15. Summary of Forward Regression Analysis for PIRS Variables Predicting HEOI Using Lowest Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
6-year graduation rate for 2008 freshman class	1.40	0.14	0.57**	1.29	0.15	0.57**
Average net-price for 2014				0.01	0.00	0.15*
R^2		.33			.35	
F for change in R^2		98.57**			6.15*	

Note. * $p < .05$, ** $p < .01$ (two-tailed).

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 11). There does not seem to be any outliers in this regression. There does appear to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

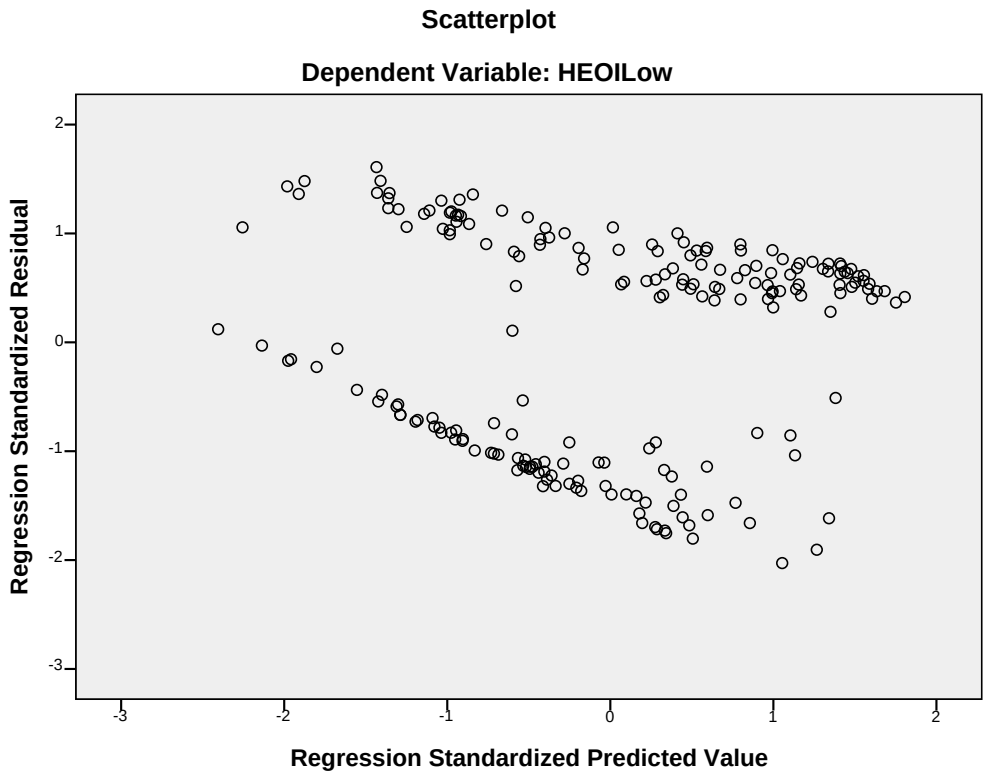


Figure 11. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (Low) from the Predictors Within the PIRS Model.

PIRS Model 2 (HEOI Using Mean Transfer-out Rate Imputation). The second multiple regression analysis was used to determine if the variables included within the PIRS rankings are predictive of the HEOI variable calculated using the mean method of imputation. Table 16 displays the two steps to arrive at the final model with three variables explaining 18 percent of the variance in the HEOI (R^2 = .18, $F_{(2, 200)}$ = 23.11, p < .05). The regression indicates that the six-year graduation rate for the 2008 freshman class (β = 0.45, $t_{(200)}$ = 6.78, p < .05) and the average net-price for 2014 (β = -0.16, $t_{(200)}$ = -2.38, p < .05) were predictive of the HEOI. The results indicate a higher six-year graduation rate and a lower average net-price is associated with higher HOEI values. The percent of the variance explained in this model is less than the previous PIRS model.

Table 16. Summary of Forward Regression Analysis for PIRS Variables Predicting HEOI Using Mean Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
6-year graduation rate for 2008 freshman class	0.32	0.05	0.41**	0.35	0.05	0.45**
Average net-price for 2014				0.00	0.00	-0.16*
R^2		.17			.18	
F for change in R^2		39.64**			5.66*	

Note. * p < .05, ** p < .01 (two-tailed).

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 12). There are some outliers in this particular regression. Specifically, there are three outliers lying more than four standard deviations from the mean. Future data analyses could remove these outliers to see if that would change the results of the regression analysis. There also appears to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

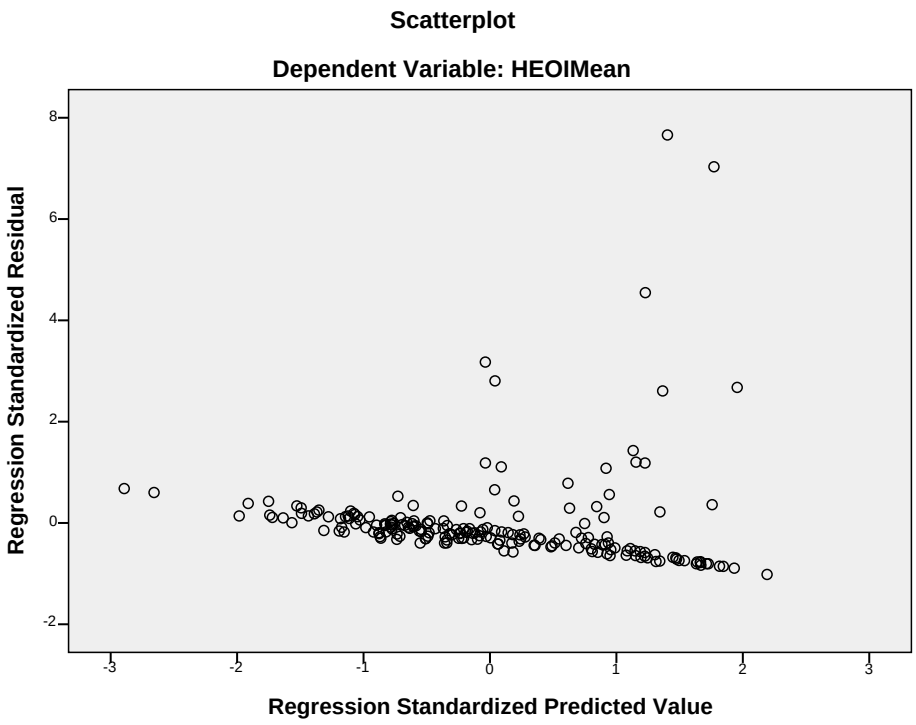


Figure 12. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (Mean) from the Predictors Within the PIRS Model.

PIRS Model 3 (HEOI Using High Transfer-out Rate Imputation). The final multiple regression analysis for the PIRS model was used to determine if the variables included within the PIRS rankings are predictive of the HEOI variable calculated using the lowest value method of imputation. Table 17 displays the two steps to arrive at the final model with three variables explaining 12 percent of the variance in the HEOI (R^2 = .12, $F_{(2, 200)} = 13.8$, $p < .05$). The regression indicates that the six-year graduation rate for the 2008 freshman class ($\beta = 0.35$, $t_{(200)} = 5.09$, $p < .05$) and the average net-price for 2014 ($\beta = -0.19$, $t_{(200)} = -2.72$, $p < .05$) were predictive of the HEOI. The results indicate a higher six-year graduation rate and a lower average net-price is associated with higher HOEI values. Again, this model explains less of the variance than the initial PIRS model.

Table 17. Summary of Forward Regression Analysis for PIRS Variables Predicting HEOI Using Highest Transfer-out Rate to Replace Missing Data (N = 203).

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
6-year graduation rate for 2008 freshman class	0.25	0.06	0.30**	0.29	0.06	0.35**
Average net-price for 2014				0.00	0.00	-0.19**
R^2		.09			.12	
F for change in R^2		19.58**			7.40**	

Note. * $p < .05$, ** $p < .01$ (two-tailed).

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 11). There are some outliers in this particular regression. Specifically, there are three outliers lying more than four standard deviations from the mean. Future data analyses could remove these outliers to see if that would change the results of the regression analysis. There also appears to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

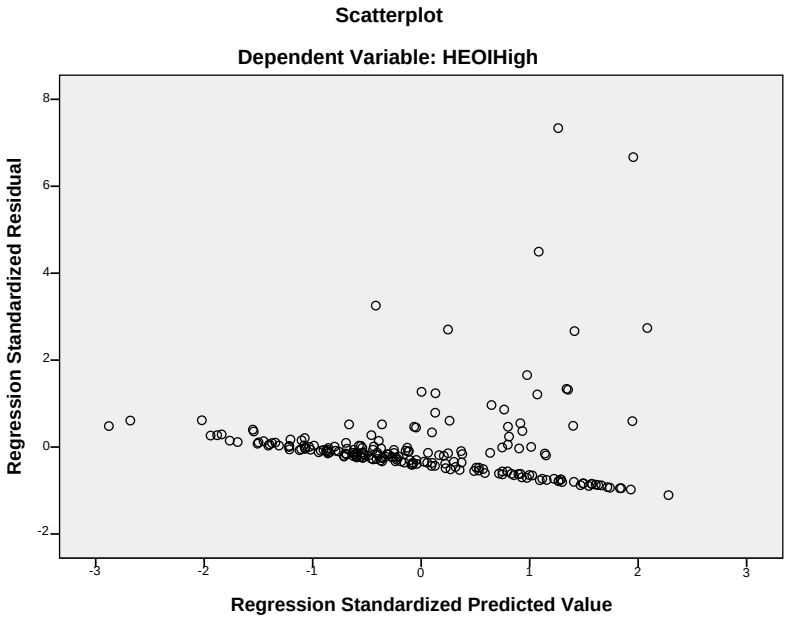


Figure 13. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (High) from the Predictors Within the PIRS Model.

IPEDS Model (HEOI Using all Three Methods of Transfer-out Rate Imputation). It was intended that three multiple regression analysis were to be used to determine if the variables included within the IPEDS rankings are predictive of the HEOI variable calculated using three different methods of imputation. When all three regressions were completed, the results for all three were exactly the same. With that said, table 18 displays the six steps to arrive at the final model with six variables explaining 70 percent of the variance in the HEOI (R^2 = .70, $F_{(6, 82)}$ = 31.37, p < .05) found in each regression analysis. The regression indicates that net-price by household income-over $110,000 ($\beta$ = 0.59, p < .05), 2014 transfer-out rate (β = -0.50, p < .05), net-price by household income-$48,001-$75,000 (β = -0.48, p < .05), the percent of degrees conferred that are graduate level (β = 0.21, p < .05), the percent of total institutional resources in 2013-2014 from government contracts and grants (β = 0.15, p < .05), and the percent of full-time faculty (β = 0.07, p = .40) were predictive of the HEOI. Of note is that the percent of full-time faculty variable was predictive of HEOI up until the last step. These results indicate higher net-price for households earning over $110,000, lower transfer-out rate, lower net-price for household income between $48,001 and $75,000, a higher percentage of graduate-level degrees, and a higher percentage of resources in 2013-2014 from government contracts and grants are associated with higher HEOI values.

Table 18. Summary of Forward Regression Analysis for IPEDS Variables Predicting HEOI-All Three Methods of Imputing Transfer-out Rate Missing Data (N = 203).

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Transfer-out rate	-1.29	0.14	-0.71	-1.24	0.13	-0.69	-1.18	0.13	-0.65	-1.12	0.13	-0.62	-0.94	0.13	-0.52	-0.90	0.13	-0.50
Percent of conferred degrees that are graduate level				0.40	0.11	0.27	0.47	0.11	0.31	0.36	0.11	0.24	0.34	0.11	0.23	0.31	0.10	0.21
Percent of full-time faculty							0.24	0.10	0.17	0.38	0.12	0.26	0.19	0.12	0.13	0.11	0.13	0.07
Net price by household income-over $110000										0.00	0.00	0.21	0.00	0.00	0.52	0.00	0.00	0.59
Net price by household income-$48,001 to $75000													-0.00	0.00	-0.45	-0.00	0.00	-0.48
Percent of resources from government grants/contracts																0.25	0.12	0.16
R^2		.51			.58			.61			.63			.68			.70	
F for change in R^2		89.89**			14.77**			5.45*			6.12*			12.23**			4.55*	

Note. * $p < .05$, ** $p < .01$ (two-tailed).

To make sure all assumptions for conducting a regression have been met, the standardized residuals were plotted against the standardized predicted values (see Figure 14). The scatter plots for all three regressions were the same. There are some outliers in all three regressions. Specifically, there are three outliers more than four standard deviations from the means with four others between two and four standard deviations from the mean. Future analyses could remove the outliers to see if this changes the regression analysis. There also appears to be a pattern in the residuals, so caution should be taken in the interpretation of these results.

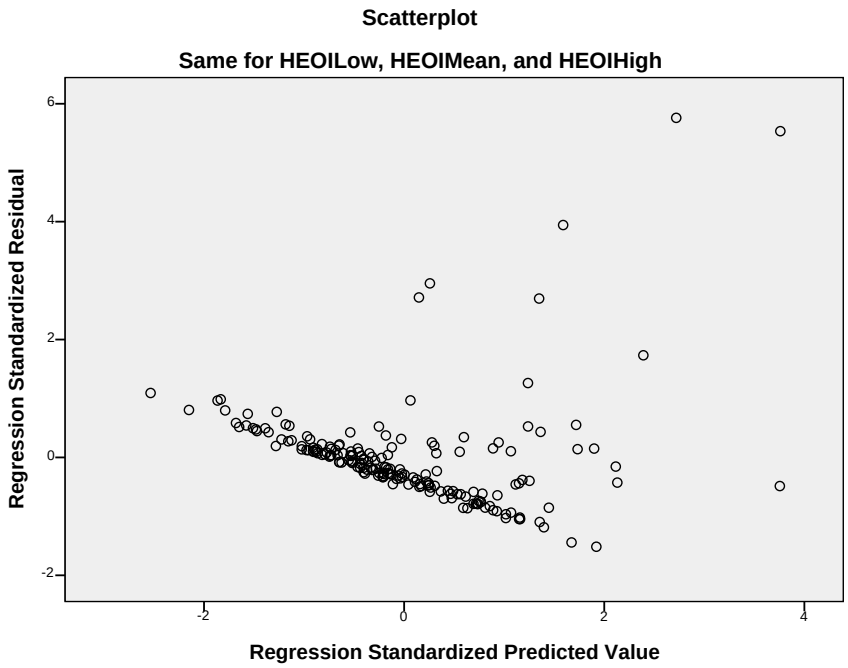


Figure 14. Scatter Plot to Assess Standardized Residuals from the Linear Regression to Predict HEOI (Low) from the Predictors Within the IPEDS Model.

