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COLLEGE RANKINGS

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by

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Abstract

Many college rankings exist, each based on a set of factors determined by publishers of the rankings. People considering colleges often use college rankings as a tool to aid them in their search. This project compares the methodology of rankings by organizing the factors of each into six categories. It was found that worldwide rankings have a much higher weighting on research than U.S.-only rankings. In addition a survey was conducted over different demographic groups. From the survey results an ideal ranking was constructed for different groups and compared to existing rankings. All demographic groups examined seek a better mix of categorized factors than any existing ranking provides.

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1. Introduction

President Obama has recently announced an initiative to grade colleges based on their performance [1] in terms of financial cost and expected return. The idea behind this initiative is to hold colleges accountable for the financial costs they incur on students. The College Board reported for the 2013-2014 school year that the average tuition for students attending in-state four-year schools was $8,893, out-of-state schools $22,203, and private schools $30,094 [2]. With such a high financial cost, it is imperative that students choose the best college available to them at a reasonable financial cost.

There are many resources available to assist students in this endeavor. In addition to President Obama's initiative to grade colleges based on their performance, there are college rankings released by organizations such as *Forbes* [3] and *U.S. News and World Report* [4] consider various factors when generating a ranking of colleges. Each ranking assigns different weights to various factors. Depending on which factors they consider and how important each factor is to a college's score, the rankings can differ significantly.

Consider for example, two rankings previously mentioned, *Forbes* and *US News and World Report*. Not only do their rankings differ, they also have different criteria for including or excluding schools from their rankings. *US News and World Report* generates two separate rankings, one for what they call National Universities [5] and another for what they call National Liberal Arts Colleges [6] while *Forbes* generates a single ranking [7] for all colleges in the United States. Naturally, one would expect the rankings to be significantly different. However, if only the institutions presented in the *Forbes* rankings that are present in the *U.S. News and World Report* National University Rankings are considered, discrepancies between their relative rankings with respect to each other would be present. Forbes has Stanford University as the top school, followed by Princeton University, Yale University, Columbia University, and Harvard University. The National University Rankings by *U.S. News and World Report* has Princeton University as the top institution, followed by Harvard University, Yale University, Columbia University, and Stanford University. This is only comparing the top five schools in the *Forbes* Top Colleges List that are also present in the National University Rankings generated by *U.S. News and World Report*.

Upon examination of multiple rankings, commonalities between the rankings can be documented. The factors under consideration tend to group into six broad categories. These six categories can be defined as Student Body, Research, Academics, Student Life, Finances, and Post-Graduation Success. The Student Body category is a grouping of factors measuring aspects of the

general student body at a college or university. For the Research category all factors measuring the research output of the university and faculty research are included. Factors measuring faculty teaching and salary were excluded from Research and placed in the Academics category instead. In the Academics category all factors relating to the quality of education received are included. For Student Life those factors relating to daily quality of life at the college or university are considered. In the Finance category only factors relating to the financial status of the student are considered. Factors such as tuition and average financial aid package are considered to be part of this category. However, factors such as the endowment of the school are not considered to be part of this category. For Post-Graduation success factors that measure the success of graduates from the school are included.

In addition to college rankings, college guidebooks like the *Princeton Review* [8], and other college resources such as *College Confidential* [9] and *College Prowler* [10] are also looked at. While the guidebooks do not contain an explicit ranking, some do rate schools based on a variety of factors. Although they are not rankings, they are still useful since the factors that the guidebooks consider can be compared to those of the rankings. The website called *College Prowler* permits the user to generate their own importance for each factor, then create a customized ranking based on those factors. The *College Prowler* ranking is not considered an actual ranking to be analyzed since the rankings will differ from user to user.

This project hopes to discover which of the college rankings is most relevant to people looking at colleges. To begin, different college rankings including both U.S.-only and worldwide rankings were searched for through popular search engines. Then, through reading the methodologies, we compared the factors each ranking considers, and categorized those factors into six broad categories. Furthermore, we calculated the proportion of the six categories for each ranking to have a more direct perspective of what each ranking concentrates on. At the same time, we also looked at the subjective and objective proportions in each ranking. We regarded the proportion of subjective versus objective factors in ranking to be important since subjective factors are based on people's opinions whereas objective factors are grounded in hard data. That is not to say that objective factors cannot be biased. The methodology behind interpreting data can affect the results significantly.

When analyzing the different ranking methodologies, it is important to keep in mind the scope of the ranking itself. In our analysis we looked at both U.S.-only rankings such as *U.S. News and World Report* and world rankings such as *Times Higher Education* [11]. After analyzing our rankings, we found that the world university rankings tended to consist of different criteria in different proportions than the U.S.-only rankings.

1.1 Road Map

The goal of this report is to look at the most commonly referenced rankings and determine the methodology that they use to rank colleges and universities and determine how they are similar and different. In order to better understand what most people value more when considering colleges, we sent out a survey on which rankings people are more familiar with, which categories people value more, and their demographic information. The survey was used to determine what categories mattered the most to people so that and "ideal ranking" of colleges and universities could be recommended to them.

In this report, the basic foundations behind college rankings are first discussed. In the chapter immediately following, a discussion on the impact of college rankings is presented. The data sources used by the college rankings are discussed, as well as a brief comment on other resources to aid college seekers aside from rankings.

In Chapter 3 a discussion of the approach in selecting college rankings to analyze is discussed. Also included is a discussion of the formulation of the six categories used in grouping together factors. Chapter 4 includes a discussion on the factors that rankings use to determine how to place colleges and universities within their rankings and in which categories the factors fall within. How much each ranking considers each of their six categories in their ranking and the proportion of subjective versus objective factors considered by the rankings is discussed as well.

Chapter 5 opens with the discussion of the survey distributed to determine people's opinions on college rankings and the categories of factors that are important to them in considering colleges. The results of the survey are presented. Comments on the overall scores for the importance of the six categories are discussed, as well as any additional comments made by respondents.

Chapter 6 makes comparisons between different demographic groups recorded in the survey. A series of statistical analyses is performed to determine if there are any statistically significant differences in how different groups of respondent rated the importance of each of the six categories. Chapter 7 further expands on the idea of the six categories and compares the weighted score for the six categories against the weights of each of the six categories presented in the rankings. Weighed score in context means the score of the category divided by the sum of scores for all six categories. Chapter 8 concludes the report with a recommendation for the "ideal ranking" for the population surveyed, as well as a discussion on the pros and cons of college rankings. A discussion on future work is presented in Chapter 8 as well.

2. Background

College and university rankings are enumerated lists of colleges and universities based on their performance in a variety of fields. Certain rankings are more specialized than other rankings. For example *PayScale* includes only financial factors [12] in their ranking of colleges. Other rankings such as *U.S. News and World Report* [4] and *Forbes* [3] consider a larger variety of factors.

2.1 Impact of College Rankings

It is undeniable that college rankings have had an impact on the colleges and universities they rank. However, some universities are taking rankings perhaps far too seriously, taking measures to ensure that they stay high ranked. Andrejs Rauhvargers in his report *Global University Rankings and Their Impact II* [13] gives some examples of actions that universities have taken to manipulate their score on rankings. He states that many universities encourage students that have no hope of being accepted to apply in order to increase the appearance of selectivity. Rauhvargers also documents instances of universities encouraging faculty to take academic leave in the spring instead of autumn, since *U.S. News and World Report* determines full time faculty for student/staff ratio in autumn.

Rauhvargers also outlines the deficiencies of rankings. He concludes that rankings fail their primary purpose of making universities more transparent, as it is difficult to follow the calculations made by the rankings to reach the final result using only publically available information. He also addresses the fact that the rankings thus far only cover some university missions, and not all of them. The rankings that currently exist at the international level focus predominantly on the research aspects of universities, in particular that of the hard sciences.

2.2 Data Sources used by College Rankings

The rankings produces their results by analyzing a pool of data collected from assorted data sources. Examples of data sources are described in the following.

Center for Measuring University Performance

The Center for Measuring University Performance [14] is a research group focused on compiling data about research expenditures of university. The CMUP also provides data on members of National Academies, significant faculty awards, doctorates awarded, postdoctoral appointments, median SAT scores, endowments, and annual giving [15].

Common Data Set

The Common Data Set (CDS) [16] is a collaborative effort among data providers and publishers in the higher education community to provide an accurate and high quality source of information to all involved in a student's transition into higher education. The CDS is created by a collaborative effort from the College Board, Peterson's, and U.S. News and World Report. Data items and definitions used by the U.S. Department of Education in its higher education surveys serve as a guide for the items included in the CDS. Data is collected by sending out surveys to target institutions. Information from the CDS is used by *U.S. News and World Report* [4] in order to generate its rankings. Items in the CDS undergo review by the CDS Advisory Board.

Integrated Postsecondary Education Data System

The Integrated Postsecondary Education Data System (IPEDS) is a group of surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES) [17]. IPEDS gathers information from every college, university, and technical and vocational programs that participate in federal student aid programs. For these institutions participation in the IPEDS survey is mandatory. IPEDS provides data on number of students enrolled, staff employed, dollars expended, and degrees earned [17].

Peterson's

Peterson's [18] is a set of data collected from surveys sent to accredited colleges and universities. Peterson's also contacts college to verify unusual data and resolve discrepancies if they exist.

SCImago Group

SCImago Group is a group that publishes reports on the research output on universities [19]. The goal of the report is so that universities can analyze and then improve their research results. Although institutions are ordered by score, they are not explicitly ranked. Thus it was not considered to be a ranking but rather part of a data set used to generate a ranking.

Scopus

Scopus [20] is an abstract and citation database of peer-reviewed research. As a data source it is used to find the amount of citations that papers published by an institution have. Scopus is used by the *CWTS Leiden Ranking* to provide the number of citations [21].

Thomson Reuters Global Profiles Project

The Thomson Reuters Global Profiles [22] project is a set of surveys developed to produce a data source that provides an effective resource to build profiles of universities around the world. The Global Profiles Project only contains what Thomson Reuters considers to be globally significant institutions. The Global Profiles Project combines together factors of reputational assessment, scholarly output, funding levels, faculty characters, and more in a single database. This data set is used by Times Higher Education to publish what they claim to be "the most definite set of World University Rankings so far."

2.3 College Resources

In addition to college rankings, there are also other college resources available to assist students and parents during the college search process. An example of what is considered a college resource is a website like *College Confidential* [9]. The website possesses a variety of articles on the college search and admissions process. In addition users registered on the website can post discussions in the *College Confidential* forum. The website also has a tool where users can filter colleges using a variety of criteria, such as tuition cost and average SAT score.

Another type of college resource is a guidebook. An example of a college guidebook is the *Fiske Guide to Colleges* [23]. *Fiske* also offers a variety of other guides to assist college-bound seniors and parents in the college admissions process such as guides on how to write essays and taking the SAT. Another example of a college guidebook is the *Princeton Review* [8]. Although the guidebook published by the *Princeton Review* includes ranks colleges in various categories, they only list the top 20 schools in each of the rankings. The rankings are also structured more like a guidebook, with a school's position in the ranking followed by a short description of why the school is ranked there, rather than just presenting the school's ranking like other college rankings. In short, the *Princeton Review* possesses more flavor text than what an actual college ranking would possess.

Included under college resources are tools that permit users to construct their own ranking of colleges and universities. *College Prowler* is an example of a website with such a tool [10]. Users of *College Prowler* can select the importance of a wide variety of factors to them then produce a ranking of

colleges and universities based on their selection. The factors that users can select include Academics, Athletics, Campus Dining, Campus Housing, Campus Strictness, Computers, Diversity, Drug Safety, Facilities, Girls, Guys, Greek Life, Health and Safety, Local Atmosphere, Nightlife, Off-Campus Dining, Off-Campus House, Parking, Transportation, and Weather. Since College Prowler and websites similar to it provide no actual college rankings without user input, it is considered to be a college resource rather than a college ranking.

Introduced in February of 2013, the White House *College Scorecard* is designed by the U.S. Department of Education to provide information to students and parents about the affordability of a college or university and the relative value it provides for the cost [24]. The information provided by the *College Scorecard* includes undergraduate enrollment, costs, graduation rate, loan default rate, median borrowing, and employment. The data displayed by the *College Scorecard* is collected by the U.S. Department of Education.

2.4 Summary

In this chapter, a discussion of previous work studying the effects of college rankings was presented. A summary of the data sources used by college rankings was discussed, and a brief overview of various college resources was provided. The college resources were overviewed in a way that outlined their usefulness to people considering colleges.

3. Approach

3.1 Justification of the Rankings Selected

College rankings are important for students planning to study at a college. Sometimes, a student makes his or her choice simply by comparing the candidate colleges in different rankings and reading comments online. The factors they consider may vary from academic rankings to post-graduation salary rankings, from campus life to financial aid resources, from faculty resources to reputation, and so on. Accordingly, rankings composed of different factors are designed to help students make their choices. So, among all the rankings, which are more popular? What are some representatives? What are their methodologies? Where do they gather data?