Regression Summary

The first hypothesis of this study was an IPEDS model including more variables would be better than either of the other two models. This hypothesis was supported with the IPEDS model explaining 70 percent, the *USNWR* model explaining 13 to 44 percent,

and the PIRS model explaining 12 to 35 percent of the variance in HEOI values. For both the *USNWR* and PIRS models, a higher percent of the variance was explained when imputing the lowest transfer-out rate to calculate the HEOI. The lowest percent of variance was explained when using the highest transfer-out rate to calculate the HEOI. A possible explanation for this could be due to the severe nonnormality of the other two HEOI variables when using mean imputation and highest reported transfer-out rate imputation.

While the analyses presented have produced separate models predicting an index of higher education outcomes, care must be taken when interpreting the results. A forward regression was used to determine the simplest model predicting the highest amount of variance in each HEOI. One issue with this is some of the predictors could be significant due to an increase in the chance of a Type I error. To reduce the likelihood of this being an issue, adjustments were made by setting a minimum *F*-value for inclusion in the model, which was 3.0 (Warner, 2013).

Question 2: How does a new ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

Using the models attained from the three linear regressions, the top 203 universities in the USNWR ranking can be re-ranked using the statistically significant predictors of the HEOI. Table 11 displays the new rankings based upon the mean method of imputing missing data for the HEOI value for all three models. The mean method of imputation was used because it is an acceptable method of estimating missing data (Warner, 2013). All three models result in different institution rankings when compared to the original *USNWR* 2016 National Best Universities List. Some changes in the

rankings very large are very large with one extreme example of a university at the very bottom of the list in the original ranking jumping to the top when using an alternate model. When the new rankings are based upon the new predictors and weights of the *USNWR* ranking, the University of Central Florida makes the biggest improvement of 100 places from 168 in the official rankings to 68 in the new rankings. Duquesne University makes the largest drop of 86 places from 115 down to 201. When the new rankings are based upon the predictors and weights from the PIRS ranking, the University of Central Florida makes the biggest improvement of 187 places from 194 in the official rankings to 7 in the new rankings. The University of Chicago makes the largest drop of 195 places from a tie for fourth down to 195. Finally, when the new rankings are based upon the predictors and weights of the IPEDS ranking, Edgewood College makes the biggest improvement of 109 places from 175 in the official rankings to 66 in the new rankings. Georgia Institute of Technology makes the largest drop of 149 places from 36 down to 185. Table 19 displays each institution's original position in the USNWR Best National Universities list and their new rankings based upon the statistically derived rankings.

Table 19. New Rankings for the 203 Universities from the USNWR Best National Universities List.

Institution	Original	USNWR	PIRS	IPEDS
Princeton University	**1**	3 (-2)	109 (-108)	35 (-34)
Harvard University	**2**	1 (1)	64 (-62)	4 (-2)
Yale University	**3**	4 (-1)	114 (-111)	16 (-13)
University of Chicago	**4**	12 (-8)	195 (-191)	10 (-6)
Columbia University	**4**	5 (-1)	121 (-117)	6 (-2)
Stanford University	**4**	6 (-2)	100 (-96)	11 (-7)
Massachusetts Institute of Technology	**7**	11 (-4)	131 (-124)	1 (6)
Duke University	**8**	8 (-)	127 (-119)	17 (-9)
University of Pennsylvania	**9**	7 (2)	134 (-125)	21 (-12)

Table 19. cont.

Institution	Original	USNWR	PIRS	IPEDS
California Institute of Technology	**10**	20 (-10)	152 (-142)	7 (3)
Johns Hopkins University	**10**	13 (-3)	143 (-133)	15 (-5)
Northwestern University	**12**	16 (-4)	163 (-151)	9 (3)
Dartmouth College	**12**	9 (3)	126 (-114)	5 (7)
Brown University	**14**	2 (12)	124 (-110)	2 (12)
Cornell University	**15**	18 (-3)	162 (-147)	12 (3)
Washington University in St. Louis	**15**	19 (-4)	189 (-174)	14 (1)
Vanderbilt University	**15**	17 (-2)	129 (-114)	23 (-8)
University of Notre Dame	**18**	21 (-3)	153 (-135)	19 (-1)
Rice University	**18**	22 (-4)	119 (-101)	30 (-12)
University of California-Berkeley	**20**	10 (10)	89 (-69)	40 (-20)
Emory University	**21**	29 (-8)	160 (-139)	20 (1)
Georgetown University	**21**	14 (7)	145 (-124)	13 (8)
Carnegie-Mellon University	**23**	26 (-3)	191 (-168)	26 (-3)
University of California-Los Angeles	**23**	15 (8)	24 (-1)	43 (-20)
University of Southern California	**23**	24 (-1)	175 (-152)	18 (5)
University of Virginia	**26**	25 (1)	41 (-15)	83 (-57)
Tufts University	**27**	23 (4)	147 (-120)	8 (19)
Wake Forest University	**27**	37 (-10)	146 (-119)	3 (24)
University of Michigan-Ann Arbor	**29**	27 (2)	76 (-47)	63 (-34)
Boston College	**30**	31 (-1)	148 (-118)	25 (5)
University of North Carolina-Chapel Hill	**30**	28 (2)	10 (20)	70 (-40)
New York University	**32**	48 (-16)	197 (-165)	29 (3)
University of Rochester	**33**	46 (-13)	186 (-153)	27 (6)
Brandeis University	**34**	35 (-1)	149 (-115)	22 (12)
College of William and Mary	**34**	32 (2)	23 (11)	41 (-7)
Georgia Institute of Technology	**36**	36 (-)	19 (17)	185 (-149)
Case Western Reserve University	**37**	55 (-18)	164 (-127)	58 (-21)
University of California-Santa Barbara	**37**	34 (3)	63 (-26)	39 (-2)
University of California-Irvine	**39**	33 (6)	18 (21)	49 (-10)
University of California-San Diego	**39**	30 (9)	38 (1)	52 (-13)
Boston University	**41**	41 (-)	180 (-139)	28 (13)
Rensselaer Polytechnic University	**41**	45 (-4)	200 (-150)	62 (-21)
Tulane University	**41**	40 (1)	181 (-140)	47 (-6)
University of California-Davis	**41**	38 (3)	82 (-41)	46 (-5)
University of Illinois-Urbana-Champaign	**41**	72 (-31)	83 (-42)	72 (-31)
University of Wisconsin-Madison	**41**	57 (-16)	81 (-40)	115 (-74)
Lehigh University	**47**	39 (8)	157 (-110)	24 (23)
Northeastern University	**47**	42 (5)	168 (-121)	33 (14)
Pennsylvania State University-University Park	**47**	56 (-9)	139 (-92)	88 (-41)

Table 19. cont.

Institution	Original	USNWR	PIRS	IPEDS
University of Florida	**47**	43 (4)	55 (-8)	110 (-63)
University of Miami	**51**	52 (-1)	188 (-137)	57 (-6)
Ohio State University-Columbus	**52**	60 (-8)	104 (-52)	119 (-67)
Pepperdine University	**52**	44 (8)	156 (-104)	48 (4)
University of Texas-Austin	**52**	47 (5)	92 (-40)	82 (-30)
University of Washington	**52**	59 (-7)	8 (44)	50 (2)
Yeshiva University	**52**	112 (-60)	150 (-98)	111 (-59)
George Washington University	**57**	66 (-9)	182 (-125)	31 (26)
University of Connecticut	**57**	64 (-7)	113 (-56)	101 (-44)
University of Maryland-College Park	**57**	54 (3)	59 (-2)	105 (-48)
Worcester Polytechnic Institute	**57**	51 (6)	202 (-145)	56 (1)
Clemson University	**61**	67 (-6)	91 (-30)	189 (-128)
Southern Methodist University	**61**	87 (-26)	194 (-133)	38 (23)
Syracuse University	**61**	78 (-17)	165 (-104)	32 (29)
University of Georgia	**61**	73 (-12)	31 (30)	197 (-136)
Purdue University-West Lafayette	**61**	76 (-15)	29 (32)	94 (-33)
Brigham Young University-Provo	**66**	58 (8)	22 (44)	171 (-105)
Fordham University	**66**	69 (-3)	198 (-132)	69 (-3)
University of Pittsburgh	**66**	71 (-5)	136 (-70)	112 (-46)
University of Minnesota-Twin Cities	**69**	61 (8)	71 (-2)	86 (-17)
Texas A&M University-College Station	**70**	94 (-24)	16 (54)	108 (-38)
Virginia Tech	**70**	98 (-28)	106 (-36)	98 (-28)
American University	**72**	62 (10)	192 (-120)	36 (36)
Baylor University	**72**	91 (-19)	196 (-124)	65 (7)
Rutgers, The State University of New Jersey-New Brunswick	**72**	88 (-16)	79 (-7)	92 (-20)
Clark University	**75**	83 (-8)	140 (-65)	55 (20)
Colorado School of Mines	**75**	53 (22)	142 (-67)	137 (-62)
Indiana University-Bloomington	**75**	109 (-34)	14 (61)	89 (-14)
Michigan State University	**75**	89 (-14)	57 (18)	116 (-41)
Stevens Institute of Technology	**75**	65 (10)	176 (-101)	59 (16)
University of Delaware	**75**	86 (-11)	67 (8)	96 (-21)
University of Massachusetts-Amherst	**75**	85 (-10)	110 (-35)	79 (-4)
Miami University-Oxford	**82**	89 (-7)	128 (-46)	148 (-66)
Texas Christian University	**82**	79 (3)	174 (-92)	45 (37)
University of California-Santa Cruz	**82**	75 (7)	54 (28)	42 (40)
University of Iowa	**82**	148 (-66)	46 (36)	166 (-84)
Marquette University	**86**	96 (-10)	184 (-98)	64 (22)
University of Denver	**86**	123 (-37)	190 (-104)	44 (42)
University of Tulsa	**86**	80 (6)	159 (-73)	81 (5)

Table 19. cont.

Institution	Original	USNWR	PIRS	IPEDS
Binghamton University-SUNY	**89**	49 (40)	70 (19)	146 (-57)
North Carolina State University-Raleigh	**89**	81 (8)	35 (54)	100 (-11)
Stony Brook University-SUNY	**89**	74 (15)	33 (56)	160 (-71)
SUNY College of Environmental Science and Forestry	**89**	93 (-4)	105 (-16)	140 (-51)
University of Colorado-Boulder	**89**	149 (-60)	123 (-34)	113 (-24)
University of San Diego	**89**	70 (19)	179 (-90)	37 (52)
University of Vermont	**89**	108 (-19)	95 (-6)	87 (2)
Florida State University	**96**	63 (33)	90 (6)	173 (-77)
Saint Louis University	**96**	107 (-11)	193 (-97)	75 (21)
University of Alabama	**96**	82 (14)	111 (-15)	158 (-62)
Drexel University	**99**	181 (-82)	201 (-102)	60 (39)
Loyola University Chicago	**99**	104 (-5)	173 (-74)	77 (22)
University at Buffalo-SUNY	**99**	99 (-)	52 (47)	170 (-71)
Auburn University	**102**	140 (-38)	108 (-6)	156 (-54)
University of Missouri	**103**	130 (-27)	94 (9)	131 (-28)
University of Nebraska-Lincoln	**103**	115 (-12)	65 (38)	141 (-38)
University of New Hampshire	**103**	114 (-11)	120 (-17)	80 (23)
University of Oregon	**103**	126 (-23)	44 (59)	118 (-15)
University of Tennessee	**103**	129 (-26)	99 (4)	175 (-72)
Illinois Institute of Technology	**108**	103 (5)	133 (-25)	91 (17)
Iowa State University	**108**	162 (-54)	39 (69)	155 (-47)
University of Dayton	**108**	84 (24)	185 (-77)	84 (24)
University of Oklahoma	**108**	154 (-46)	93 (15)	152 (-44)
University of San Francisco	**108**	106 (2)	183 (-75)	34 (74)
University of South Carolina	**108**	101 (7)	101 (7)	159 (-51)
University of the Pacific	**108**	105 (3)	187 (-79)	53 (55)
Clarkson University	**115**	100 (15)	161 (-46)	68 (47)
Duquesne University	**115**	201 (-86)	154 (-39)	90 (25)
Temple University	**115**	111 (4)	116 (-1)	129 (-14)
University of Kansas	**115**	193 (-78)	102 (13)	150 (-35)
University of St. Thomas	**115**	163 (-48)	170 (-55)	76 (39)
University of Utah	**115**	176 (-61)	12 (103)	165 (-50)
University of Arizona	**121**	146 (-25)	75 (46)	136 (-15)
University of California-Riverside	**121**	92 (29)	30 (46)	51 (70)
The Catholic University of America	**123**	166 (-43)	199 (-76)	71 (52)
DePaul University	**123**	116 (7)	167 (-44)	74 (49)
Michigan Technological University	**123**	167 (-44)	74 (49)	99 (24)
Seton Hall University	**123**	155 (-32)	151 (-28)	104 (19)
Colorado State University	**127**	158 (-31)	51 (76)	93 (34)
New School	**123**	137 (-14)	203 (-80)	61 (62)

Table 19. cont.