To answer the above questions, we started with the rankings we used when we chose our colleges. Such examples are *U.S. News and World Report* National University Rankings, *Times Higher Education* World University Rankings, College Guide [25] by *Washington Monthly*, and Academic Ranking of World Universities [26] by *Shanghai Jiao Tong University*. Then, to enlarge the number of rankings we consider, we searched online to see what additional rankings we could find.

When searching "College Rankings" in Google, the entries come to the top of the page include college rankings from *U.S. News*, America's Top Colleges List from *Forbes* [7], College Guide from *Washington Monthly* [27], College Rankings from *Princeton Review* [8], and so on. Most of them are U.S.-only rankings. In the next several pages of search results, most of the rankings are sports rankings, which do not seem as important as the ones in the first page, since the majority of students would not consider sports as a factor of vital importance.

When searching "World Rankings", websites like *Times Higher Education* World University Rankings, and *QS* World University Rankings come out. A link from *U.S.* News comes out first, but this is only an article about world universities, rather than a ranking.

With the help of Professor Wills, other rankings were also looked at. A paper called "*Global University Rankings and Their Impact Report II*" [13] gave more clues. Therefore rankings based on research like CWTS [28] and Webometrics [29] were added.

Table 1 summarizes all of the rankings considered.

Table 1: University Rankings

Publisher	Title	Type
Forbes	America's Top Colleges	U.S.-only
Kiplinger	Kiplinger's Best Values in Private Colleges	U.S.-only
PayScale	College Education Value Rankings	U.S.-only
U.S. News	National University Rankings	U.S.-only
Washington Monthly	2013 National University Rankings	U.S.-only
CWTS	CWTS Leiden Ranking 2013	World
QS	QS World University Rankings - 2012	World
Shanghai Jiao Tong University	Academic Ranking of World Universities	World
Times Higher Education	THE World University Rankings	World
Webometrics	Ranking Web of Universities	World

Overall, both worldwide and U.S.-only rankings were chosen to be studied. They also have different focuses: some of them focus more on academics and reputation, while others focus more on campus life and post-graduation success.

Other resources such as *College Prowler*, *Department of Education College Scorecard*, and *College Reality Check* [30] were also examined. Students can refer to these websites for useful information relating to their college of choice that is not presented in the rankings.

3.2 Classification of Factors into Categories

To analyze different rankings, a common set of criteria first needs to be defined for the rankings in order to enable comparisons between many different rankings.

3.2.1 Initial Categories: Input, Output, University

Initially we produced the idea of sorting the factors into the categories of Input, Output, and University. Input contains factors describing the quality of the incoming student body. Examples of such factors include student selectivity (from *U.S. News and World Report*), and proportion of international students (from *QS*). Output contains factors describing the quality of life after graduation. Such factors include quality of education (from ARWU-Shanghai), Forbes America leaders (from *Forbes*), and service (from *Washington Monthly*). University contains factors describing the quality of the university itself, the resources for students and facility quality. Such factors include quality of faculty (from ARWU-Shanghai), research output (from ARWU-Shanghai), and student satisfaction (from *Forbes*). Then we put every

factor from each ranking into the corresponding category and calculated the proportion of each category in a specific ranking.

3.2.2 Division of University Category

However, we found our initial division of factors into categories to be unsatisfactory. We had a large proportion of the factors falling under the University category. Upon analyzing the factors within the University category, we realized that the factors need to be further divided into specific categories. From our University category we created the categories of Faculty Quality, Academic Quality, Non-Academic Quality, and Finance. At the same time, we decided to rename our Input category to Student Quality to more accurately reflect what was measured by the factors in that category and our Output category to Post-Graduation Success.

We also added an Unknown category to temporarily store the factors we were uncertain about. The Unknown category was filled with factors that we did not know how to categorize, primarily factors that fit into two or more of the categories we already had. Due to the factors present in the Unknown category, we decided to examine our categories to see if we could condense two or more categories into a single category. Our reexamination provided the impetus for the creation of the Research category.

3.2.3 Creation of the Research Category

When looking at the factors contained in the categories of Faculty Quality and Academic Quality we had a difficult time placing some of the factors in one category or another. Upon inspection we noticed that the factors we had difficulty placing shared a common theme: They were related to research. Due to this, we decided to create an additional category, Research, to house these factors. With the addition of the Research category, we had seven categories. We also modified the definition of the category Faculty Quality.

3.2.4 Removal of Faculty Category

With the creation of the Research category, we had a place for the factors which we had a difficult time deciding whether they belonged in the Faculty Quality category or the Academic Quality category. However, this left few factors in both the Faculty Quality and Academic Quality categories, as we realized that some of the factors we previously had under Academic Quality could be considered as

research. Dissatisfied with the two categories, we examined the factors remaining to see if there was any way of combining the two categories. We noted that the remaining factors under the category of Faculty Quality related to the teaching ability of the professors. With this in mind we decided to remove the Faculty Quality category and merge the contents into Academic Quality. As a result of this change, we ended up with six categories. We also modified the names of the categories to more accurately reflect the factors contained within.

3.2.5 Final Categories

Here is a list of categories considered and their definitions correspondingly.

3.2.5.1 Category 1: Student Body

This category contains factors relating to aspects of the student body of the college or university. This includes factors such as admission rate, average SAT/ACT scores, and student diversity.

3.2.5.2 Category 2: Research

This category contains factors relating to the research output of the college or university. It includes factors such as the total number of citations for faculty at each university per year and research funding.

3.2.5.3 Category 3: Academics

This category contains factors relating to the academic quality of the college or university. Such factors include the reputation of the school, student to faculty ratio, and graduation rate.

3.2.5.4 Category 4: Student Life

This category contains factors relating to the daily life of the students at the college or university. It includes factors such as athletics, social scene, community service, ROTC size, and so on.

3.2.5.5 Category 5: Finance

This category contains factors relating to finance. Such factors include student debt, average financial aid, and endowment.

3.2.5.6 Category 6: Post-Graduation Success

This category contains factors relating to post-graduation success. Such factors include salary of graduates and acceptance rate to graduate schools.

3.3 Subjective vs. Objective Factors

At the same time, the proportion of subjective and objective factors in each ranking was also analyzed. Subjective factors are those related to people's opinions, such as reputation, while objective factors are those based on the real numerical data, such as student selectivity, retention rate and graduation rate, which are calculated based on real data. The proportion of subjective factors versus objective factors is important because subjective factors can be biased. An example of a possible bias would be a person rating a school highly because they saw that it was high in a ranking, or if they graduated from the school in question. Objective factors avoid possible bias by examining quantifiable measures.

3.4 Summary

This chapter introduced the approach to analyzing rankings. First, through online searching mainly, several rankings were selected to be examined for this project. The selected rankings are generated by the following publishers: *CWTS*, *Forbes*, *Kiplinger* [31], *PayScale*, *QS* [32], *Shanghai Jiao Tong University*, *Times Higher Education*, *U.S. News*, *Washington Monthly*, and *Webometrics*. The methodologies of these rankings were studies, and to better analyze the common factors used in these rankings, six categories were proposed, including Student Body, Research, Academics, Student Life, Finances, and Post-Graduation Success. Also, the selected rankings were also analyzed based on whether the factors are subjective and objective. In the next chapter, these rankings will be analyzed by sorting the factors they consider into categories then comparing the results.

4. Ranking Results

4.1 Analysis of Factors in Rankings against the Combination of Categories and Subjective versus Objective Measures

The tables below summarize the breakdown of factors in consideration by the rankings we looked at, sorted by category. The table provides information about the factor, whether it is subjective or objective, which ranking it is from, the weight within the ranking, and the source of data that it comes from. After each table, ambiguously defined factors are explained.

4.1.1 Category 1: Student Body

The Student Body category contains factors relating to aspects of the incoming student body.

Table 2: Factors contained within Student Body category

Factor	**Subject or Objective**	**Ranking (weighting in ranking)**	**Source of Data**
Competitiveness	Objective	Kiplinger (25%)	Peterson's
International Outlook (ratio of international to domestic students)	Objective	Times (2.5%)	Thomson Reuters
Proportion of International Students	Objective	QS (5%)	Scopus
Social Mobility (percentage Pell Grants)	Objective	Washington Monthly (16.5%)	IPEDS
Student Selectivity	Objective	U.S. News (12.5%)	Common Data Set

The competitiveness factor for *Kiplinger* is an amalgamation of admission rate and yield of students [33]. Yield refers to the percentage of students who enroll out of those admitted. For *Washington Monthly's* Social Mobility factor, three main measures are considered: percentage of students receiving Pell Grants, graduation rate, and net price which were used to produce two formulas: the actual versus predicted percentage Pell grants and cost-adjusted graduation rate performance [34]. *Washington Monthly* is unclear as to what exactly predicted percentage of Pell Grant recipients mean.

4.1.2 Category 2: Research

The Research category contains factors relating to the research output of the university.

Table 3: Factors contained within Research category

Factor	Subjective or Objective	Ranking (weighting in ranking)	Source of Data
Activity (excellence)	Objective	Webometrics (16.6%)	SCImago Group
Activity (presence and openness)	Objective	Webometrics (33.4%)	Webometrics
Citations	Objective	Times (30%)	Thomson Reuters
Citations per Faculty	Objective	QS (20%)	Scopus
Citation Volume	Objective	CWTS Leiden (100%)	Thomson Reuters
Industry Income: Innovation	Objective	Times (2.5%)	Thomson Reuters
International Outlook (proportion of university's total research journal publications with at least one international co-author)	Objective	Times (2.5%)	Thomson Reuters
Research	Objective	Washington Monthly (33.33%)	Center for Measuring University Performance, National Science Foundation, Washington Monthly
Research Output	Objective	ARWU (44.5%)	Nature and Science
Research (volume, income, reputation)	Subjective (18%) Objective (12%)	Times (30%)	Thomson Reuters
Quality of Faculty	Objective	ARWU (44.5%)	Nature and Science
Visibility	Objective	Webometrics (50%)	Majestic SEO, ahrefs

The research factor in *Washington Monthly* is based on five measurements: total research spending, number of science and engineering PhDs awarded by the university, number of undergraduate alumni who later receive PhDs, relative number of faculty receiving prestigious awards, and relative number of faculty in the National Academies [34].

The *Times* factor Industry Income: Innovation refers to the amount that a university receives from industry for research [35]. The Research factor in *Times* consists of three components. The university's reputation for research excellence among peers, the research income scaled against number of staff and adjusted for purchasing power parity, and the research output scaled against the number of staff. The research output is the number of papers published in academic journals indexed by Thomson Reuters.

In the *Webomterics* ranking the Activity factor is divided into three parts: presence, openness, and excellence [36]. The presence portion of the Activity factor refers to the number of webpages

hosted in the web domain of the university indexed by Google. Openness refers to the number of rich files published in dedicated websites according to Google Scholar. Excellence is the number of papers published that are part of the 10% most cited papers in their respective fields. The visibility factor refers to amount of times webpages on a university's web domain are linked. ahrefs [37] and Majestic SEO [38] are tools to display internal and external links.

4.1.3 Category 3: Academics

The Academics category contains factors relating to the academic performance of colleges and universities.

Table 4: Factors contained within Academics category

Factor	Subjective or Objective	Ranking (weighting in ranking)	Source of Data
Academic Reputation	Subjective	QS (40%)	Scopus
Academic Reputation Survey (invitation only)	Subjective	Times (15%)	Thomson Reuters
Academic Support	Objective	Kiplinger (12.5%)	Peterson's, Kiplinger
Doctoral to Bachelor Degree Ratio	Objective	Times (2.25%)	Thomson Reuters
Faculty Resources	Objective	U.S. News (20%)	Common Data Set
Freshman Retention	Objective	Forbes (7.5%)	IPEDS
Faculty-Student Ratio	Objective	QS (20%)	Scopus
Graduation Rate	Objective	Kiplinger (18.75%)	Peterson's, Kiplinger
Graduation Rate Performance	Objective	U.S. News (7.5%)	Common Data Set
Institutional Income (adjusted for number of academic staff)	Objective	Times (2.25%)	Thomson Reuters
Proportion of International Faculty	Objective	QS (5%)	unknown
Ratio of International to Domestic Staff	Objective	Times (2.5%)	Thomson Reuters
Retention	Objective	U.S. News (22.5%)	Common Data Set
Student Satisfaction (graduation rate)	Objective	Forbes (11.25%)	IPEDS
Student Satisfaction (*RateMyProfessor*)	Subjective	Forbes (15%)	www.ratemyprofessor.com
Student-to-Staff Ratio	Objective	Times (4.5%)	Thomson Reuters
Undergraduate Academic Reputation	Subjective	U.S. News (22.5%)	U.S. News
Unique Subject Mix (volume of doctoral awards in different disciplines)	Objective	Times (6%)	Thomson Reuters

Kiplinger's Academic Support factor is a combination of the graduation rate and the amount of students per faculty member [33]. The faculty resources factor in *U.S. News* is an amalgamation of classes with fewer than 20 students, proportion of classes with 50 or more students, faculty salary, proportion of professors with the highest degree in their fields, student-faculty ratio, and proportion of faculty who are full time [4]. The Undergraduate Academic Reputation factor from the same ranking utilizes responses to a survey sent out to presidents, provosts, and deans of admissions of colleges and universities asking them to provide and assessment on the academic programs of various schools [4].

15% of the Student Satisfaction factor of the *Forbes* ranking was derived from professor ratings on *RateMyProfesser* [39], a website where students review professors [3].

4.1.4 Category 4: Student Life

The Student Life category contains factors relating to the daily life of students at colleges and universities. While only Washington Monthly was classified as having a factor within the Student Life category, the do-it-yourself rankings have many factors selectable that are within the category of Student Life. Do-it-yourself rankings refer to sources like *College Prowler*, which was discussed in the previous chapter.

Table 5: Factors contained within Student Life Category

Factor	**Subjective or Objective**	**Ranking (weighting in ranking)**	**Source of Data**
Service	Objective	Washington Monthly (33.3%)	unknown

The service factor in *Washington Monthly* is measured by a combination of the size of the school's Air Force, Army, and Navy ROTC programs relative to the size of the school, relative number of alumni serving in the Peace Corps, percentage of federal work-study grant money spent on community service projects, the number of students participating in community service and total service hours performed relative to the size of the school, and the number of academic courses that incorporate service relative to the size of the school. Also considered was whether or not the school provides community service scholarships [34].

4.1.5 Category 5: Finance

This category contains factors relating to the financial statues of students and of colleges and universities.

Table 6: Factors contained within Finance category

Factor	Subjective or Objective	Ranking (weighting in ranking)	Source of Data
Cost and Financial Aid	Objective	Kiplinger (31.25%)	Peterson's
Financial Resources	Objective	U.S. News (10%)	Common Data Set
Social Mobility (cost-adjusted graduation rate performace)	Objective	Washington Monthly (16.5%)	IPEDS
Student Debt	Objective	Forbes (17.5%)	unknown
Student Indebtedness	Objective	Kiplinger (12.5%)	Peterson's

The Financial Resources factor for *U.S. News* refers to the spending of a college or university per student.

4.1.6 Category 6: Post-Graduation Success

This category contains factors such as salary of graduates and acceptance rate to graduate schools.

Table 7: Factors contained within Post-Graduation Success category

Factor	Subjective or Objective	Ranking (weighting in ranking)	Source of Data
Alumni Giving Rate	Objective	U.S. News (5%)	unknown
Employer Reputation	Subjective	QS (10%)	QS Survey
Forbes America's Leaders	Subjective	Forbes (22.5%)	Forbes
Nationally Competitive Awards	Objective	Forbes (11.25%)	Forbes
Post-Graduation Salaries	Objective	Forbes (15%)	Payscale
Quality of Education	Objective	ARWU (11.11%)	Nobel Prize Winners, List of Fields Medalists
Return on Investment	Objective	PayScale (100%)	PayScale

The Quality of Education factor for ARWU refers to the amount of alumni of the institution that win Nobel Prizes and Fields Medals. The information for winners of Nobel Prizes was obtained from the Nobel Prize website [40]. The information on Fields medalists was found from the list of Fields medalists [41]. For this factor alumni are those who obtains bachelor, master, or doctoral degrees from the institution [42].

The Nationally Competitive Awards factor of *U.S. News* refers to the amount of students who win prestigious scholarships such as the Rhodes, National Science Foundation, and Fullbright scholarships [3]. It also includes undergraduate alumni who earn PhDs.

PayScale's ranking of colleges by return on investment (ROI) uses the 30 year median pay for a 2012 bachelor's graduate then takes that value and finds the difference between the 30 year median pay for a bachelor's graduate in 2012 and the 34-36 year median pay for a 2012 high school graduate weighted for number of years worked [12]. Then the weighted cost of attending college is subtracted from the value to find the 30 year return on investment in 2012 dollars. The weighted cost of attending college refers to the weighted average of the net cost paid by students who graduate in four, five, and six years. This factor from *PayScale* was considered to be Post-Graduation Success since although the financial cost of a college factors into the calculation, the majority of the factor is influenced by the earnings of the graduate.

4.2 Summary of Ranking Results

Based on the categorization methodology mentioned above, the percentage for each of the six categories in the rankings was calculated. The percentages of subjective and objective factors in those rankings were also calculated.

4.2.1 Distribution of Six Categories in U.S.-only College Rankings

The rankings considered here include *Forbes*, *Kiplinger*, *PayScale*, *U.S. News*, and *Washington Monthly*.

Table 8: Category weights for U.S.-only rankings

	Forbes	Kiplinger	PayScale	U.S. News	Washington Monthly
Student Body	0%	25%	0%	13%	17%
Research	0%	0%	0%	0%	33%
Academics	34%	31%	0%	73%	0%
Student Life	0%	0%	0%	0%	33%
Finance	18%	44%	0%	10%	17%
Post-Graduation Success	49%	0%	100%	5%	0%

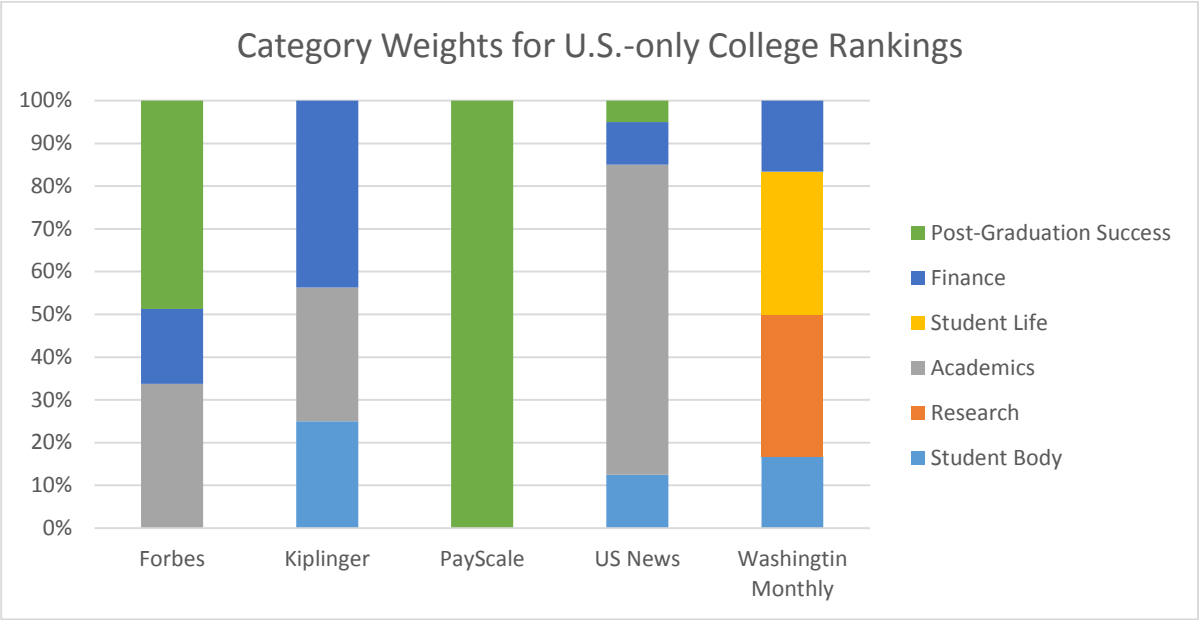

Figure 1: Category weights for U.S.-only college rankings

As shown in Table 8 and Figure 1, none of the rankings consider all of the six categories we defined. Among all of these rankings, two (*U.S. News* and *Washington Monthly*) consider four categories, another two (*Forbes* and *Kiplinger*) consider three categories, and one (*PayScale*) considers only one category. Although both consider four categories, *Washington Monthly* has a more balanced distribution of categories, while *U.S. News* heavily focuses on Academics. Considering only three categories, *Forbes* tends to focus more on Post-Graduation Success while less on Finance. *Kiplinger's* categories have roughly equal weights, with a little extra focus on the financial aspects of college. On the other hand, *PayScale* focused solely on one aspect, Post-Graduation Success.

4.2.2 Distribution of Six Categories in World College Rankings

The rankings considered here include ARWU-Shanghai, *CWTS*, *QS*, *Times*, and *Webometrics*.

Table 9: Category weights for world college rankings

	ARWU-Shanghai	CWTS	QS	Times	Webometrics
Student Body	0%	0%	5%	3%	0%
Research	89%	100%	20%	65%	100%
Academics	0%	0%	65%	33%	0%
Student Life	0%	0%	00%	0%	0%
Finance	0%	0%	0%	0%	0%
Post-Graduation Success	11%	0%	10%	0%	0%

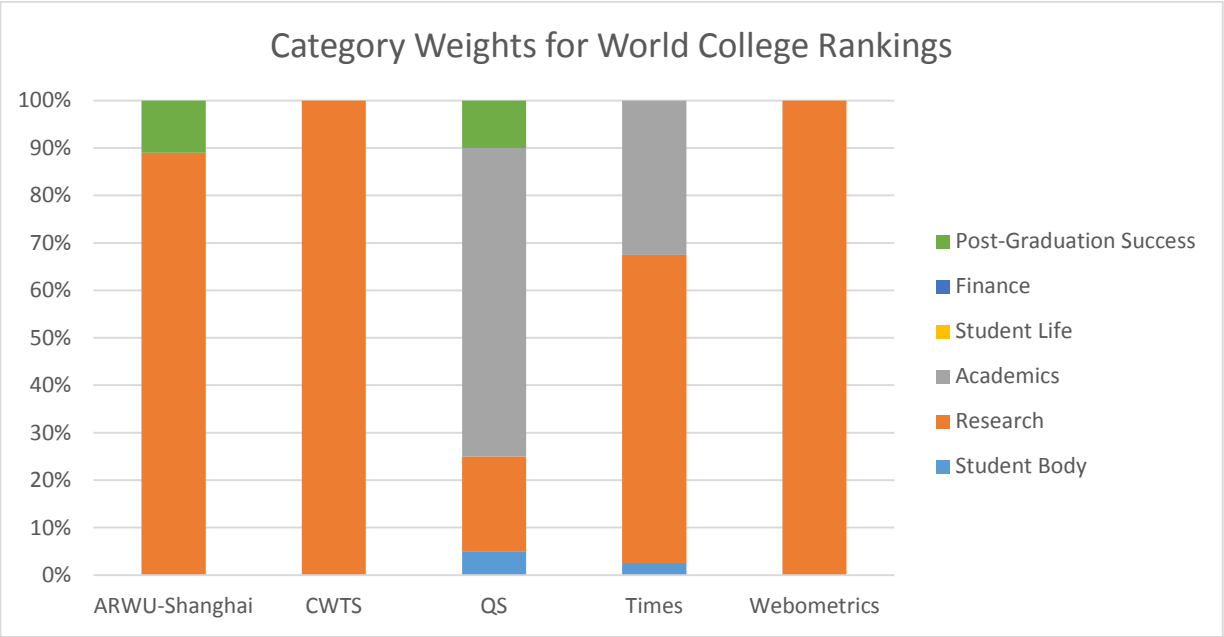

Figure 2: Category weights for world college rankings

As shown in Table 9 and Figure 2, most of the world college rankings focus on research, and none of them pay attention to the financial aspects of attending a college or university. The funding the faculty receive for research was counted in the Research category.