Institution	Original	USNWR	PIRS	IPEDS
Arizona State University-Tempe	**129**	164 (-35)	21 (108)	188 (-59)
Louisiana State University-Baton Rouge	**129**	133 (-4)	34 (95)	195 (-66)
University at Albany-SUNY	**129**	102 (27)	48 (81)	161 (-32)
University of Arkansas	**129**	119 (10)	50 (79)	194 (-65)
University of Illinois-Chicago	**129**	157 (-28)	15 (114)	85 (44)
University of Kentucky	**129**	156 (-27)	61 (68)	169 (-40)
George Mason University	**135**	120 (15)	97 38)	142 (-7)
Hofstra University	**135**	138 (-3)	171 (-36)	167 (-32)
Howard University	**135**	113 22)	132 (3)	203 (-68)
Ohio University	**135**	132 (3)	117 (180	143 (-8)
Oregon State University	**135**	161 (-26)	87 (48)	127 (8)
New Jersey Institute of Technology	**140**	134 (6)	62 (78)	125 (15)
Rutgers, The State University of New Jersey-Newark	**141**	124 (17)	4 (137)	95 (46)
University of Cincinnati	**140**	147 (-7)	118 (22)	154 (-14)
University of Mississippi	**140**	172 (-32)	60 (80)	164 (-24)
University of Texas-Dallas	**140**	95 (45)	1 (139)	153 (-13)
Washington State University	**140**	160 (-20)	86 (54)	78 (62)
Kansas State University	**146**	195 (-49)	77 (69)	172 (-26)
Missouri University of Science & Technology	**146**	178 (-32)	47 (99)	183 (-37)
St. John Fisher College	**146**	122 (24)	138 (8)	121 (25)
Illinois State University	**149**	118 (31)	85 (64)	120 (29)
Oklahoma State University	**149**	153 (-4)	58 (91)	138 (11)
San Diego State University	**149**	50 (99)	5 (144)	109 (40)
University of Alabama-Birmingham	**149**	191 (-42)	42 (107)	199 (-50)
Adelphi University	**153**	159 -6)	144 (9)	54 (99)
Southern Illinois University-Carbondale	**153**	200 (-47)	78 (75)	130 (23)
St. John's University	**153**	134 (19)	158 (-5)	97 (56)
University of Maryland-Baltimore County	**156**	117 (39)	43 (113)	144 (12)
University of Massachusetts-Lowell	**156**	150 (6)	80 (76)	117 (39)
University of South Florida	**156**	77 (79)	13 (143)	168 (-12)
Virginia Commonwealth University	**156**	143 (13)	115 (41)	128 (28)
University of LaVerne	**160**	110 (50)	141 (19)	73 (87)
Biola University	**161**	131 (30)	178 (-17)	67 (94)
Florida Institute of Technology	**161**	168 (-7)	169 (-8)	133 (28)
Immaculata University	**161**	180 (-19)	172 (-110	122 (39)
Maryville University of St. Louis	**161**	141 (20)	135 (26)	162 (-1)
Mississippi State University	**161**	145 (16)	66 (95)	193 (-32)
University of Hawaii-Manoa	**161**	186 (-25)	20 (141)	147 (14)
University of Rhode Island	**161**	171 (-10)	98 (63)	106 (55)
Ball State University	**168**	128 (40)	26 (142)	139 (29)

Table 19. cont.

Institution	Original	USNWR	PIRS	IPEDS
Texas Tech University	**168**	127 (41)	40 (128)	145 (23)
University of Central Florida	**168**	68 (100)	56 (112)	186 (-18)
University of Idaho	**168**	152 (16)	49 (119)	182 (-14)
University of Louisville	**168**	179 (-11)	53 (115)	176 (-8)
University of Maine	**168**	182 (-14)	88 (80)	151 (17)
University of Wyoming	**168**	202 (-34)	17 (151)	157 (11)
Andrews University	**175**	97 (78)	137 (38)	124 (51)
Azusa Pacific University	**175**	170 (5)	177 (-2)	103 (72)
Edgewood College	**175**	177 (-2)	130 (45)	66 (109)
Kent State University	**175**	185 (-10)	103 (72)	174 (1)
West Virginia University	**175**	184 (-9)	3 (172)	178 (-3)
Pace University	**180**	196 (-16)	166 (14)	102 (78)
St. Mary's University of Minnesota	**180**	139 (41)	125 (55)	114 (66)
University of New Mexico	**180**	125 (55)	27 (153)	202 (-22)
University of South Dakota	**180**	194 (-14)	72 (108)	196 (-16)
University of North Dakota	**180**	190 (-10)	84 (96)	179 (1)
Bowling Green State University	**185**	121 (64)	96 (89)	181 (4)
North Dakota State University	**185**	187 (-2)	45 (140)	190 (-5)
South Dakota State University	**187**	197 (-10)	68 (119)	192 (-5)
University of Houston	**187**	165 (22)	25 (162)	132 (55)
University of Nevada-Reno	**187**	183 (4)	73 (114)	184 (3)
University of North Carolina-Greensboro	**187**	136 (51)	6 (181)	149 (38)
Western Michigan University	**187**	192 (-5)	69 (118)	187 (-)
Widener University	**187**	175 (12)	155 (32)	107 (80)
University of Alabama-Huntsville	**187**	199 (-12)	32 (155)	191 (-4)
Central Michigan University	**194**	151 (43)	37 (157)	134 (60)
East Carolina University	**194**	169 (25)	28 (166)	135 (59)
South Carolina State University	**194**	203 (-9)	107 (87)	201 (-7)
University of Missouri-Kansas City	**194**	173 (21)	112 (82)	180 (14)
University of North Carolina-Charlotte	**194**	144 (50)	7 (187)	126 (68)
Ashland University	**199**	174 (25)	122 (77)	123 (76)
Indiana University-Purdue University-Indianapolis	**199**	188 (11)	11 (188)	163 (36)
Louisiana Tech University	**199**	142 (57)	2 (197)	200 (-1)
New Mexico State University	**199**	189 (10)	9 (190)	198 (1)
University of Colorado-Denver	**199**	198 (1)	36 (163)	177 (22)

Note: Values in parentheses indicate the change from the *USNWR* ranking to the new ranking.

When institutions are ranked, there are demonstrated influences in the decision-making processes of some prospective students (Griffith & Rask, 2007). In addition,

changes in ranks can have an impact on a variety of factors. Meredith (2004) notes how moving into the top 25 of the rankings can mean an increase in the average SAT of students of 20 points, an increase in the percent of freshmen who graduate in the top 10 percent of their high school class of 1.5 percent and a decrease in the institution acceptance rate of four percent. In addition, movement up the rankings can increase the applicant pool for universities. Alter and Reback (2014) found that being in the *USNWR* top 25 can lead to a 6-10 percent increase in the number of applications, which translates to a better applicant pool and additional revenue from application fees. For this reason, the top 25 universities were examined more closely when re-ranking the list using the newly developed models.

After re-ranking the universities using the new weights and variables from the *USNWR* model, there was movement in the rankings. Interestingly, the top 25 shifted around with only two universities jumping into the new top 25 using the new *USNWR* model. Tufts University jumped up two spots just into the top 25 at number 23 and the University of Virginia jumped one spot to number 25. Table 20 includes all universities in the top 25 when using the new *USNWR* model.

Table 20. Top 25 Universities When Using the USNWR Model.

Rank	Institution
1	Harvard University
2	Brown University
3	Princeton University
4	Yale University
5	Columbia University
6	Stanford University
7	University of Pennsylvania
8	Duke University
9	Dartmouth College
10	University of California-Berkeley
11	Massachusetts Institute of Technology
12	University of Chicago
13	Johns Hopkins University
14	Georgetown University
15	University of California-Los Angeles
16	Northwestern University
17	Vanderbilt University
18	Cornell University
19	Washington University in St. Louis
20	California Institute of Technology
21	University of Notre Dame
22	Rice University
23	Tufts University
24	University of Southern California
25	University of Virginia

After re-ranking the universities using the weights and variables from the PIRS model, there was considerable movement in the rankings. Considering the universities in the original top 25 have higher average net-prices it is not a surprise they would fall out of the top 25 when factoring that into the ranking. This is evidenced by the University of California Los Angeles being the only university originally in the *USNWR* top 25 to be in the top 25 based upon the PIRS model. The University of Texas-Dallas made the largest

jump in this rankings from number 140 in the original *USNWR* ranking to number one. Table 21 displays the top 25 when using the PIRS model to rank universities.

Table 21. Top 25 Universities When Using the PIRS Model.

Rank	Institution
1	University of Texas-Dallas
2	Louisiana Tech University
3	West Virginia University
4	Rutgers, The State University of New Jersey-Newark
5	San Diego State University
6	University of North Carolina-Greensboro
7	University of North Carolina-Charlotte
8	University of Washington
9	New Mexico State University
10	University of North Carolina-Chapel Hill
11	Indiana University-Purdue University-Indianapolis
12	University of Utah
13	University of South Florida
14	Indiana University-Bloomington
15	University of Illinois-Chicago
16	Texas A&M University-College Station
17	University of Wyoming
18	University of California-Irvine
19	Georgia Institute of Technology
20	University of Hawaii-Manoa
21	Arizona State University-Tempe
22	Brigham Young University-Provo
23	College of William and Mary
24	University of California-Los Angeles
25	University of Houston

After re-ranking the universities using the weights and variables from the IPEDS model, there was movement in the rankings. There was more movement within this ranking system than with the *USNWR* model, but not as much as with the PIRS model. There were five new universities in the top 25 when using the IPEDS model: Tufts University, Boston College, Lehigh University, Brandeis University, and Wake Forest

University. Wake Forest University made the largest jump from a tie at 27 to number three on this list. Table 22 includes all universities in this top 25 ranking.

Table 22. Top 25 When Using the IPEDS Model.

Rank	Institution
1	Massachusetts Institute of Technology
2	Brown University
3	Wake Forest University
4	Harvard University
5	Dartmouth College
6	Columbia University
7	California Institute of Technology
8	Tufts University
9	Northwestern University
10	University of Chicago
11	Stanford University
12	Cornell University
13	Georgetown University
14	Washington University in St. Louis
15	Johns Hopkins University
16	Yale University
17	Duke University
18	University of Southern California
19	University of Notre Dame
20	Emory University
21	University of Pennsylvania
22	Brandeis University
23	Vanderbilt University
24	Lehigh University
25	Boston College

Ranking List Summary

The second hypothesis of this study was there would be movement in the rankings depending upon which model was used to create the rankings. Evaluating the list of the different rankings and comparing them to the original Best National Universities List indicates how data used for rankings can influence the perception of universities. Most of

the movement occurred when using the PIRS model. The next list with the second most movement occurred when using the IPEDS model. The list exhibiting the smallest amount of movement was the rankings created from new weights and indicators in the *USNWR* model. As indicated in past research, jumping into and out of the top 25 of lists can influence decision-making of students and demographics of the incoming student body. These implications will be discussed in more detail in Chapter 5.

CHAPTER V

DISCUSSION

The purpose of this study was to utilize publicly available higher education data provided by the U.S. Department of Education to (1) test competing models of higher education institution ratings, and (2) comparing them to a current popular higher education ranking system (*U.S. News and World Report*), and a proposed method of rating higher education universities (Postsecondary Institution Ratings System). Past research has examined the impacts of rankings on institutional policies (Shin & Cummings, 2010) and student choices (Bowman & Bastedo, 2009). Since rankings involve a form of program evaluation (i.e., what inputs and activities are resulting in outputs), it stands to reason logic modeling was an appropriate theoretical framework.

This chapter will provide a summary of the previous chapters followed by a detailed interpretation and discussion of the research questions addressed by this dissertation. In addition, the results will be related back to existing literature and how they add to the current knowledge base. Program evaluations serve as a mechanism by which organizations and institutions will determine improvements that need to be made. As such, rankings can operate as a tool to drive policy changes at the institutional and legislative levels. This chapter will address implications different ranking systems could have on policy decisions. Finally, this dissertation will conclude with study limitations and proposed future research directions.

Review of Previous Chapters

Chapter 1 provided an initial discussion of drawbacks related to some current higher education ranking systems. While having a system providing information related to the effectiveness of higher education institutions is helpful, there are some issues inherent when developing metrics to rank institutions. For example, Altbach (2015) compares using peer assessment as a measure of ranking insitutions to a "popularity contest". With the U.S. Department of Education's focus on the accountability of higher education institutions (as demonstrated by the evaluation of a postsecondary institution rating system), it is essential that existing data be used correctly by those who would develop said system of accountability. Using techniques of program evaluation, specifically logic modeling, provides a good approach to address what data should be used and how to use it when developing a rating system.

Research in existing ranking systems, specifically the *USNWR* ranking system, and the proposed PIRS system, were reviewed in Chapter 2. Literature addressing the issues related to the popular *USNWR* rankings were addressed, which include limitations and how it ranks higher education institutions. With the federal government interest in the accountability of higher education systems, a proposed postsecondary institution rating system (PIRS) was also reviewed. Finally, other institutional data related to positive higher education outcomes were reviewed for possible inclusion in a future higher education ranking system.

The methodology for this study was detailed in Chapter 3. Three models where evaluated based upon past research: information from the *USNWR* Best National Universities list, data assessing a proposed PIRS, and institutional data publicly available

from IPEDS related to characteristics associated with positive higher education outcomes. Forward multiple regressions were conducted to test the competing models with the results being discussed in chapter 4. The models were then used to calculate predicted higher education outcomes, which was then used to rank the institutions in the analyses. These new rankings were then compared to the original *USNWR* rankings, with the change from the original ranking noted from each institution. The resulting regressions provided three different models that can be used to rank institutions included in the USNWR Best National Universities list. In addition, results indicate how using different data elements yield different institution rankings.