4.2.3 Distribution of Subjective versus Objective Factors in U.S.-only College Rankings

Table 10: Proportion of subjective versus objective factors in U.S.-only college rankings

	Forbes	Kiplinger	PayScale	U.S. News	Washington Monthly
Subjective	45%	0%	0%	23%	0%
Objective	55%	100%	100%	78%	100%

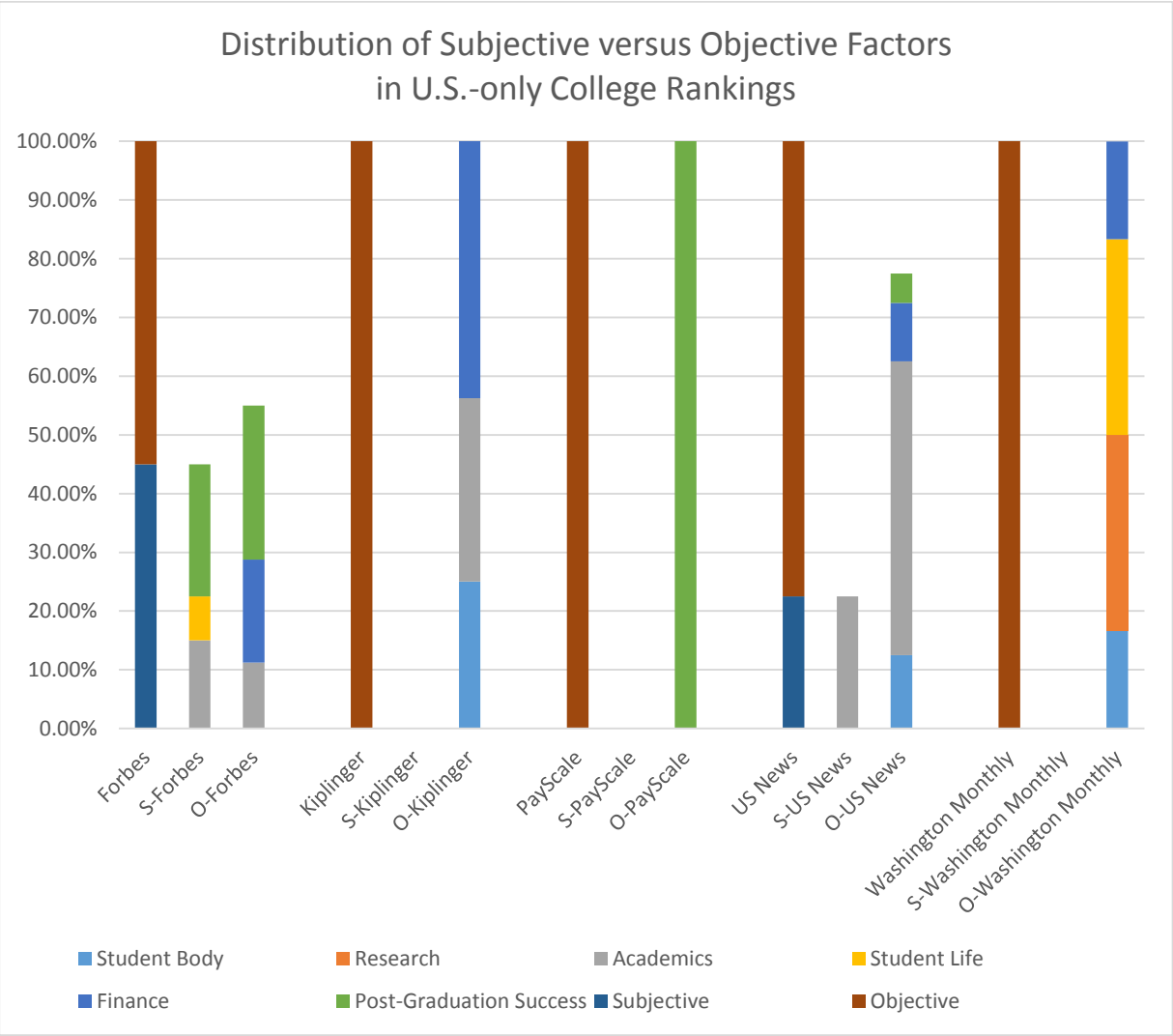

Figure 3: Subjective versus objective factors for U.S.-only college rankings

As the shown in Figure 3 and Table 10, both *Forbes* and *U.S. News* have combined the subjective measurements and objective measurements in designing their rankings, while others, *Kiplinger*, *PayScale*, and *Washington Monthly* only focus on objective measurements.

4.2.4 Distribution of Subjective versus Objective Factors in World College Rankings

Table 11: Proportion of subjective versus objective factors in world college rankings

	ARWU-Shanghai	CWTS	QS	Times	Webometrics
Subjective	0%	0%	50%	33%	0%
Objective	100%	100%	50%	67%	100%

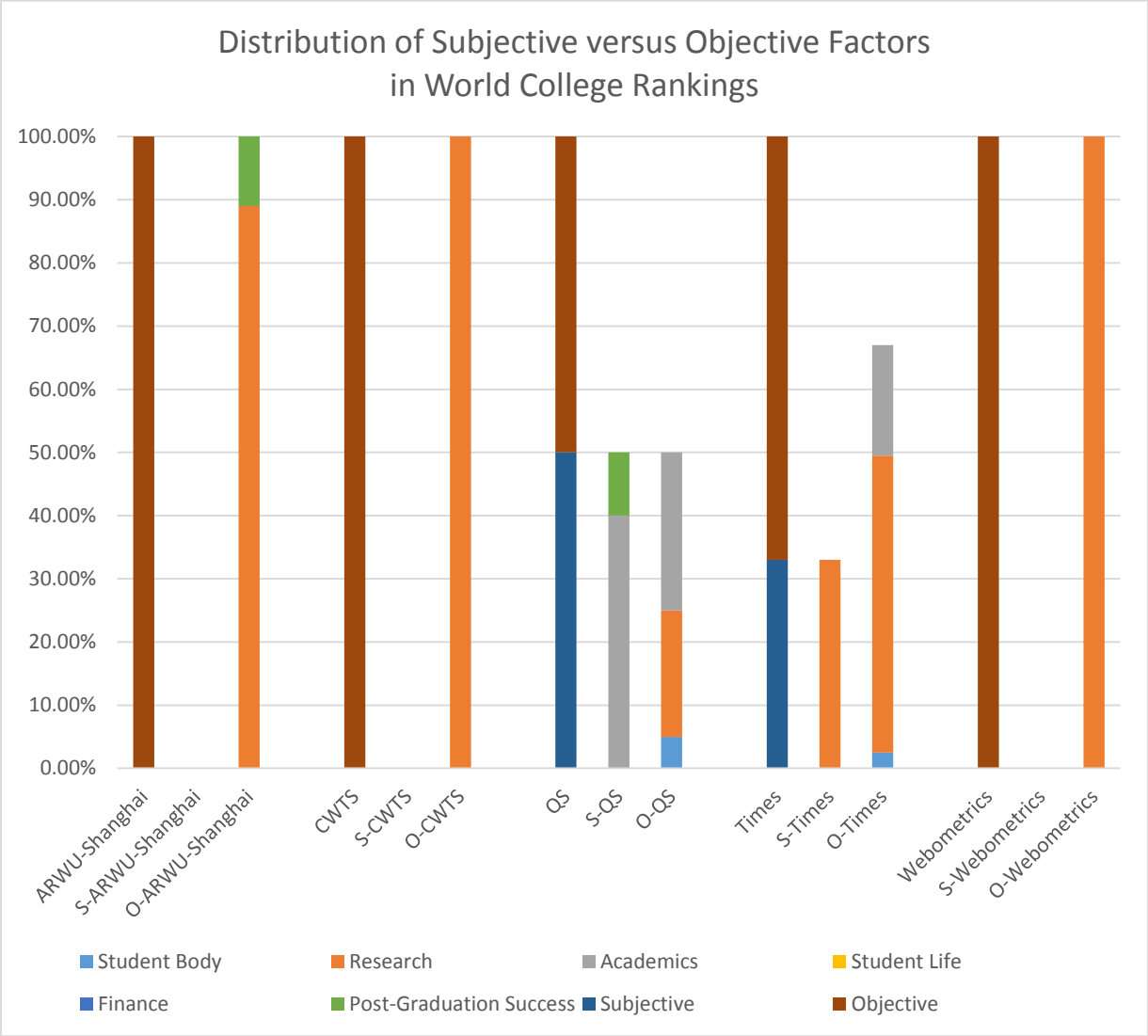

Figure 4: Subjective versus objective factors for world college rankings

As shown in Figure 4 and Table 11, *QS* and *Times* have combined subjective measurements and objective measurements in designing their rankings. Especially, *QS* has a one-to-one ratio in subjective and objective measurements. On the other hand, ARWU-Shanghai, *CWTS*, and *Webometrics* focus on only objective measurements.

4.3 Summary

This chapter categorized factors into the six categories introduced in the previous chapter, along with their property of being subjective or objective, their publisher and their weights in the rankings. Furthermore, the proportion of each category in each ranking was calculated, and then 100% stacked

bar graphs were generated to help better understand the composition of each ranking. The proportion of subjective factors versus objective factors were calculated in a similar way. To compare people's ideal composition of rankings with the selected rankings, a survey was conducted to gather information, and will be described in details in the following chapter.

5. Survey

5.1 Motivation for Producing a Survey

How much each of our six categories of factors is considered in various college rankings tells us what the authors of the rankings to be important aspects of a college. What the authors of rankings believe to be important aspects of a college differ wildly between the various rankings we examined. We were curious as to how different the importance on categories placed by rankings were from what people consider to be important factors in selecting a college for them. In order to determine what categories people consider to be most important for a college, we designed a survey to be distributed asking people how important each of our six categories were to them when they were considering colleges.

The purpose of the survey was to generate data that would enable the determination of what types of people consider to be important sets of factors in considering colleges. As noted in Chapter 4, the world rankings tended to place a heavy emphasis on the Research category while the rankings that only considered colleges in the United States tended to be more widely varied.

5.2 Survey Design

We generated our survey using Google Forms. Our survey was distributed by email to faculty, graduate students, and a portion of undergraduate students at Worcester Polytechnic Institute. The survey was also distributed to a small selection of respondents outside of Worcester Polytechnic Institute, such as the relatives of the group members.

The screenshots of the survey can be found in the Appendix. Here is the URL of the survey: https://docs.google.com/forms/d/1dYDDDUgJJ6fkTiv2vSac_L0IdlKAkBl3IHMEiPxFtd0/viewform?usp=send_form

After taking the survey, respondents were allowed to see the summary of the responses so far.

In terms of the design of this survey, it was divided into the following five sections.

Section 1: General Familiarity with College Rankings and Related Resources

Section 1 takes one page, and is composed of two questions: one asks the importance of college rankings, and the other asks the importance of other resources. By comparing the importance of college rankings to that of other resources, the relevance of college rankings can be discovered.

Section 2: Categories

Section 2 takes two pages, and is composed of six questions. Each question asks the importance of a category previously defined in Chapter 3. We want to know the importance of each of our categories to our respondents.

Section 3: Importance of Subjective Factors vs. Objective Factors

Section 3 takes one page, and is composed of two questions that ask the respondents the degree of importance of subjective and objective factors. We want to know how important subjective and objective factors are to different groups of people.

Section 4: Familiarity with Each Ranking

This section takes one page, and is composed of three questions. Each question asks respondents to check all of the rankings or online resources listed that they are familiar with. The results permit the comparison of people's familiarity with U.S. college rankings to that with world university rankings, as well as to that with other resources.

Section 5: Demographic Information

This section takes one page, and is composed of eight questions. By gathering the data of age, gender, region of residence, and whether they are enrolled in a college/university, we can better group people, so that to analyze the difference of views toward college rankings. There was also a free response question for people to write comments and thoughts about our survey.

5.3 Summary of Survey Responses

An analysis was performed on the results of the survey to determine the overall response to each of the questions. Only responses received before April 2, 2014 were considered. We received a total of 341 responses.

The primary area of interest was how respondents rated the importance of each of the six categories. In order to produce an average, a numerical value to each possible response to the question of how important each of the six categories were to them. The response "Not Important" was assigned a value of 0, "Somewhat Important" a value of 1, "Important" a value of 2, "Very Important" a value of 3, and "Extremely Important" a value of 4. Using these assigned values, the average value for the

importance of each of the six categories was determined. A similar process was performed on the responses to the importance of Subjective versus Objective factors.

After values were assigned to the responses, those values could be used to compute a numerical average. The values for the numerical average were used to generate a stacked bar graph in Microsoft Excel.

Section 1: General Questions

Section 1 of the survey asked two questions. The first question was how important college rankings are to the respondent in considering colleges. The purpose of this question is to determine just how important college rankings are in general to respondents and their general familiarity with them. The second question asks how important other resources to the respondent in considering colleges are. An example of a resource would be a guidebook such as the Princeton Review.

Question 1: How important are college rankings, such as U.S. News and World Report and Forbes, to you in considering colleges?

Table 12: Importance of college rankings

Don't know what they are.	5	1%
Not Important	43	13%
Somewhat Important	125	37%
Important	91	27%
Very Important	55	16%
Extremely Important	22	6%

Table 12 displays the responses to the questions of how important college resources are to the respondent in considering colleges. 50% of respondents rated the importance of college rankings as Somewhat Important or below, meaning that for half the respondents college rankings were a major part of the college decision-making process. 22% of respondents rated the importance of college rankings as Very Important or above. 6% of respondents said that college rakings are extremely important in considering colleges. 1% of respondents did not know what college rankings were.

Question 2: How important are other resources, such as college guidebooks like the Princeton Review and websites like the College Board, to you in considering colleges?

Table 13: Importance of college resources

Don't know what they are.	11	3%
Not Important	39	11%
Somewhat Important	121	35%
Important	105	31%
Very Important	53	16%
Extremely Important	12	4%

As seen from Table 13 responses for the importance of college guidebooks show a similar distribution. 46% of respondents rated the importance of college guidebooks in considering colleges as Somewhat Important or lower. 20% of respondents rated the importance of College Guidebooks as Very Important or above. 4% of respondents said that college guidebooks are extremely important in considering colleges. 3% of respondents did not know what college resources were.