In this final chapter, the results will be interpreted and put into context of what this could mean to higher education institution ranking systems (both current and future). The data will be interpreted in the context of what factors are important if one is to rank different higher education institutions with different mission statements. This final chapter will also discuss the policy implications different ranking systems could have in higher education.

Research Questions

Question 1: What institutional characteristics are associated with positive higher education outcomes? Specifically, what model would explain the most variance when using factors present in the *USNWR* ranking, the proposed PIRS, and the factors publicly available on the IPEDS website?

The first research question was addressed by conducting multiple linear regressions examining the predictors of a newly developed Higher Education Outcome Index. There are certain higher educational outcomes that are considered positive within higher education, one of which is graduation rate (Kelly & Schneider, 2012). When factoring in potential performance of higher education institutions, an institution's six-

year graduation rate is frequently included in the evaluation (see the USNWR ranking system described in Chapter 2 and Shin & Toutkoushian, 2011). In order to analyze different models of ranking higher education institutions, six-year graduation rate will need to be included in the model. As a result, six-year graduation rate cannot be the dependent variable for the analyses. Therefore, a Higher Education Outcome Index was developed to be the dependent variable.

Higher Education Outcome Index. The Higher Education Outcome Index (HEOI) was intended to be an outcome variable based upon six-year graduation rate (actual and predicted) and transfer-out rate and will be the dependent variable in each regression analysis. There was a problem with missing data within the transfer-out rate variable. Only 89 out of the 203 institutions (44%) reported their transfer out rate. While there were multiple imputation methods used to replace missing data and get a range of predictors and their respective weights. The transfer-out data seem to be missing not at random, as research universities (very high research activity) seem to not report transfer-out data when compared to the other two categories (60% compared to 51-52%). The high number of missing values is also problematic in creating an accurate HEOI. If transfer-out rate is going to be used as part of the dependent variable (HEOI) or as a predictor in higher education ranking systems, then institutions will need to be more transparent and report this data.

***USNWR* Model.** The first model tested the predictive nature of the 17 variables included in the popular *USNWR* ranking system. As described in Chapter 2, this ranking system assigns weights to the different variables within seven categories. Figure 15 displays the significant predictors of the HEOI. When examining the *USNWR* model

using three different methods of imputation for missing values in transfer-out rate, different predictors of higher education outcomes as assessed in this dissertation emerge. Depending upon the transfer-out rate values used to replace missing data, variables within four of the seven categories of data are found to predict the HEOI.

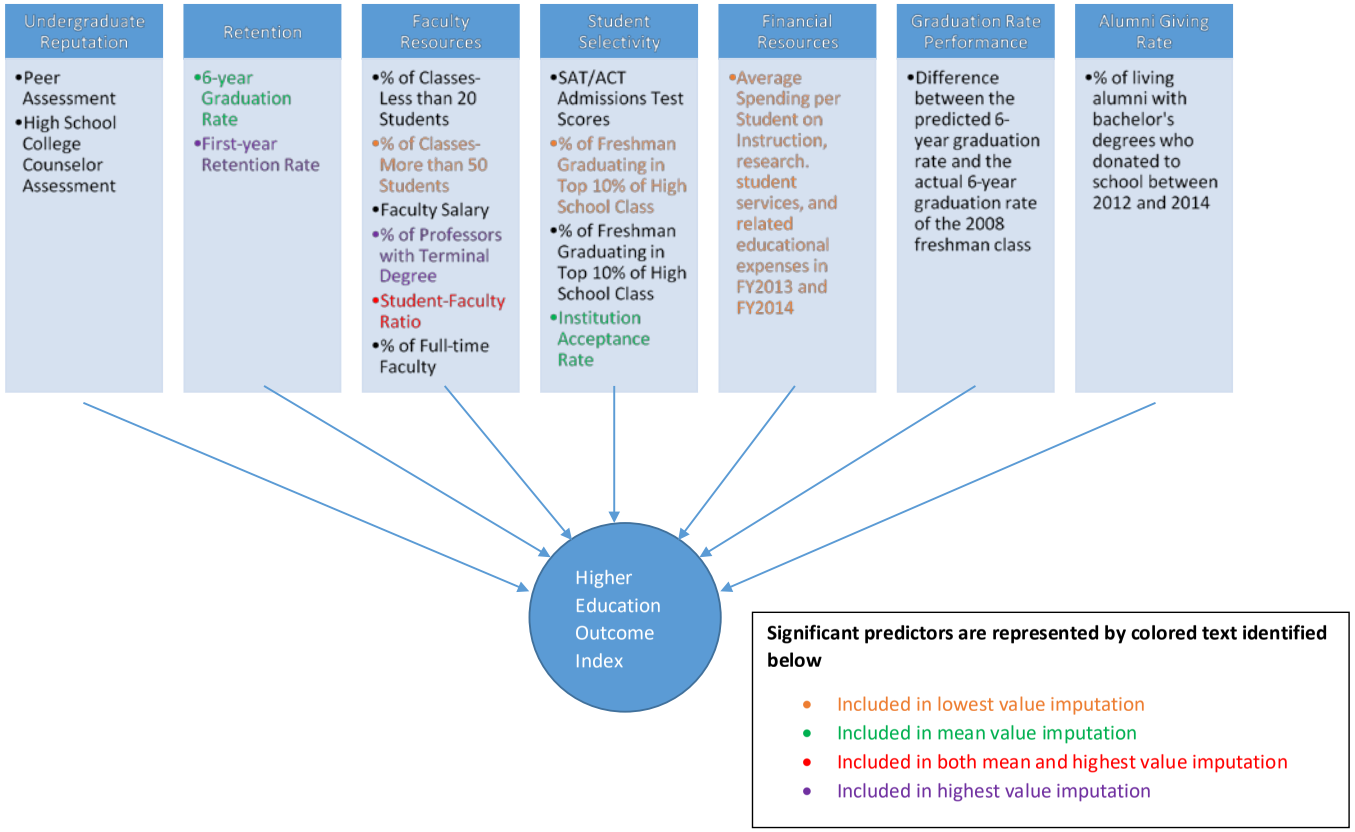


Figure 15. Significant Predictors of Higher Education Outcome Index in USNWR Model.

Interestingly, peer assessment and high school counselor assessment do not predict HEOI. As Altbach (2005) stated, measures such as these amount to a popularity contest and seem to be unrelated to higher education outcomes. This also reinforces work by Webster (2001) who found peer assessment was among the lowest ranking factors when compared to the others. In addition, reputational assessments are susceptible to anchoring effects and do not contribute much additional information when developing a ranking system (Bowman & Bastedo, 2011). Bowman and Bastedo (2011) even go so far as to say "reputation largely serves to maintain the status quo, establishing the credibility of rankings, and ensuring stability in results over time" (p.440). The results of this study reinforces their stance on reputation as peer assessment and high school counselor assessment was not related to the HEOI.

Other long-time measures within the *USNWR* ranking system that are not associated with higher education outcomes within this study are alumni giving rate and graduation rate performance. This is not surprising as the amount of money donated to higher education institutions is more important related to financial resources than the percent of alumni donating to the institution. For example, if there are a few individuals donating millions of dollars to an institution compared to many donors providing significantly smaller amounts, the larger dollar amounts will have more of an impact on what institutions can provide to students than the smaller dollar amounts. As it relates to graduation rate performance (i.e., actual minus predicted graduation rates), the actual graduation rate and the predicted graduation rate are so closely related to one another, the difference between the two cannot account for any additional variance above and beyond the actual graduation rate.

***USNWR* Model 1 (HEOI Using Low Transfer-out Rate Imputation).** The first analysis determined the variables included within the *USNWR* rankings that were predictive of the HEOI variable calculated using the lowest value method of imputation for transfer-out rate. Results indicate that the percent of freshman who graduated in the top 10 percent of their high school class, the percent of the institution's classes with more than 50 students, and the average spending per student on instruction/research by rank relative to other institutions were predictive of the HEOI. One variable associated with higher levels of HEOI (and a higher resulting ranking) was a higher percentage of enrolling freshmen who graduated in the top ten percent of their respective high school classes. This is similar to the results found by Meredith (2004) who found higher ranked institutions had a higher percent of the freshmen graduating from the top ten percent of their graduating class. Another finding is that larger class sizes are associated with a lower HEOI. This supports research by Kokkelenberg, Dillon, and Christy (2008) that found higher class sizes leads to lower grades in those classes. While their research is not assessing graduation rates, lower grades can lead to an inability of students to graduate. The final variable associated with the HEOI is the rank of institutions related to one another on the average spending per student on instruction and research. The higher the institution's ranking was associated with higher measures on the HEOI. This reinforces past research indicating more available financial resources for instruction and research can lead to positive higher education outcomes (Gnolek, et al., 2014).

***USNWR* Model 2 (HEOI Using Mean Transfer-out Rate Imputation).** The second analysis determined the variables included within the *USNWR* rankings that were predictive of the HEOI variable calculated using the mean method of imputation. The

results indicated that six-year graduation rate for the 2008 freshman class, the student to faculty ratio, and institutional acceptance rate were predictive of the HEOI. Considering the six-year graduation rate is a component of the HEOI, positive association of six-year graduation rate and HEOI is not a surprise. What is a surprise is that a higher student to faculty ratio is associated with a higher HEOI. Previous research has indicated that lower student to faculty ratios are associated with higher education outcomes (Jacoby, 2006). Finally, greater institutional selectivity as indicated by a lower acceptance rate is associated with a higher HEOI value. This finding mirrors past research conducted by Scott, Bailey, and Kienzl (2006).

***USNWR* Model 3 (HEOI Using High Transfer-out Rate Imputation).** The final analysis for the *USNWR* model determined the variables included within the *USNWR* rankings that were predictive of the HEOI variable calculated using the mean method of imputation. The results indicated that the first year retention rate, the student to faculty ratio, and the percent of faculty who have a terminal degree were predictive of HEOI. A higher first year retention rate was associated with a higher score on the HEOI. The relationship between retention and graduation rate has been documented with strategies examined to increase both graduation rates and retention rates (Talbert, 2012). From an administrative standpoint, it makes sense to address both issues simultaneously because if institutions cannot retain their students then they will not be able to graduate them. As with the second *USNWR* model, a higher student to faculty ratio was associated with higher values on the HEOI. Another interesting finding of this *USNWR* model is a lower percentage of faculty with a terminal degree or Ph.D. was associated with higher

values on the HEOI variable. Webber (2011) discusses how faculty productivity has become of interest as institutions are focusing more on rankings.

PIRS Model. The second model tested involved using three variables included in the proposed PIRS system. As described in Chapter 2, this ranking system includes variables within three categories. The purpose of this analysis was to determine if the variables included in the proposed rankings are predictive of higher education outcomes and statistically identify the appropriate weights for each variable. Only two of the three variables were significantly related to HEOI as shown in Figure 16. Affordability and Outcomes were associated with HEOI while Access was not. As with the USNWR model, three different outcome variables were calculated with slightly different results for each model.

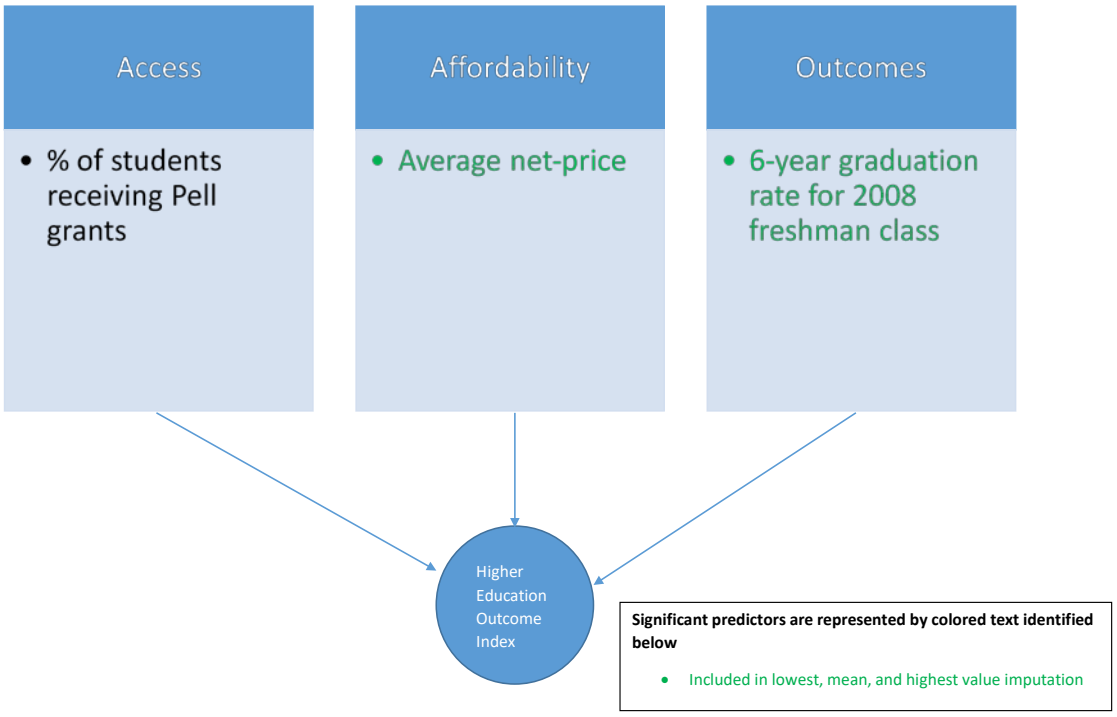


Figure 16. Significant Predictors of Higher Education Outcome Index in the PIRS Model.