From the responses to the questions in Section 1, in general for respondents college rankings had an approximately equal importance to college resources such as guidebooks and website to them in considering colleges.

Section 2: Categories

Section 2 of the survey asked six questions pertaining to the importance of the six categories to our respondents in considering colleges. There was one question for each of the six categories asking respondents to rate the importance of that category to them in considering colleges.

Question 3: How important are factors relating to the Student Body to you in considering colleges?
Question 4: How important are factors relating to Research to you in considering colleges?
Question 5: How important are factors relating to Academics to you in considering colleges?
Question 6: How important are factors relating to Student Life to you in considering colleges?
Question 7: How important are factors relating to Finance to you in considering colleges?
Question 8: How important are factors relating to Post-Graduation Success to you in considering colleges?

Summary of Six Categories:

Table 14: Responses to the importance of the six categories

	Student Body	Research	Academics	Student Life	Finance	Post-Graduation Success
Not Important	6%	25%	1%	11%	6%	2%
Somewhat Important	20%	29%	6%	22%	14%	11%
Important	38%	23%	19%	31%	21%	19%
Very Important	28%	16%	38%	27%	33%	36%
Extremely Important	7%	7%	35%	9%	26%	33%
Score	2.10	1.51	2.99	2.00	2.60	2.87

As shown in Table 14, respondents rated Academics as the most important category to them, followed by Post-Graduation Success and Finance coming in at second and third most important, respectively.

Section 3: Importance of Subjective Factors vs. Objective Factors

Section 3 of the survey asked two questions about the importance of subjective and objective factors to them in considering colleges.

Question 9: How important are Subjective Factors such as reputation and student survey results to you in considering colleges?

Question 10: How important are Objective Factors such as graduation rate and research funding to you in considering colleges?

Table 15: Importance of subjective versus objective factors

	Subjective	Objective
Not Important	9%	6%
Somewhat Important	29%	21%
Important	35%	34%
Very Important	22%	30%
Extremely Important	5%	9%
Score	1.84	2.14

Based on the average score, objective factors appear to be more important to respondents in considering colleges. The difference in average score between subjective and objective factors is statistically significant at a 95% confidence level.

Section 4: Familiarity with Each Ranking

Section 4 of the survey asked three questions regarding the familiarity respondents had with various college rankings and other college resources.

Question 11: From the following list, check all U.S. college rankings that you are familiar with.

Table 16: Familiarity with U.S. college rankings

America's Top Colleges List by Forbes (Forbes)	234	69%
PayScale	103	30%
U.S. News and World Report (U.S. News)	291	85%
Washington Monthly National University Rankings (Washington Monthly)	24	7%
Other	19	6%

Question 12: From the following list, check all world college rankings that you are familiar with.

Table 17: Familiarity with world college rankings

Academic Ranking of World Universities by Shanghai Jiao Tong University (ARWU)	44	13%
CWTS Leiden	6	2%
Quacquarelli Symonds University Rankings (QS)	19	6%
Times Higher Education World University Rankings (Times)	98	29%
Webometrics	11	3%
Other	8	2%

From Table 16 and Table 17, it is apparent that the *U.S. News and World Report* rankings were most familiar to the respondents, with 85% responding that they were familiar in some way with *U.S. News and World Report*. The respondents were generally less familiar with world college rankings than U.S. college rankings. Only 29% of respondents indicated that they were familiar with the *Times Higher Education World* University Rankings which was the world college ranking that the most respondents indicated they were familiar with.

Question 13: From the following list, check all the resources that you are familiar with.

Table 18: Familiarity with college resources

College Board Guidebook	206	60%
College Confidential	92	27%
Fiske	100	29%
Kiplinger	97	28%
Princeton Review	285	84%
White House College Scorecard	28	8%
Other	6	2%

Of the college resources, 84% of respondents indicated that they were familiar with the Princeton Review. 60% of respondents indicated that they were familiar with the College Board Guidebook. Only 8% of respondents indicated that they were familiar with the White House College Scorecard.

Section 5: Demographic Information

Section 5 of the survey asked seven questions about the demographics of the respondents, with an eighth question for any additional comments the respondents may have had regarding the survey. The demographic information collected by the survey was used to create comparisons between the general trends in responses for the other sections of the survey for different demographic groups.

Question 14: Age

Table 19: Age ranges of respondents

under 18	7	2%
18-25	163	48%
26-35	37	11%
36-45	32	9%
above 45	102	30%

Question 15: Gender

Table 20: Gender of respondents

Male	161	47%
Female	180	53%

Question 16: In what region of the world is your residence?

Table 21: Residence of respondents

United States	290	85%
Africa	1	0%
Asia	36	11%
Australia/Oceania	4	1%
Europe	7	2%
North America, excluding United States	2	1%
South America	1	0%

Of particular interest are the locations of primary residence indicated by the respondents. 85% of respondents indicated that their residence was within the United States. 11% of respondents indicated that their primary residence was in Asia.

Question 17: Are you planning on attending a college/university?

Table 22: Future plans for college or university attendance of respondents

Yes	162	49%
No	172	51%

Question 18: Are you currently enrolled in a college/university?

Table 23: Current college or university attendance of respondents

Yes	177	52%
No	161	48%

Question 19: Have you previously enrolled in a college/university?

Table 24: Previous college or university attendance of respondents

Yes	245	72%
No	94	28%

Question 20: Are you a parent that has a child planning to enroll or are currently enrolled in a college/university?

Table 25: Parental Status of Respondents

Yes	83	25%
No	255	75%

Question 21: Do you have any additional comments about college rankings?

This is a free response question.

There are 40 responses for this question. In other words, about 12% respondents answered this question. However, the perspectives to answer this question varied greatly. The responses can be summarized into the following groups.

Some respondents talked about which of the categories they considered more important. A couple of respondents said that financial aids and reputation were considered very important compared to other factors. However, one respondent thought that it is not good to just focus on the cost and repay.

Some respondents talked about to whom college rankings are more important. Three of them thought college rankings are more useful for employment, while another respondent indicated “the reputation of the university should not determine the candidate’s eligibility for the job.”

Some respondents criticized on the phenomenon of overemphasizing college rankings or even the education system. One of them said, “I think it's a shame that colleges and universities are forced to pander to rankings such as U.S. News and World Report which have no actual relation to the quality of education and educational experience delivered at the institutions they are measuring. I also think it's a shame that our entire public school system is built around standardized tests such as the SAT that have nothing to do with predicting future academic success. I wish more colleges and universities would go SAT optional or forgo SAT scores altogether to stop this insane dependence on standardized tests that is ruining the educational system in the United States”. Similarly, some indicated that the experience of attending a college is much more important than the numerical numbers.

Some respondents also talked about their feeling in filling out this survey. One said, “More question could be included pertaining specifically to grad students”. “My responses are based mostly on the college search process for my two children, rather than my own college search.” “All my kids are now grown and done with college...not sure my answers are very relevant.” “A few clarifications: You asked "Are you planning on attending a college/university?” I replied "No" because I have completed college. You asked "Are you a parent that has a child planning to enroll or are currently enrolled in a

college/university?” I replied "No" because my children have completed college. Of course, your survey might not have been designed for faculty. But we do respond to surveys. Sometimes.”

There are also three ambiguous responses among the 40 responses. So there are 37 valid responses for this question.

5.4 Summary

This chapter described the survey used to gather people’s opinions regarding college rankings. Specifically, the motivation of conducting this survey, the design of this survey, and basic summary of the survey responses were addressed in this chapter. In the next chapter, the responses will be further analyzed based on the demographic information.

6. Analysis of Survey Results

After getting the raw results, an analysis was performed to see whether the importance of categories and subjective versus objective factors differ based on demographic. Five pairwise comparisons were produced. The first comparison was between respondents whose residence was in the United States and those whose residence was outside of the United States. The second comparison compared the responses of younger respondents against those of older respondents. The third comparison was between male and female respondents. The fourth comparison was between respondents who indicated that they were parents of students planning to enroll or were currently enrolled in college and students in college. The final comparison was between respondents who were planning to enroll in college and respondents who indicated that they were parents. A z-test was performed on the samples in the pairwise comparisons to check if any differences between the two were statistically significant. A z-test finds the confidence interval for each group then compares the confidence intervals to see if they overlap or not. If they overlap then the result is not statistically significant. If they do not overlap the result is statistically significant. The formula for confidence interval can be found by using the formula

$$\mu \pm S \times \frac{\sigma}{\sqrt{n}}$$

where μ is the mean of the score, S is the test-statistic, n is the sample size of that particular group. The test-statistic is a constant used to determine the margin of error. For a 95% confidence level the test-statistic is 1.96 and for a 90% confidence level it is 1.645.

In each of the comparisons, the importance of the six categories was compared first. A stacked bar graph was generated for each of the sample groups being compared for the importance of the six categories. The stacked bar graph displays each score as a percentage of the total numerical score for each sample group, in order to determine percentage-wise how important that category is to them in considering colleges. Then the importance of subjective versus objective factors was compared. For the importance of subjective versus objective factors, a stacked bar graph was not generated due to the small amount of variables.

6.1 Comparison of Responses between United States and non-United States Residents

In Chapter 4 it was noted that the world university rankings tend to place a heavier emphasis on the research aspect in their rankings than the U.S. college rankings did. To determine if the emphasis on

the Research category is justified, a comparison was performed between U.S. and non-U.S. respondents to determine if the non-U.S. respondents on average rated Research higher than their U.S. counterparts.

6.1.1 Importance of Six Categories

Table 26: Importance of six categories for U.S. versus non-U.S. residents

	U.S.	non-U.S.	Difference
Student Body	2.10	2.12	-0.02
Research	**1.39**	**2.16**	**-0.77**
Academics	3.02	2.80	0.22
Student Life	2.03	1.80	0.23
Finance	2.64	2.31	0.33
Post-Graduation Success	2.91	2.63	0.28

After performing a z-test on the importance of categories for United States residents versus non-United States residents, only the research category possessed a statistically significant difference between the two scores at a 95% confidence level. The result proves the initial hypothesis suggested by the difference in compositions of categories used to generate the U.S.-only versus worldwide rankings correct, that non-U.S. residents rated Research higher than U.S. residents. However the difference is not as large as the importance that worldwide university rankings place on Research suggests. Figure 5 displays the importance of the six categories for U.S. and non-U.S. respondents.

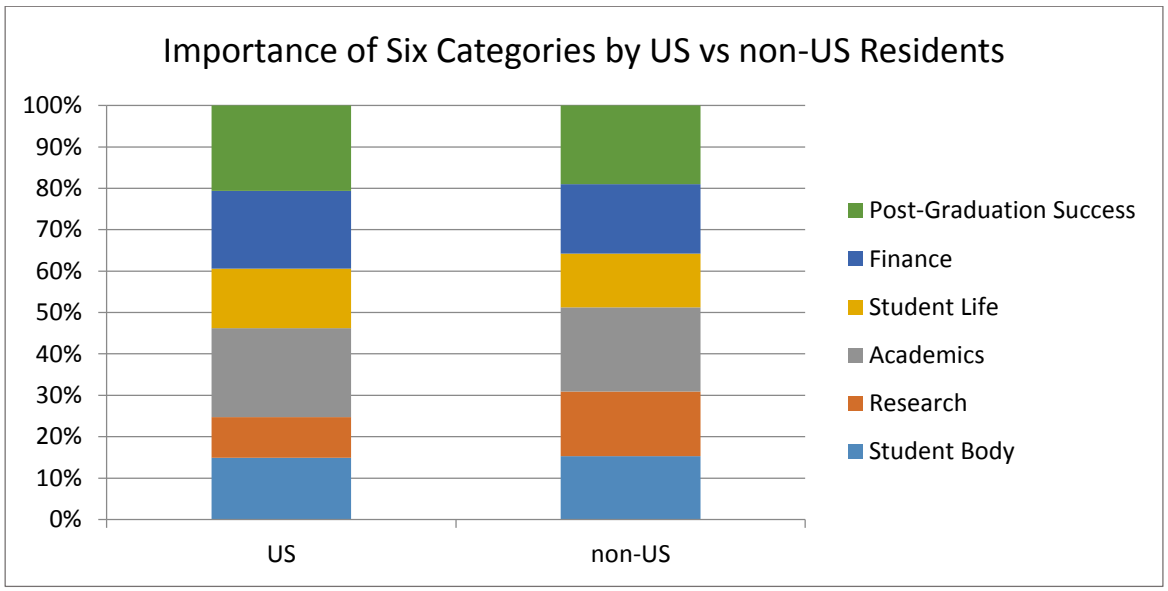

Figure 5: Importance of six categories by U.S. versus non-U.S. residents

6.1.2 Importance of Subjective versus Objective Factors

Table 27: Importance of subjective versus objective factors for U.S. residents versus non-U.S. residents

	U.S.	non-U.S.	Difference
Subjective	1.84	1.88	-0.04
Objective	2.14	2.10	0.04

Using a z-test on the importance of subjective versus objective factors for United States residents versus non-United States residents, it was found that the difference between the two demographic groups was not statistically significant.

6.2 Comparison of Responses between Respondents below 26 and above 35

Since people's opinions have known to change with age, a comparison was performed between two different age groups to see if there are any differences between the two. For this comparison respondents were sorted into two groups, those under 26 and those above 35. Respondents between the ages of 26 and 35 were excluded from this comparison. There is a gap between the two age groups in order to produce a clear distinction between the two.

6.2.1 Importance of Six Categories

Table 28: Importance of six categories for respondents under 26 versus respondents above 35

	Under 26	Above 35	Difference
Student Body	2.13	2.15	-0.02
Research	1.51	1.42	0.09
Academics	3.02	2.95	0.07
Student Life	2.00	2.08	-0.08
Finance	2.53	2.70	-0.17
Post-Graduation Success	2.89	2.79	0.10

After performing a z-test on the importance of categories by the two age groups, no statistically significant difference between the two scores was found at a 95% confidence level or 90% confidence interval.

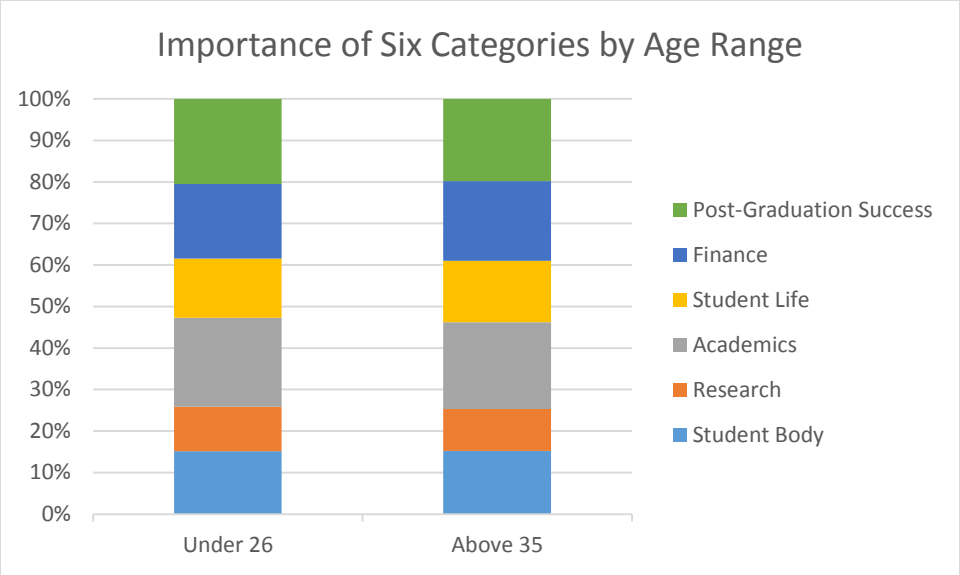

Figure 6: Importance of six categories by age range

6.2.2 Importance of Subjective versus Objective Factors

Table 29: Importance of subjective versus objective factors for respondents below 26 versus respondents above 35

	Under 26	Above 35	Difference
Subjective	1.81	1.88	-0.07
Objective	2.11	2.13	-0.02

After performing a z-test on the importance of subjective versus objective factors by the two age groups, there is no statistically significant difference between the two age groups at a 95% confidence level.

6.3 Comparison of Responses between Male and Female Respondents

A comparison was made between male and female respondents to determine if there is a difference in opinion on the importance of the six categories and subjective versus objective factors between the two groups.

6.3.1 Importance of Six Categories

Table 30: Importance of six categories for male versus female respondents

	Male	Female	Difference
Student Body	2.05	2.15	-0.10
Research	1.48	1.53	-0.05
Academics	3.05	2.94	0.11
Student Life	1.85	2.13	-0.28
Finance	2.45	2.72	-0.27
Post-Graduation Success	2.90	2.84	0.06

After performing a z-test on the scores for the importance of the six categories by gender, it was found that none of the differences are statistically significant at the 95% or 90% level.

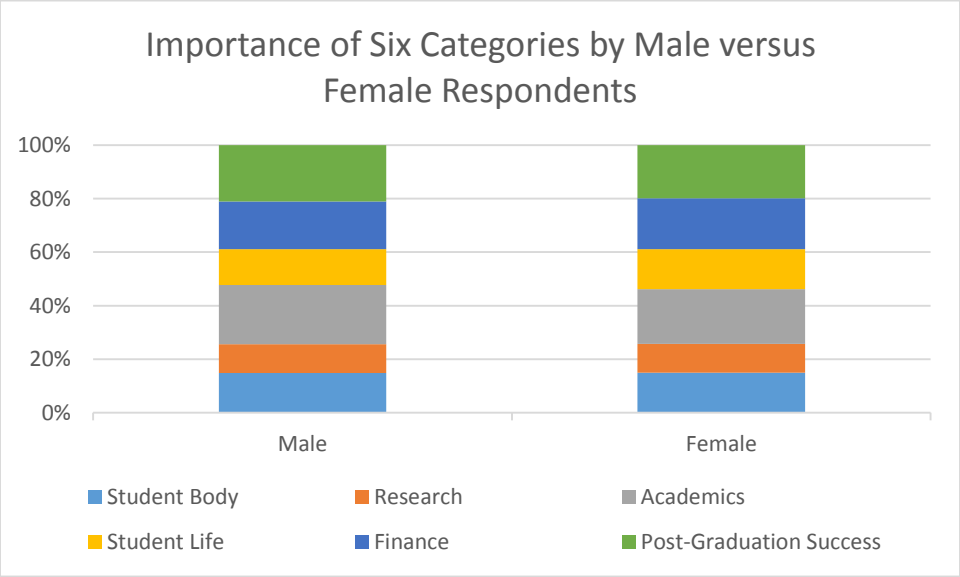

Figure 7: Importance of six categories for male versus female respondents

6.3.2 Importance of Subjective versus Objective Factors

Table 31: Importance of subjective versus objective factors for male versus female respondents

	Male	Female	Difference
Subjective	1.80	1.88	-0.08
Objective	2.10	2.17	-0.07

Using a z-test on the importance of subjective versus objective factors by gender, it was found that the difference between males and females was not statistically significant.

6.4 Comparison of Responses between Current Students and Parents

This comparison was done between the respondents who said yes for Question 18, (namely they are currently enrolled in a college) and the respondents who said yes for Question 20, (namely they are parents that are parents who have children planning to go to college or are currently enrolled).

The hypothesis is that there might be difference between these groups because of their life status, and therefore this comparison was performed to determine if there was any difference.

6.4.1 Importance of the Six Categories

Table 32: Importance of the six categories for current students versus parents

	Current Students	Parents	Difference
Student Body	2.03	2.24	-0.21
Research	1.58	1.34	0.24
Academics	2.97	2.88	0.09
Student Life	**1.81**	**2.28**	**-0.47**
Finance	2.49	2.57	-0.08
Post-Graduation Success	2.89	2.72	0.17

At a 95% confidence level, there is a statistically significant difference between the scores of Student Life, which means that parents tend to value more on Student Life than current students.

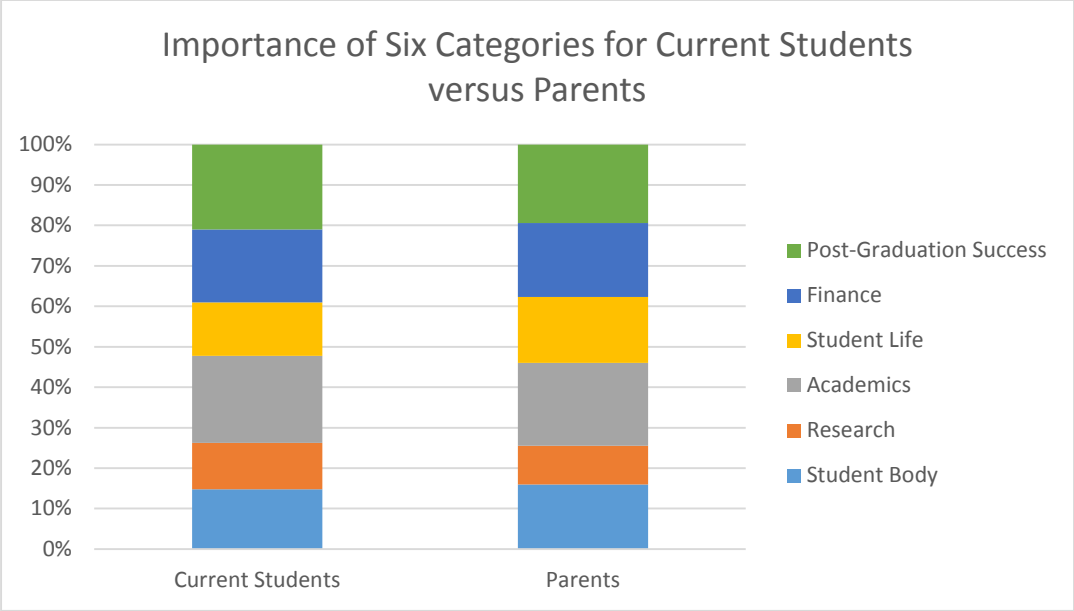

Figure 8: Importance of the six categories for current students versus parents

6.4.2 Importance of Subjective versus Objective Factors

Table 33: Importance of subjective versus objective factors for current students versus parents

	Current Students	Parents	Difference
Subjective	1.76	1.84	-0.08
Objective	2.09	2.07	0.02

A z-test performed on the two samples did not find any statistically significant difference at either the 95% or 90% confidence level.

6.5 Comparison of Responses between Future Students and Parents

This comparison was done to check whether there existed a difference between respondents who indicated they were planning to enroll and respondents who indicated that they were parents who had children planning to enroll or currently enrolled in a college. The comparison determines if there is any difference between what people planning to enroll in college believe is important in a college and what parents believe is important.

Similarly to the previous section, it was hypothesized that there might be a difference between these two groups.

6.5.1 Importance of Six Categories

Table 34: Importance of six categories for future students versus parents

	Future Students	Parents	Difference
Student Body	2.07	2.24	-0.17
Research	1.51	1.34	0.17
Academics	2.98	2.88	0.10
Student Life	*1.93*	*2.28*	*-0.35*
Finance	2.57	2.57	0.00
Post-Graduation Success	**1.94**	**2.72**	**-0.78**

A z-test was performed to compare the responses of future students against those of parents. It was found that the average score for the category of Post-Graduation Success showed a statistically significant difference between the two groups at the 95% confidence level. Parents rated the importance of Post-Graduation Success higher on average than those that indicated that they were planning to enroll in the future. At the 90% confidence level the scores for Student Life showed a statistically significant difference between the two groups. Again, parents on average rated the importance of Student Life higher than the future students.

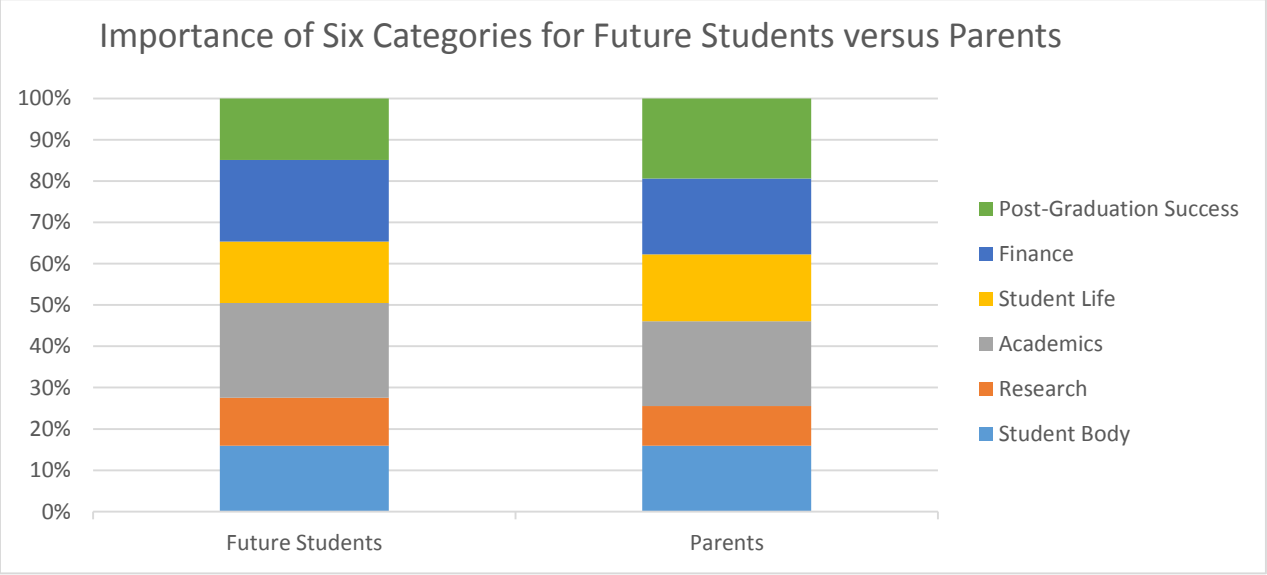

Figure 9: Importance of six categories for future students versus parents

6.5.2 Importance of Subjective versus Objective Factors

Table 35: Importance of subjective versus objective factors for future students versus parents

	Future Students	Parents	Difference
Subjective	1.83	1.84	-0.01
Objective	2.16	2.07	0.09

Performing a z-test on the two samples did not yield a statistically significant difference.