PIRS Model 1 (HEOI Using Low Transfer-out Rate Imputation). The first analysis determined the variables included within the PIRS model that were predictive of the HEOI variable calculated using the lowest value method of imputation. The results indicate that the six-year graduation rate for the 2008 freshman class and the average net-price for 2014 were predictive of the HEOI. As expected, higher graduation rates are associated with higher values on the HEOI. Average net-price relates to the average price students pay per year (tuition, fees, book, room, and board) after subtracting out grants and scholarships received. A higher average net-price was associated with higher values on the HEOI. Considering this is factoring in the lowest transfer-out rate for missing values, this is not a surprise. Much of the transfer-out rate missing data comes from the highest research activity universities. Concurrently, these universities are also among the higher net-price values of the sample. As a result, these universities will score higher on the HEOI than others.

PIRS Model 2 (HEOI Using Mean Transfer-out Rate Imputation) and PIRS Model 3 (HEOI Using High Transfer-out Rate Imputation. The second and third analyses determined the variables included within the PIRS rankings that were predictive of the HEOI variable calculated using the mean method of imputation and the highest value method of imputation. For both models, the results indicated that the six-year graduation rate for the 2008 freshman class and the average net-price for 2014 were predictive of the HEOI. They were both different from the first PIRS model in that lower average net-price was associated with higher HEOI values.

IPEDS Model. The final model provided involved using 36 variables included from data publicly available from the U.S. Department of Education IPEDS system. As

described in Chapter 2, this ranking system contains variables within five categories. The purpose of this analysis was to determine which variables included in the proposed rankings are predictive of higher education outcomes and statistically identify the appropriate weights for each variable. Figure 17 displays all variables found to be significant predictors of the Higher Education Outcome Index.

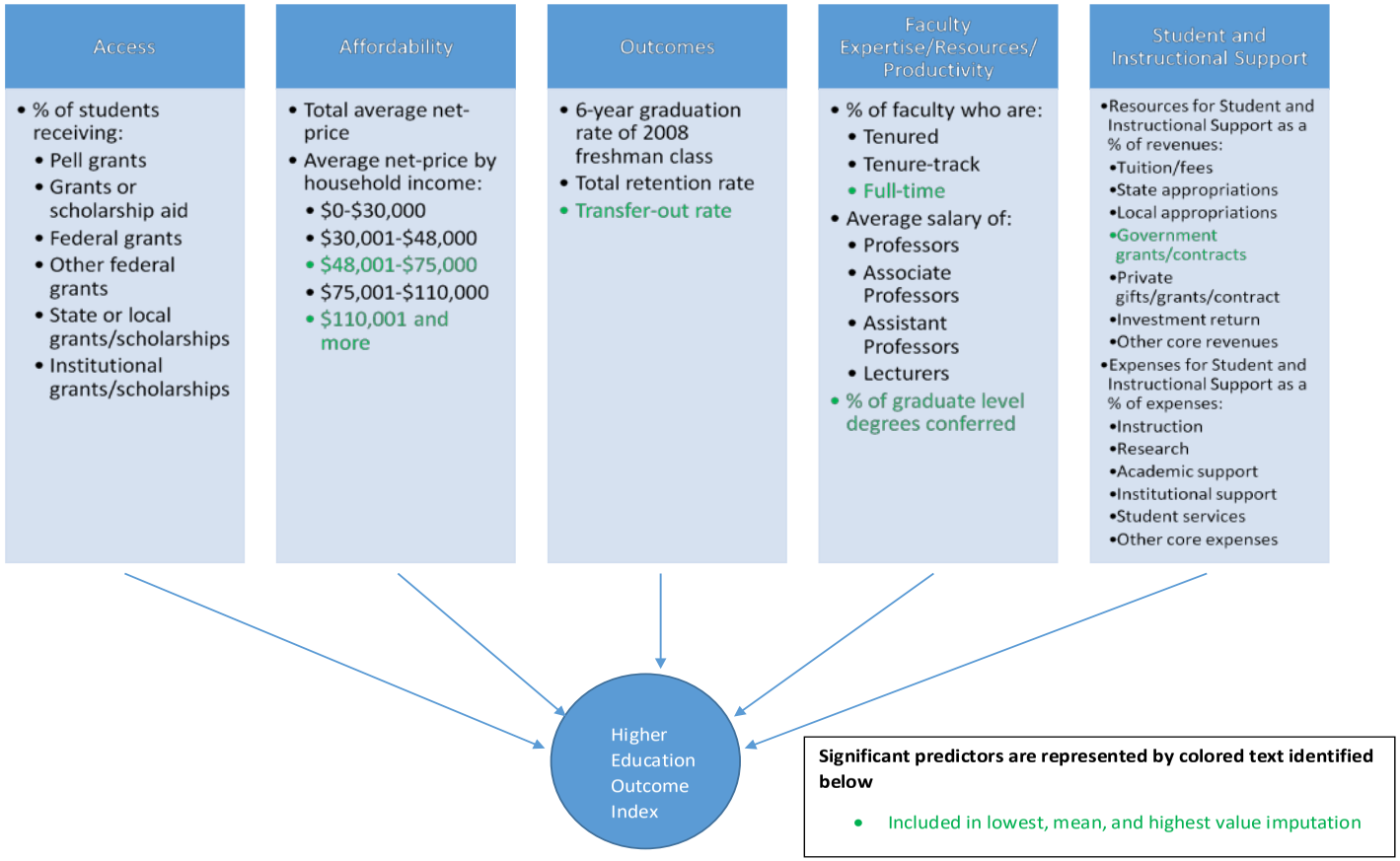


Figure 17. Significant Predictors of Higher Education Outcome Index in the IPEDS Model.

IPEDS Model (HEOI Using all Three Methods of Transfer-out Rate Imputation). It was intended that three multiple regression analysis was used to determine if the variables included within the IPEDS rankings are predictive of the HEOI variable calculated using three different methods of imputation. The results of all three analyses were exactly the same. The results indicated that the 2014 transfer-out rate, the percent of degrees conferred that are graduate level, the percent of full-time faculty, net-price by household income-over $110,000, net-price by household income-$48,001-$75,000, and the percent of total institutional resources in 2013-2014 from government contracts and grants were predictive of the HEOI. Of note is that the percent of full-time faculty variable was predictive of HEOI up until the last step. Within this model, lower transfer-out rate and lower net-price by households earning $48,001 to $75,000 were associated with higher HEOI values. A higher percentage of graduate /professional degrees, higher percent of full-time faculty, higher percent of resources per full-time student from government contracts/grants, and higher net-price by households earning over $110,000 were associated with higher HEOI values.

Implications of the Different Models

This study found three different models that can be used to predict positive higher education outcomes as defined by the HEOI. If any of the proposed models would be used to rank institutions, it could lead to changes in the strategic planning of institutions. Hazelkorn (2015) states that institutions can react to rankings in three ways. First, promote their position in the rankings and take advantage of their position. Second, "restructure their organization, strategy, recruitment policy, pedagogy, etc. in order to improve their position in the rankings and hence reap the benefits". Finally, trying to

ignore the rankings (which is probably the position of those close to the bottom of the rankings. The balance of this discussion of implications will focus on implications for using each model.

USNWR Model

Using the model from the USNWR ranking system could lead to different institutional strategies in order to move up the rankings. There were different models depending upon the imputation method used when calculating HEOI. Some of the findings could cause institutions to change strategy related to recruiting students, faculty, and spending of resources. In one instance, higher percentage of freshmen who were in the top ten percent of their graduating class was associated with positive higher education outcomes. This could affect prospective student recruiting for institutions who want to move up the ranking by recruiting high school students who are in the top ten percent of their respective high school classes. With the federal government focus on access, this strategy could go against providing access by focusing on the student in the top ten percent of their graduating classes. To go along with the recruitment of students, another element of selectivity was found in this study and could impact institutional strategies. Lower acceptance rates coincide with higher levels of HEOI. As a result, if institutions are interested in moving up the rankings then they would be more selective in the number of freshmen accepted each year. This once again, counters the goals of providing access to higher education for more prospective students. While the implications exist for student recruitment, there are also implications for recruiting faculty.

The different USNWR models could also impact strategic planning regarding faculty recruitment. First, larger class sizes as identified by the percent of classes with 50

or more students in them are associated with lower values of the HEOI. This means institutions would possibly limit class sizes to move up the rankings when using this model. If class sizes are limited, then more sections may be needed to serve the same number of students. This would result in an increase in the number of faculty needed to cover the increase in class sections. Another finding of this study could provide options for who would handle the extra sections to create smaller class sizes. Since result indicated a lower percentage of faculty with a terminal degree or Ph.D. is associated with higher HEOI values, institutions could hire more part-time faculty minimum qualifications to teach courses instead of faculty with terminal degrees or a Ph.D. Finally, with higher student to faculty ratios associated with higher HEOI values, institutions would be encouraged to operate with fewer faculty as a cost-saving measure (i.e., fewer faculty mean lower salary costs).

Not all evidence within the USNWR models relate to cost-saving measures. One finding within one model was that a higher ranking related to resources used per student on instruction, research, student services, and other educational expenses was associated with higher HEOI values. Implications for institutions could mean increasing spending on technology in classrooms, student services, or laboratories as a means of moving up the rankings. One issue with this would be how to determine which areas to increase spending and which to hold steady with so many factors included in this facet of the model

PIRS Model

The proposed PIRS system is focused on access, affordability, and outcomes. This model used a simplified number of variables to represent each of these three factors.

Access was not a significant factor in the model and affordability displayed two different relationships with HEOI. Depending upon the model used, this could influence what an institution does regarding affordability. First, in one instance a higher average net-price is related with higher HEOI values. In an effort to move up in the rankings (when focusing on net-price), institutions could take two approaches. First, they could raise tuition to create a higher average net-price. Second, an institution could do is to offer fewer institutional grants and scholarship to increase the average net-price. This could allow the institution to divert the grants and scholarship funds to other areas in financial need (provided the grant and scholarship funds moved are not earmarked for student fees).

IPEDS Model

The proposed IPEDS model expands the PIRS model by including faculty expertise/resources and student/instructional support along with access, affordability, and outcomes. Interestingly, access was the one category without a significant predictor of HEOI values (similar to the PIRS model). However, even though access did not have any significant predictors, a lower net-price for the middle-level household income groups ($48,001-$75,000) would predict higher levels of HEOI. Past research has shown that rankings can influence the net-price of the institution without the institution discounting tuition (Monks & Ehrenberg, 1999). Often, institutions will look to increase aid to students to attract them with lower net-price. If institutions were to see these results, they could increase financial aid to prospective students who come from families with household income between $48,001 and $75,000 as a way to attract students and increase their ranking. Conversely, they could offer less aid to students from families with household incomes above $110,000 as a way to increase institutional ranking.

There are also three other initiatives that could result from using the IPEDS ranking model as discussed in this thesis. First, the IPEDS model indicates a higher percentage of full-time faculty is associated with higher levels of the HEOI variable. This could lead to institutions going away from part-time and adjunct faculty as a method of covering classes to increase the institution's rank. Second, institutions could shift resources to recruiting and supporting graduate/professional students as a means of increasing their ranking. Finally, institutions could pursue prestigious government contracts and grants as a means of generating revenue. One example of such a grant could come from the U.S. Department of Health and Human Services National Institutes of Health. A second grant source would be the U.S. Department of Commerce's Economic Development Administration University Center grant program.

Question 2: How does a new ranking model using these institutional characteristics compare to the current *U.S. News and World Report* rankings and the proposed Postsecondary Institution Ratings System model?

Using the models attained from the three linear regressions, the top 203 universities in the USNWR ranking can be re-ranked using the statistically significant predictors of the HEOI. Institution position in a rankings list can influence different factors. Some of the bigger issues involved include the economic impact of the institution, which is passed down to the students. For example, past research has demonstrated that moving down in the rankings is associated with a decrease in the typical expected self-help contribution from students (e.g., student loans). It appears they lower these forms of self-help as a method of attracting more students. In addition, dropping 10 places or more also impacts the average net-price by reducing net-price by approximately 4 percent. Institutions experiencing this do not reduce the price of tuition

due to a lower rank so as not to appear to be discounting their price due to poor rankings. Rather, they increase the amount of financial aid they offer as a way to attract applicants (Monks & Ehrenberg, 1999).

Future Directions and Implications

This study demonstrates the volatility of higher education institution rankings depending upon the data used in the analysis. While some may argue the merit of the different ranking systems that exist, Webster, (2001) argues that rankings can influence the number and quality of applicants. This then impacts the student body within the institution, the quality of instruction at the institution, and the perception of the quality of an institution's degree. Higher education institutions also use rankings as a "policy instrument" to speed up higher education reform (Hazelkorn, 2008). In other words, policies that can aid in moving an institution up in the rankings are likely to gain traction with administrators. The early sections of this discussion provided some examples of the policies that could be addressed due to the method of rankings provided here is used.

Depending upon the model used to rank institutions, rankings can change as much as 197 places when assessing 203 institutions. Gnolek et al. (2014) found that institutions might change +/- 2 spots within an individual methodology (*USNWR* ranking) with moves greater than this considered "noise". Competition within the higher education system is great and institutions do what they need to increase enrollment. One method of accomplishing this goal is to increase their place in the rankings. Hazelkorn (2015) states that "two-thirds of institutions had developed strategies designed to support 'strong/robust/higher' ranking, and the remaining third had set clear targets to improve

their rankings" (p. 207). Competition not only comes from the not-for profit institutions, but increasingly from the for-profit sector.

> "Since 1990 the number of for-profit, degree-granting college and university campuses in the United States has quietly increased by 112 percent, from approximately 350 to 750 campuses. During that same time period, at least 200 non-profit colleges closed their doors" (Ruch, 2003, p. 4).

This previous statement demonstrates the incredible growth of for-profit institutions while some non-profit schools closed their doors. However, it is also important to note that these same for-profits that were growing so fast are starting to lose money and close. In 2016, ITT Tech closed down with approximately 35,000 students who are left with college credits that may not ultimately count towards a college degree.

This study, as well as the *USNWR*'s Best National Universities List, includes universities with missions primarily related to research. This covers a small fraction of the over 7,000 higher education institutions who report institutional data to the U.S. Department of Education. Chapter 2 of this dissertation covered the different classification systems identified in the Carnegie Classification system. This system separates institutions by factors like institutional size, degrees conferred, and enrollment profile to name a few. While some of these classifications make sense and are helpful in evaluating similar institutions with one another, there are some institutions unique in their additional mission in serving specific populations. These institutions also are not separately identified by the Carnegie Classification as others serving specific populations (e.g., Tribal Colleges and Associate's Dominant Institutions) and could benefit from analysis independent of the others within the research-intensive classification.

Rankings may always have a place in higher education, but there are issues that need to be considered moving forward. As the implications that could result from the use of any of the models presented in this study have demonstrated, any ranking system does not operate in a vacuum. Factors that are deemed important in a ranking system will impact the strategic planning of institutions who are ranked in an effort to move up the rankings (especially those just outside of the first tier of the rankings).

One issue within this study was the amount of missing data related to transfer-out rates. With all models within this study including six-year graduation rate, it became necessary to create an outcome variable that would allow for the creation of a statistically developed model to use for ranking institutions. With transfer-out rates containing a significant amount of missing data, it made calculating an outcome variable difficult. Multiple methods of imputing the missing data were used, but the results indicated how significant predictors in the *USNWR* model differ depending upon the method of imputation used. Future research could evaluate models of rankings utilizing individual higher education outcomes (like retention rate and six-year graduation rate) as the dependent variables to create weights to be used in ranking systems. Past researchers have used this method to determine significant predictors of these examples of higher education outcomes (Walker, 2016).

Shin and Toutkoushian (2011) identified four ways to upgrade future ranking systems. They are as follows:

- Current ranking systems should become multiple ranking systems to reflect different institutional missions and size.

- Ranker-centered systems should become customer-centered systems to satisfy reader's different needs for rankings.
- Global rankings should become regional ranking systems to account for different cultures and languages.
- Institutional ranking systems should become discipline-based ranking systems in order to account for differences in disciplines.

The results of this study provide evidence for the suggestions made by Shin and Toutkoushian. Even limiting the institutions to high-level research universities demonstrates how models using different data can result in drastically different rankings. Within the institutions examined in this study, there exists some institutions with different missions from their peers. One example is the different missions of non-predominately white institutions. While some rankings recognize the difference in specific missions (as seen in the multiple *USNWR* Rankings) there are a few institutions with multiple missions that might have a differential impact when ranking these institutions.

Ranking HBCUs

Within this study, institutions examined fell into one of three separate basic Carnegie Classifications: very high research activity, high research activity, and doctoral/research universities. There are other types of higher learning institutions categorized by the Carnegie Classification system, but one group of institutions not always separately categorized are institutions intended to serve minorities. There are schools identified as Historically Black Colleges and Universities (HBCU) and there are also Tribal Colleges. W.E.B. DuBois (1903) highlights the need of African-Americans to

seek out higher education and even be trained in “Negro colleges”. Browning and Williams (1978) discussed the intent of HBCUs: develop higher education system designed for freed people after the Civil War. This section will identify the impact a rating or ranking system could have on minorities, how institutions serving minorities differ in mission from other institutions, and some unique considerations when developing a rating or ranking system.

If certain metrics are going to dominate any ratings or rankings system, then that system can run the risk of creating an even bigger disparity in education than what already exists. As Dewey (1916) stated: “… the American nation is itself complex and compound. Strictly speaking it is inter-racial and inter-national in make-up” (pp. 425-426). To ignore this fact as it relates to education would be a travesty. Ratings and rankings can have an adverse impact on the admittance of minorities to certain universities, especially graduate and professional degree programs due to the importance placed on test scores and GPAs (like law school). Espeland and Sauder (2009) point out the focus of law school admissions test (LSAT) scores and GPA on the rankings of law schools, but also discuss how a diversity index could be a factor in rankings. One issue with ratings and rankings is the ratings or rankings can alter the focus of an institution in hopes of moving up on the list. Often times this means focusing more intently on certain metrics like test scores and GPA when admitting students.

With HBCUs, they fall into many different categories. Lee and Keys (2013) echo this sentiment and state: “while the ‘HBCU’ marker readily identifies institutions with similar missions, it does not capture the diversity of institutions in this category. Table 23 comes from publicly available data at the National Center for Education Statistics,

Integrated Postsecondary Education Data System and displays how the 100 HBCUs they have data for compare to the 2010 Basic Carnegie Classification System.

Table 23. HBCUs According to 2010 Basic Carnegie Classification (N=100).

Carnegie Classification	Number
Doctoral Universities	
Research Universities (High Research Activity)	2
Doctoral/Research Universities	8
Master's Colleges and Universities	
Larger programs	7
Medium programs	9
Smaller programs	8
Baccalaureate Colleges	
Arts & Sciences	18
Diverse Fields	29
Baccalaureate/Associate's Colleges	2
Associate's Colleges	
Associate's--Public Rural-serving Small	4
Associate's--Public Rural-serving Large	2
Associate's--Public Urban-serving Multicampus	3
Associate's--Private Not-for-profit	1
Associate's--Public 2-year colleges under 4-year universities	1
Special Focus Institutions	
Theological seminaries, Bible colleges, and other faith-related institutions	3
Medical Schools & Centers	2
N/A, not in Carnegie universe (not accredited or nondegree-granting)	1

Note. Data comes from the National Center for Education Statistics, Integrated Postsecondary Education Data System.

Coaxum (2001) identifies a major issue with using the Carnegie Classification to classify HBCUs. This major issue is the mission of HBCUs goes beyond the scope and mission related to the types of degrees conferred. Coaxum (2001) makes a point of how Dubois wanted to classify HBCUs as a means of strengthening them. Dubois' classification system resulted in three tiers of HBCUs: first-grade colored colleges, second-grade colored colleges, and third-grade colored colleges. As a result, Coaxum proposed a different classification method: using student entry characteristics,

institutional characteristics, and student outcome characteristics to distinguish HBCUs from one another.

Implications for Practice

Previous research has indicated the propensity for higher education administrators to use information garnered from rankings as a means of improving their institutions. Rankings in the past have combined subjective and objective measures with the intent of rating and ranking institutions. One aspect of the USNWR that could be abused is when administrators rating peer institutions. This study provided evidence that peer assessments and counselor assessments (another subjective measure) did not predict higher education outcomes as defined in chapter 3. As a result, future rankings could exclude similar subjective measures and rely more on objective measures.

A final practical implication from this study is re-evaluating the data collected for any type of ranking system. The largest percent of variance in the HEOI was explained by the variables within the IPEDS model. That still means 30 percent of the variance is left unexplained. Re-evaluating the data collected may see what other institutional factors explain the variance in higher education outcomes. Considering the great difference in rankings when different variables were included in the rating, finding appropriate additional data could improve the accuracy of any ranking system.

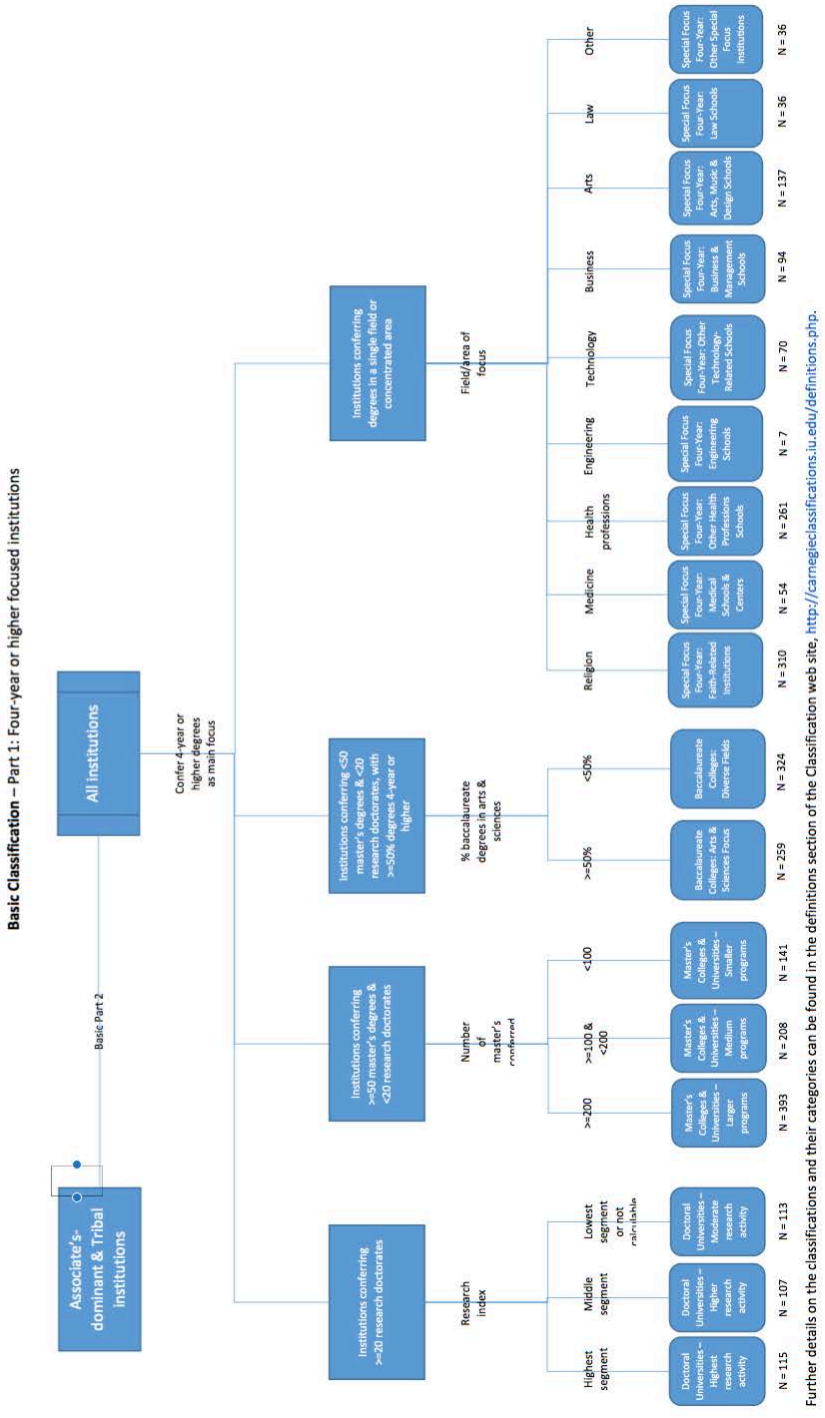
To conclude, administrators must be cautious and diligent when making policy decisions. Previous researchers have mentioned the “top-down” and “bottom-up” approaches in evaluating the implementation of a policy. Both methods involve determining a mission/stated objectives, identifying major actors in the process, what criteria (i.e., data) is to be used for evaluation, and in interactions involved in achieving

the overall focus of an initiative (Sabatier, 1986). Other researchers aiming to further develop ratings and rankings of higher education institutions would be well-served to take the ideas from this study and further evaluate what is the overall mission of the institution(s), who is affected by the development of a rating and ranking system, what data is appropriate to consider (to include a comparison outcome variable), and how do the important actors involved interact to steer the higher education institutions towards improving their respective standing.