6.6 Summary

This chapter analyzed the importance of six categories from the survey results based on demographics. Five pairs of groups were chosen to make pairwise comparisons, including U.S. residents versus non-U.S. residents, respondents below 26 versus respondents above 35, male respondents versus female respondents, current students versus parents, and future students versus parents. Then the importance of each category was converted into scores, and confidence intervals were calculated for each group. Only a few statistically significant difference were examined in this chapter. In the following chapter, the results of the importance of six categories from the ranking and the survey will be compared to find out which ranking best depicts people's ideal ranking.

7. Comparing Ranking and Survey Results

In this chapter, comparisons between the survey results and ranking methodologies are made. First, the ratings of the six categories generated from the survey were converted to percentages. For example, the average scores for all respondents of the six categories are 2.15, 1.53, 2.94, 2.13, 2.72, and 2.84 respectively. The percentage of the first category, which is Student Body, is calculated by 2.15 divided by the sum of all scores. In this way, we computed the "percentage scores" for the groups of respondents mentioned in Chapter 6, namely, U.S. residents, non-U.S. residents, respondents under 26, respondents above 35, male respondents, female respondents, current students, future students and parents. Then, for each respondent group and for each category, the comparison has been done by taking the absolute value of the difference between the percentage score of this group and the ranking being compared with. For example, in *Forbes*, the category of Student Body takes up 0%, while the percentage score for this category from the overall result of the survey is 15%, which results in the absolute value of the difference of 15%. Then, the absolute values of the differences were summed to get the final difference between the group of respondents and a specific ranking. Finally, the sum of the absolute values was divided by six to get the percentage difference per category.

7.1 Comparisons for U.S.-only Rankings

Table 36: Comparison for U.S.-only rankings with ideal ranking

	Forbes	Kiplinger	PayScale	U.S. News	Washington Monthly
Overall	14%	15%	27%	17%	14%
U.S.	13%	15%	26%	17%	15%
non-U.S.	15%	16%	27%	17%	13%
Under 26	14%	15%	26%	17%	14%
Above 35	14%	15%	27%	17%	14%
Male	13%	15%	26%	17%	15%
Female	14%	15%	27%	17%	14%
Current Students	13%	15%	26%	17%	15%
Future Students	15%	14%	28%	17%	14%
Parents	14%	15%	27%	17%	14%

Table 36 shows the percentage differences per category between different groups of respondents and U.S.-only rankings. Overall, *Forbes* gives the best ranking composition since the difference per category (13.62%) is the smallest among all kinds of comparisons. Washington Monthly

comes to the second with a difference per category of 14.49%. For almost all groups, *Forbes, Kiplinger*, and *Washington Monthly* have similar differences per category. The percentage difference per category of *U.S. News* is slightly larger (17.08%), and the largest is that of *PayScale* (26.53%). It is reasonable that *Forbes, Kiplinger* and *Washington Monthly* come to the top because all of them have at least three categories in their methodologies for rankings. *U.S. News* results in a bigger difference than these three because the category of Academics takes up more than half of the weights, and consequently gives a bigger difference. On the other hand, *PayScale* gives the largest difference simply because it focuses on the Post-Graduation Success only.

7.2 Comparisons for World Rankings

Table 37: Comparison for world rankings with ideal ranking

	ARWU-Shanghai	CWTS	QS	Times	Webometrics
Overall	26%	30%	18%	22%	30%
U.S.	26%	30%	18%	22%	30%
non-U.S.	24%	28%	16%	21%	28%
Under 26	26%	30%	18%	22%	30%
Above 35	26%	30%	18%	22%	30%
Male	26%	30%	17%	22%	30%
Female	26%	30%	18%	22%	30%
Current Students	26%	30%	17%	21%	30%
Future Students	26%	29%	17%	21%	29%
Parents	26%	30%	18%	22%	30%

Table 37 shows the percentage differences per category between different groups of respondents and world rankings when compared with those of U.S.-only rankings. Overall, all the rankings differ from respondents' ideal ranking composition by a large difference. The best match in the world rankings is *QS*, which gives about 18% difference, then followed by *Times*, ARWU-Shanghai, *CWTS* and *Webometrics*. *CWTS* and *Webometrics* always have the same difference, because both of them put 100% weight to the Research category.

The result of this chapter doesn't show the best ranking necessarily. The ranking with the lowest difference to respondents' opinions results from a relatively balanced composition of the six categories. So, we suggest using this ranking to get an overall sense of which college is better, but choosing a college is way more complicated. Based on how closely the ranking weights match that of weights given by respondents, *Forbes* would be the best ranking.

7.3 Summary

This chapter compared the survey results to rankings to find out the best ranking in terms of people's needs. The ideal proportion of six categories from the five pairs of groups mentioned in the previous chapter were compared to the real composition of the selected rankings mentioned in Chapter 4. The difference per category was calculated between each group and each ranking. It was found that the ranking published by *Forbes* came to the top among all rankings in terms of proportion of six categories. In the next chapter, final conclusion and future work will be addressed.

8. Conclusion

8.1 Summary

According to the survey results, the overall scores for six categories (Student Body, Research, Academics, Student Life, Finance, and Post-Graduation Success) were 2.1, 1.5, 3.0, 2.0, 2.6, and 2.9, which showed that for general people, Academics and Post-Graduation Success were the most important categories of factors, while Research was the least important category among the six. Although some variations were found from different groups of people, not many of them are statistically significant. The difference for Research category between U.S. residents and non-U.S. residents, that for Student Life category between current students and parents, and that for Post-Graduation Success between future students and parents were found to be statistically significant at a 95% confidence level. The difference for Student Life category between future students and parents was found to be statistically significant at a 90% confidence level.

Then after comparing the ideal composition of ranking to the existing rankings, in terms of the composition of six categories, *Forbes* was the best ranking with a 13.62% of percentage difference per category deviated from the ideal composition generated from the survey, and then came the *Washington Monthly*, with a 14.49% of percentage difference per category. The comparison based on subjective versus objective factors was taken away from the research of interest because the results from Chapter 6 didn't show any statistically significance.

However, for students who are seeking the best college for themselves, it is suggested to start with *Forbes* and *U.S. News and World Report*, but not limited to these two rankings. For example, if a student is more interested in Post-Graduation Success, it is recommended to check out *PayScale*. If a student is planning to go to graduate school after undergraduate study, then it is recommended to check out some of the world rankings, like ARWU-Shanghai and *Times Higher Education* World University Rankings, which focus more on the Academics category. Combining all kinds of resources is also helpful: *Fiske* and *Princeton Review* are popular guides for college choices.

As a standalone resource, the White House *College Scorecard* is lacking in some respects. It only considers colleges in terms of potential financial return without considering other aspects of colleges that potential students and parents of potential students may be interested in. In terms of the six categories, the *College Scorecard* considers Academics, Finance, and Post-Graduation Success. As previously suggested, it is best to use the *College Scorecard* in conjunction with other college resources to provide a complete picture.

8.2 Future Work

There are many different directions that future work can branch off into. One possibility is exploring the methodology behind ranking programs, especially that of graduate programs. The sorting of factors into categories can also be reexamined in future work and it can be questioned if the categories defined in this project are what the categories should be.

Another possibility is to explore the idea of asking people through a survey how they would construct their ideal ranking and comparing it to the existing surveys. A redesigned survey could ask respondents to grade how important each category is to them using a series of sliders, with the total of the sliders not exceeding 100%. This future survey could also expand beyond the limited demographic surveyed in this report, which consisted predominantly of WPI faculty, graduate students, and Computer Science students.

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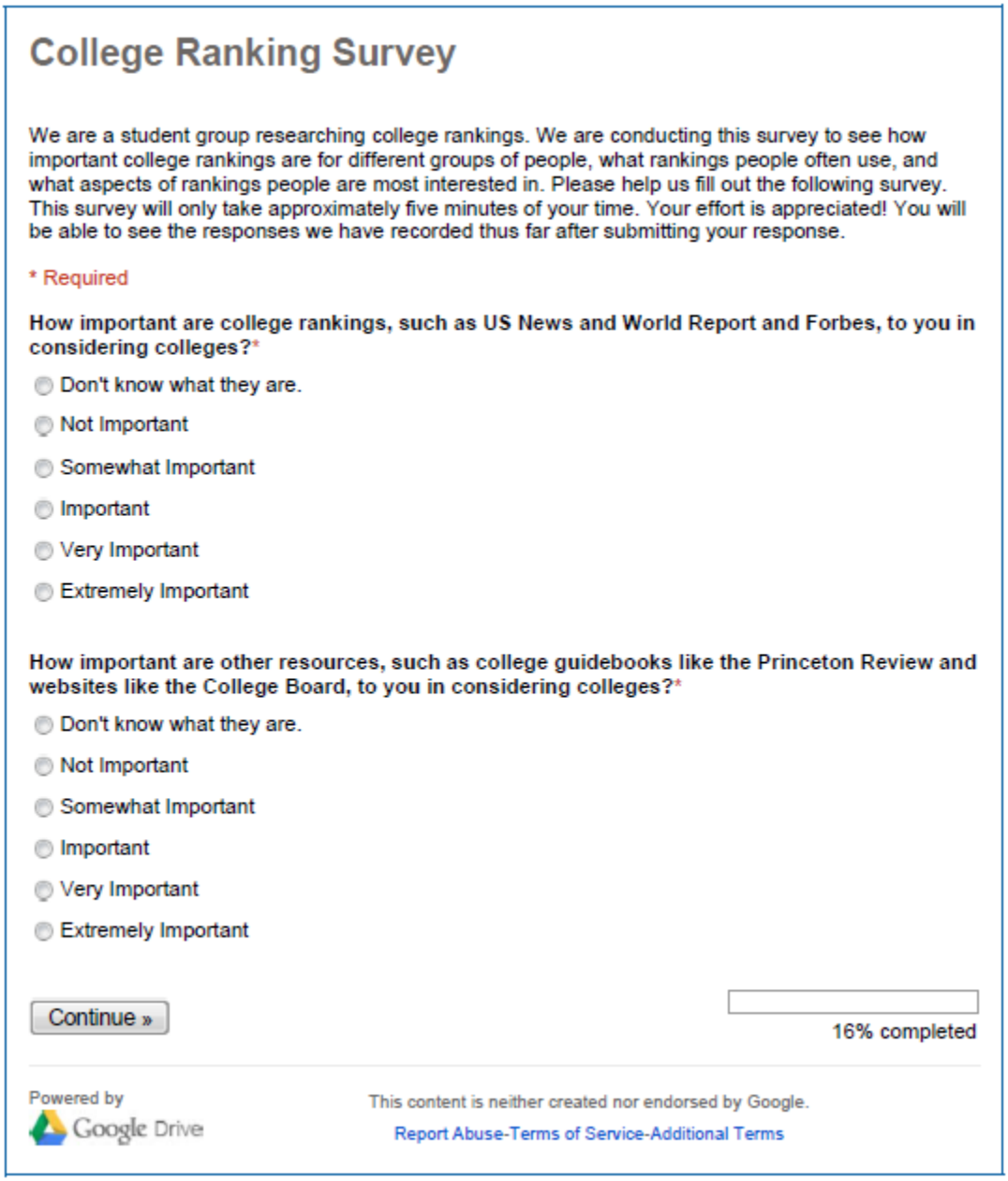
Appendix

Survey Page 1



College Ranking Survey

We are a student group researching college rankings. We are conducting this survey to see how important college rankings are for different groups of people, what rankings people often use, and what aspects of rankings people are most interested in. Please help us fill out the following survey. This survey will only take approximately five minutes of your time. Your effort is appreciated! You will be able to see the responses we have recorded thus far after submitting your response.