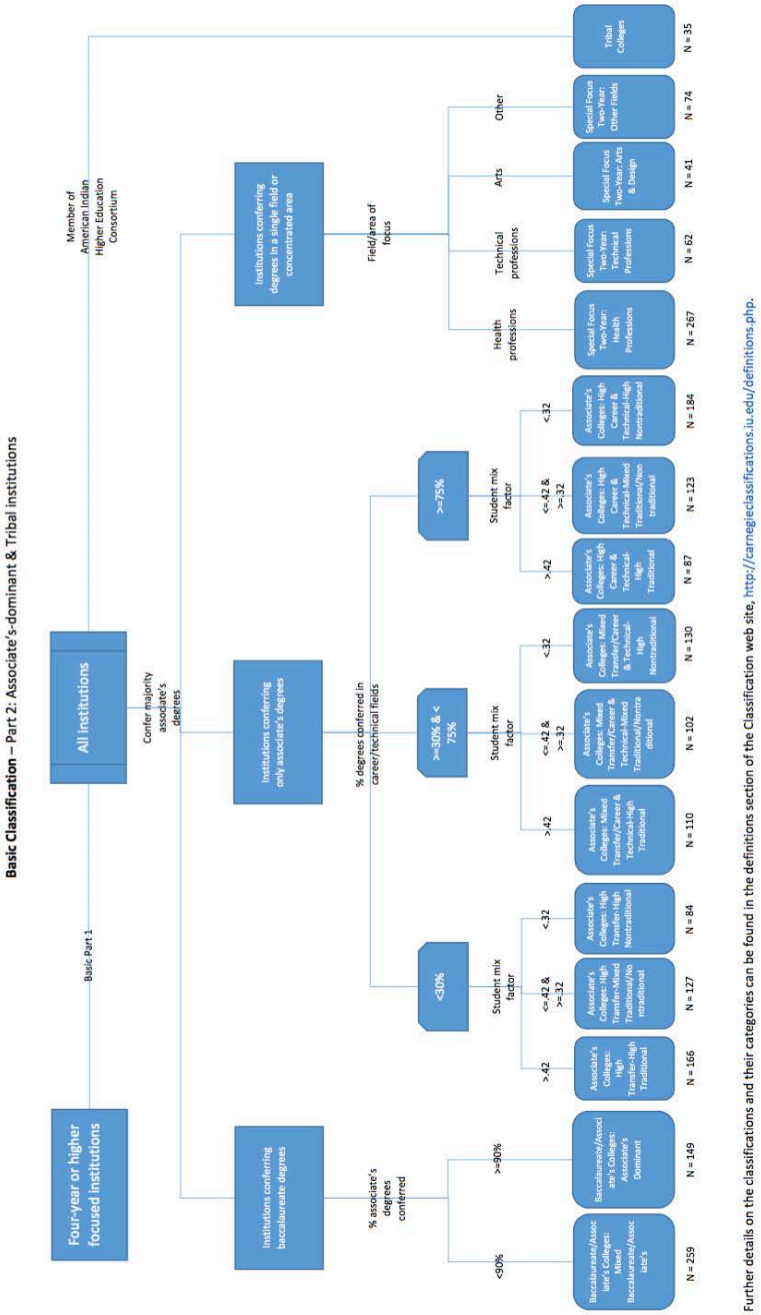
APPENDICES

Appendix A

Basic Classification-Part 1: Four-Year or Higher Focused Institutions

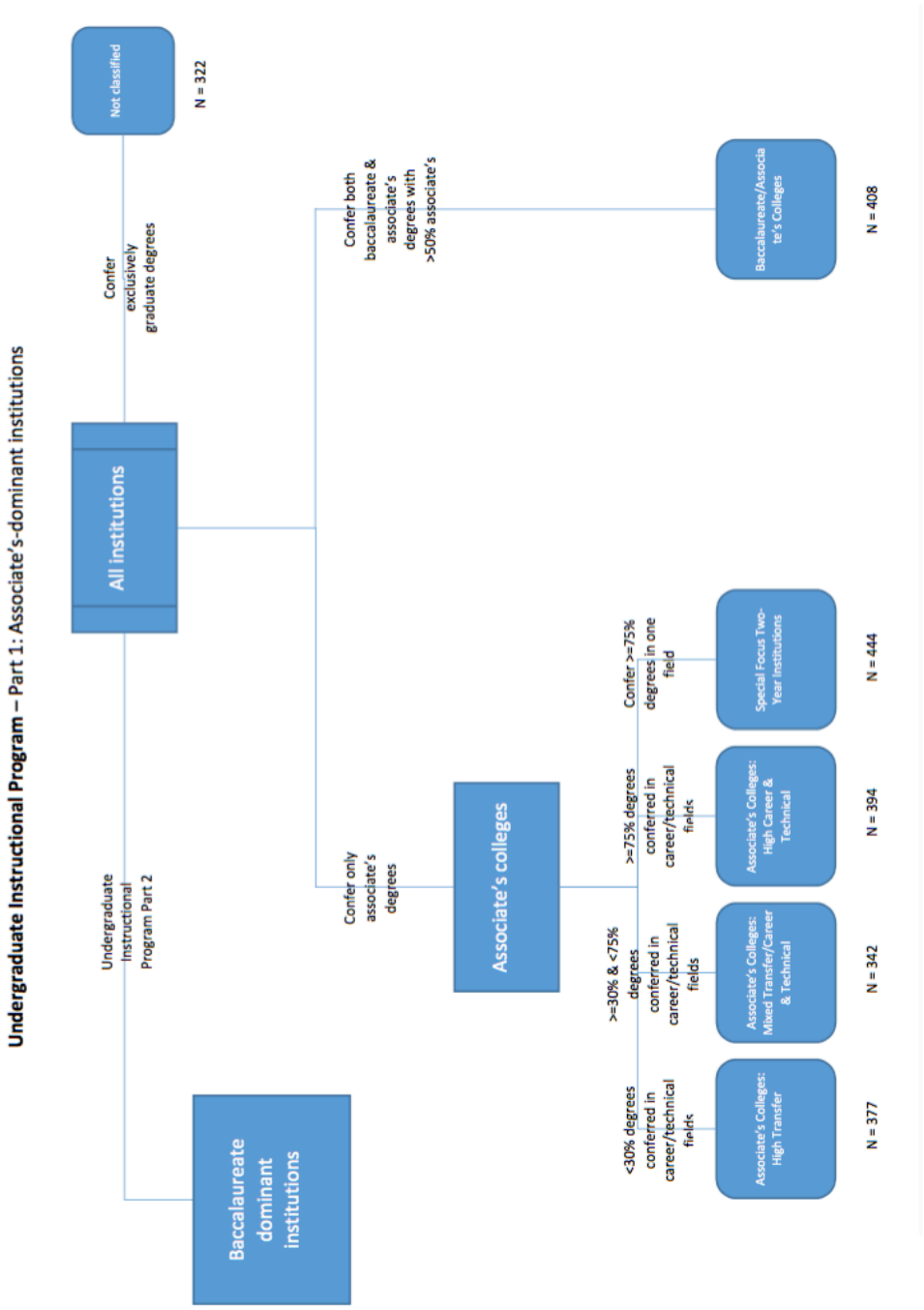


Appendix A
Basic Classification-Part 2: Associate's-dominate & Tribal Institutions

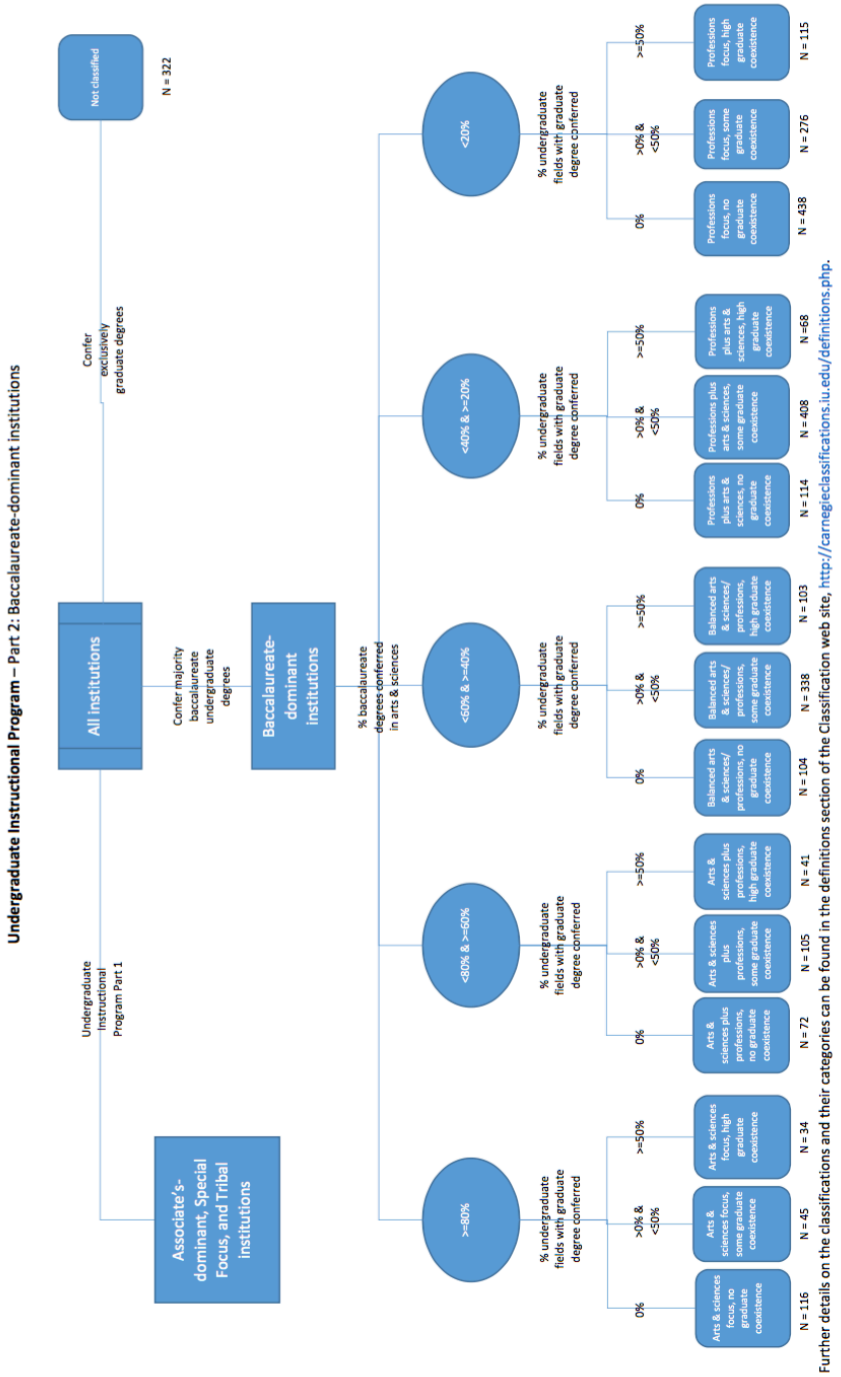


Appendix B

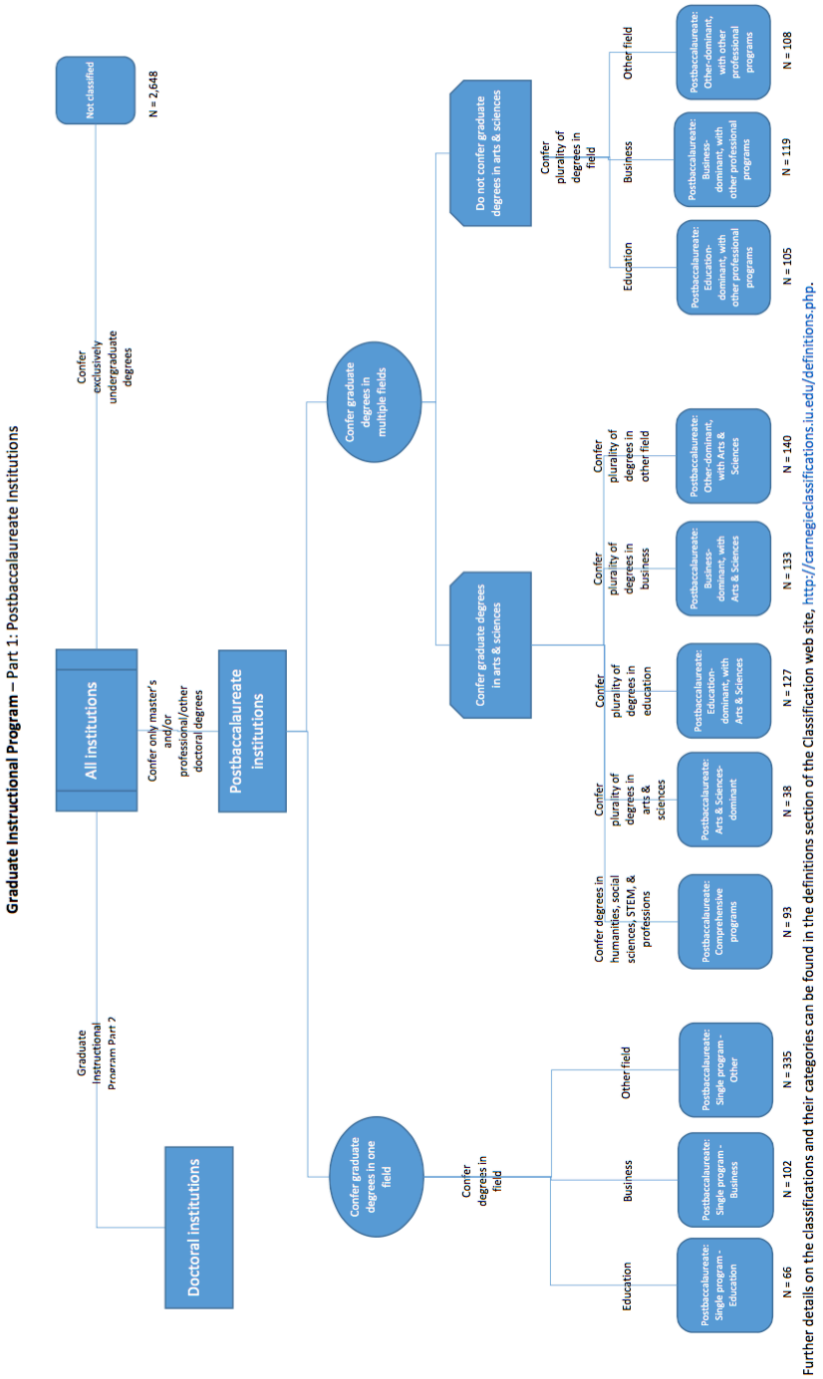
Undergraduate Instructional Program-Part 1: Associate's-dominant Institutions



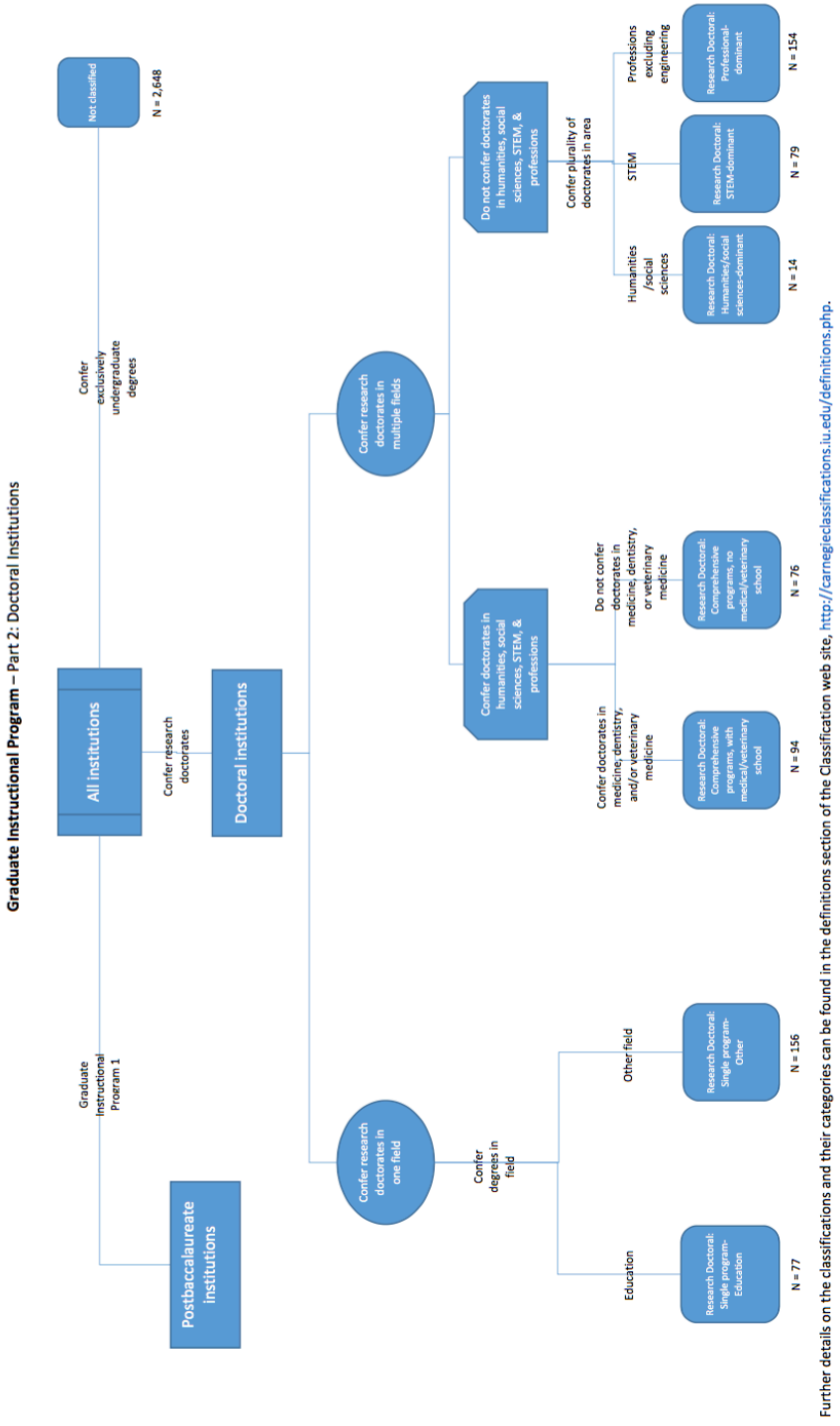
Appendix B cont.
Undergraduate Instructional Program-Part 2: Baccalaureate-dominant Institutions



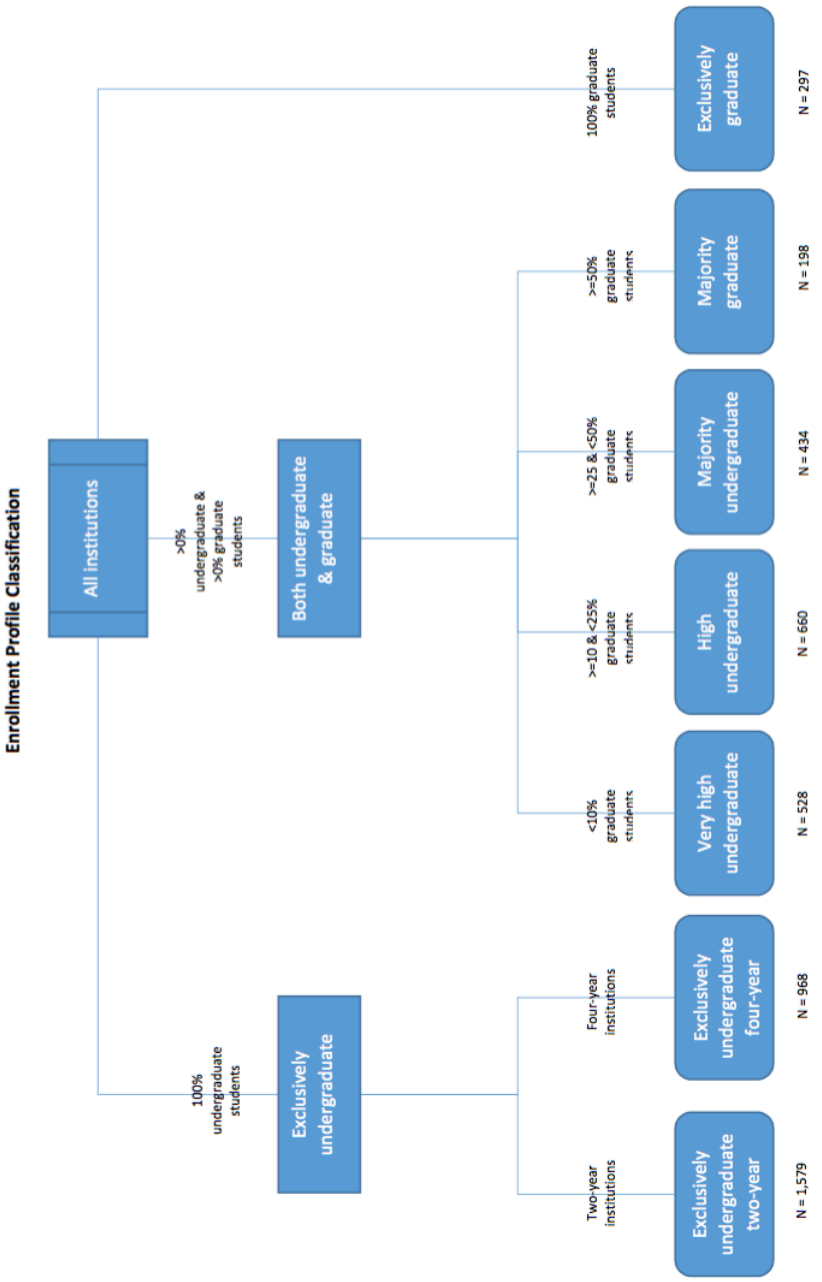
Appendix C
Graduate Instructional Program-Part 1: Postbaccalaureate Institutions



Appendix C cont.
Graduate Instructional Program-Part 2: Doctoral Institutions

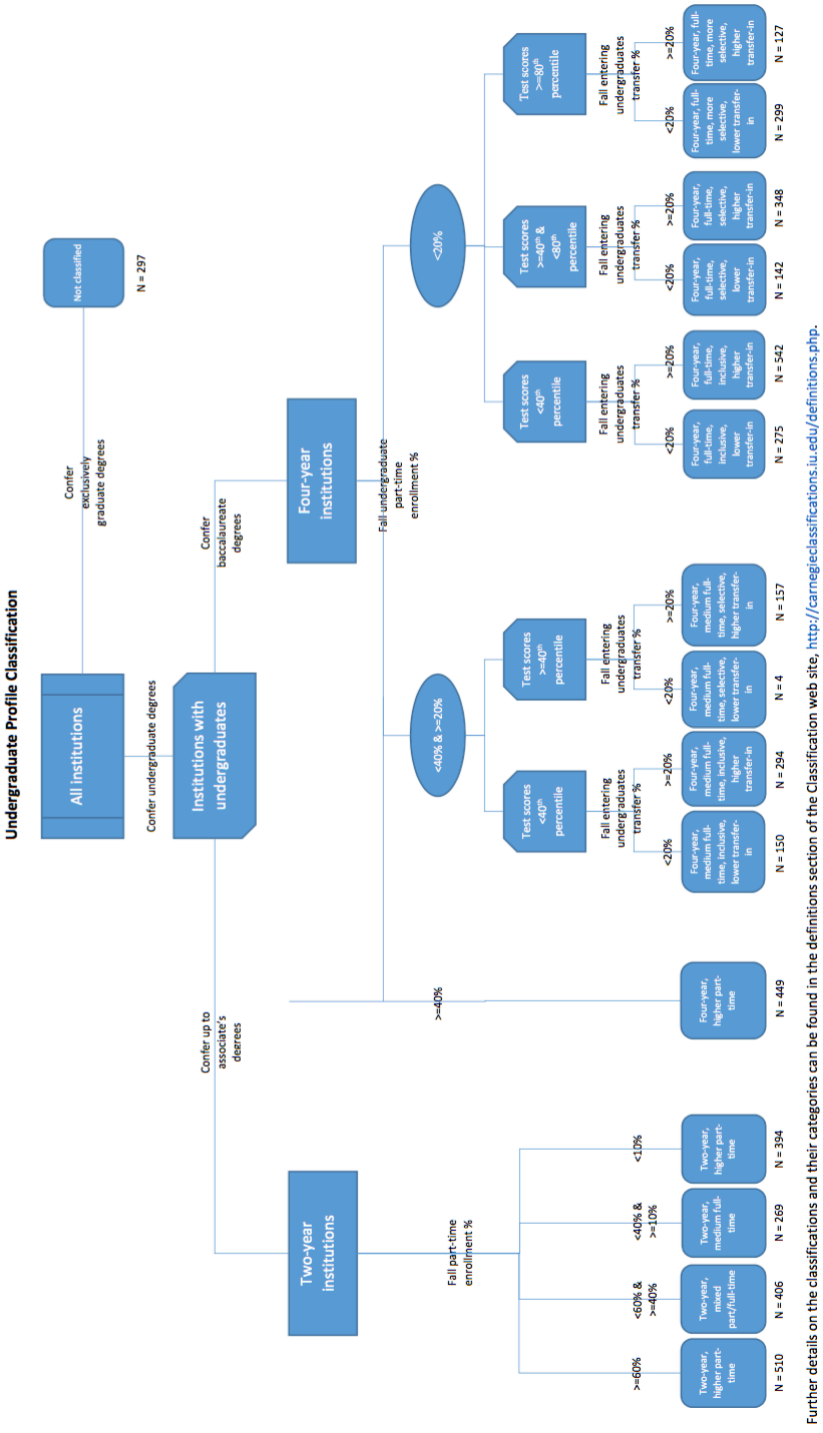


Appendix D
Enrollment Profile Classification

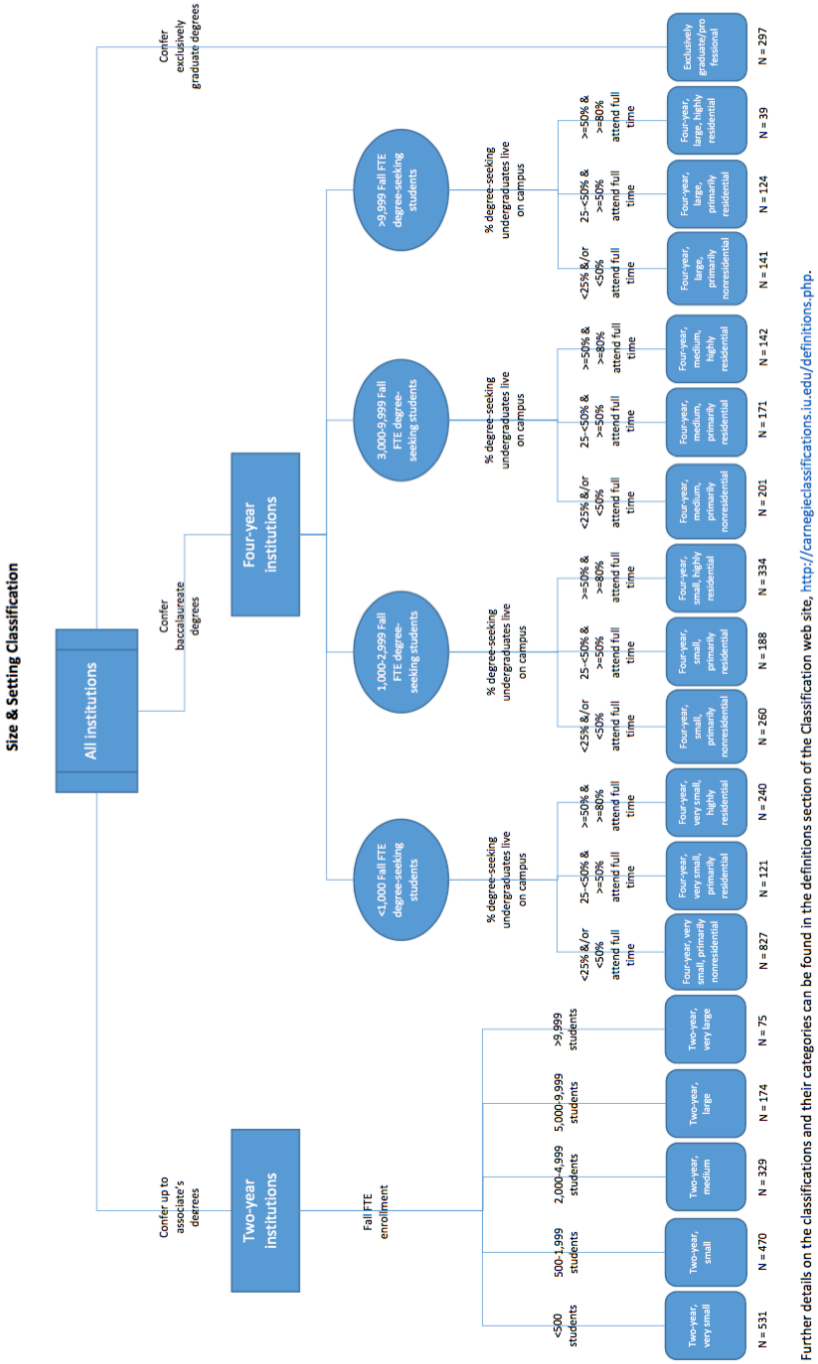


Further details on the classifications and their categories can be found in the definitions section of the Classification web site, http://carnegieclassifications.iu.edu/definitions.php.

Appendix E
Undergraduate Profile Classification



Appendix F
Size & Setting Classification



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