* Required

How important are college rankings, such as US News and World Report and Forbes, to you in considering colleges?*

- Don't know what they are.
- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

How important are other resources, such as college guidebooks like the Princeton Review and websites like the College Board, to you in considering colleges?*

- Don't know what they are.
- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

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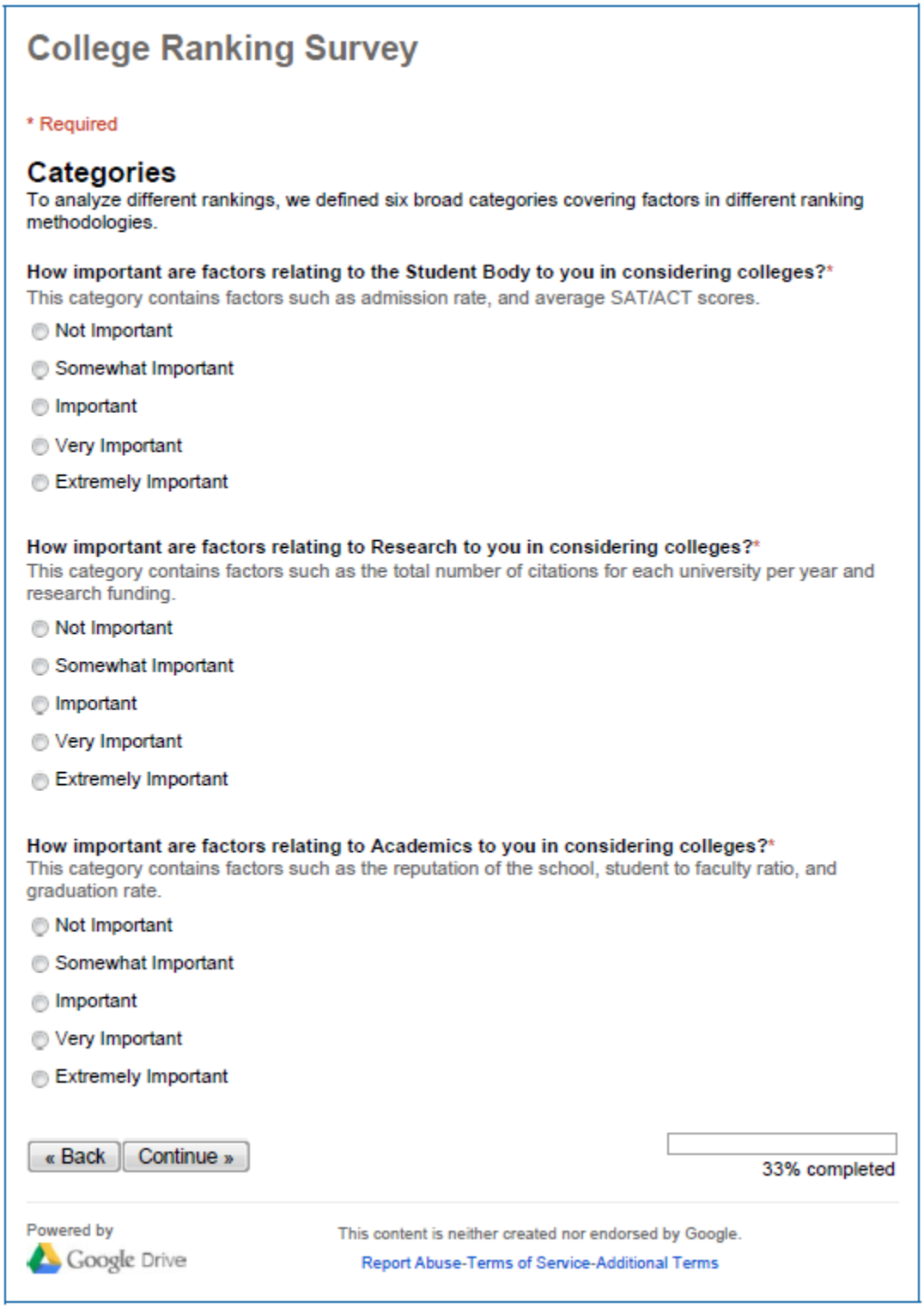
Survey Page 2



College Ranking Survey

* Required

Categories

To analyze different rankings, we defined six broad categories covering factors in different ranking methodologies.

How important are factors relating to the Student Body to you in considering colleges?*

This category contains factors such as admission rate, and average SAT/ACT scores.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

How important are factors relating to Research to you in considering colleges?*

This category contains factors such as the total number of citations for each university per year and research funding.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

How important are factors relating to Academics to you in considering colleges?*

This category contains factors such as the reputation of the school, student to faculty ratio, and graduation rate.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

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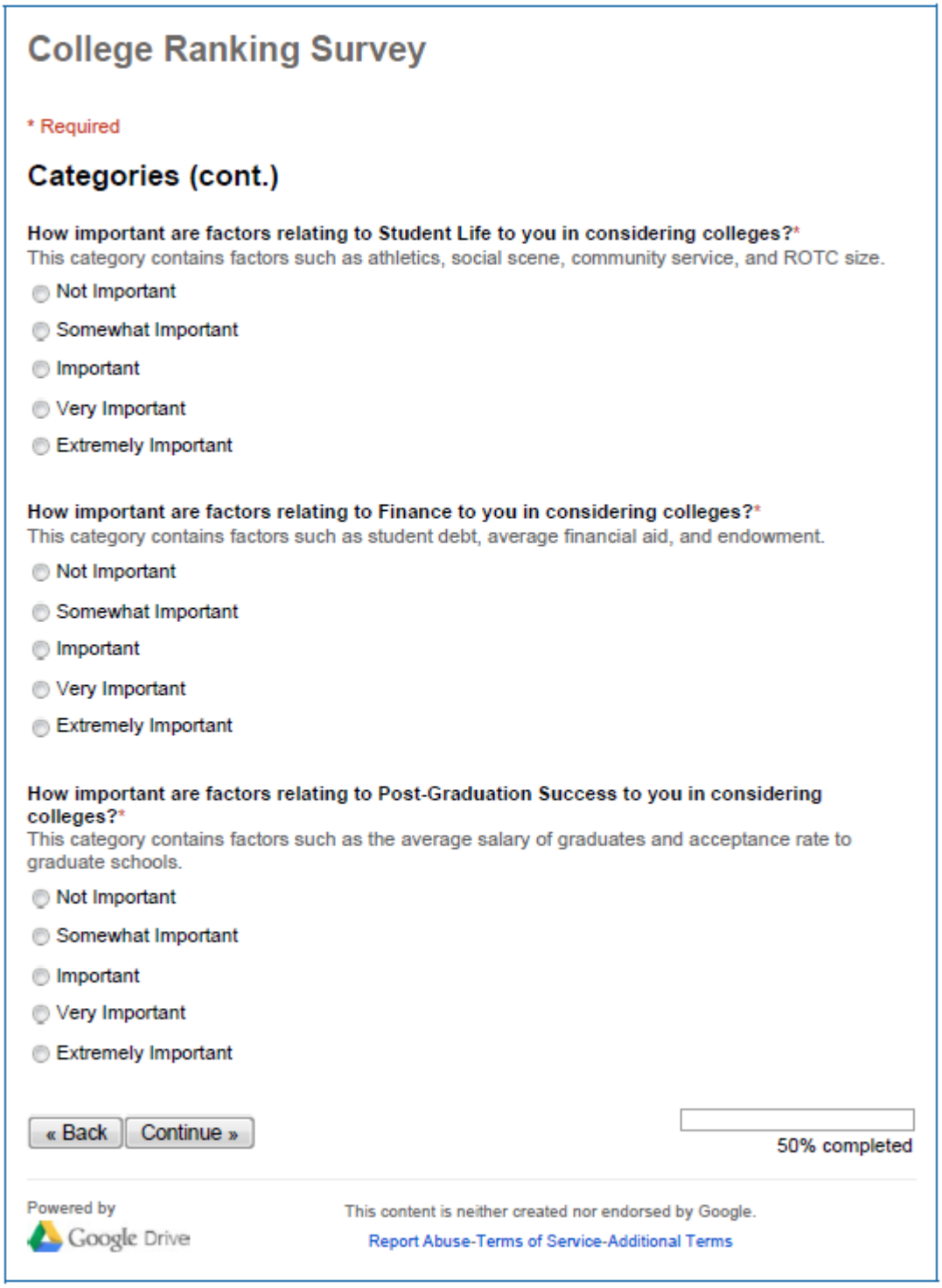

College Ranking Survey

* Required

Categories (cont.)

How important are factors relating to Student Life to you in considering colleges?*
This category contains factors such as athletics, social scene, community service, and ROTC size.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

How important are factors relating to Finance to you in considering colleges?*
This category contains factors such as student debt, average financial aid, and endowment.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

How important are factors relating to Post-Graduation Success to you in considering colleges?*
This category contains factors such as the average salary of graduates and acceptance rate to graduate schools.

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremely Important

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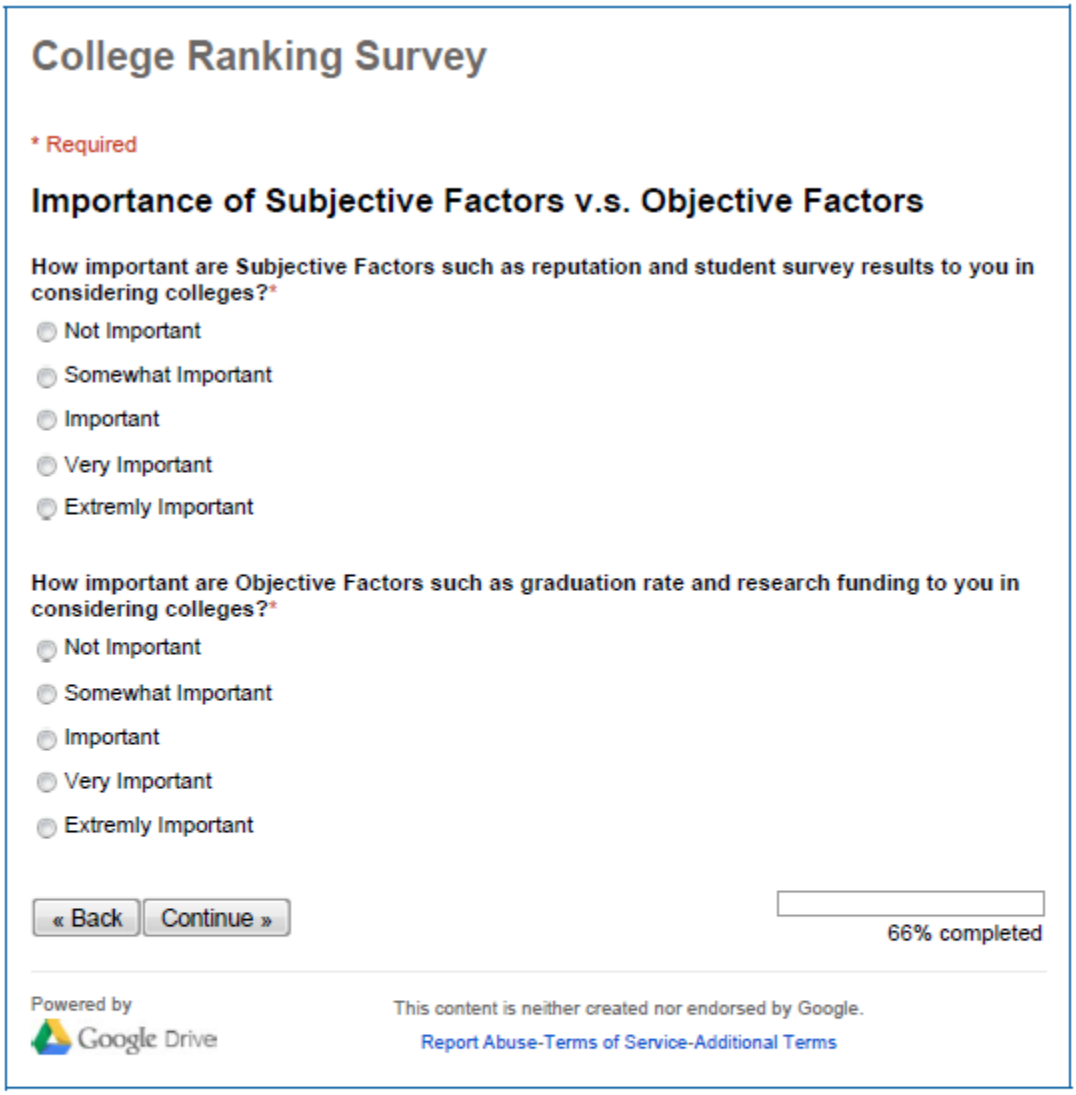

College Ranking Survey

* Required

Importance of Subjective Factors v.s. Objective Factors

How important are Subjective Factors such as reputation and student survey results to you in considering colleges?*

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremly Important

How important are Objective Factors such as graduation rate and research funding to you in considering colleges?*

- Not Important
- Somewhat Important
- Important
- Very Important
- Extremly Important

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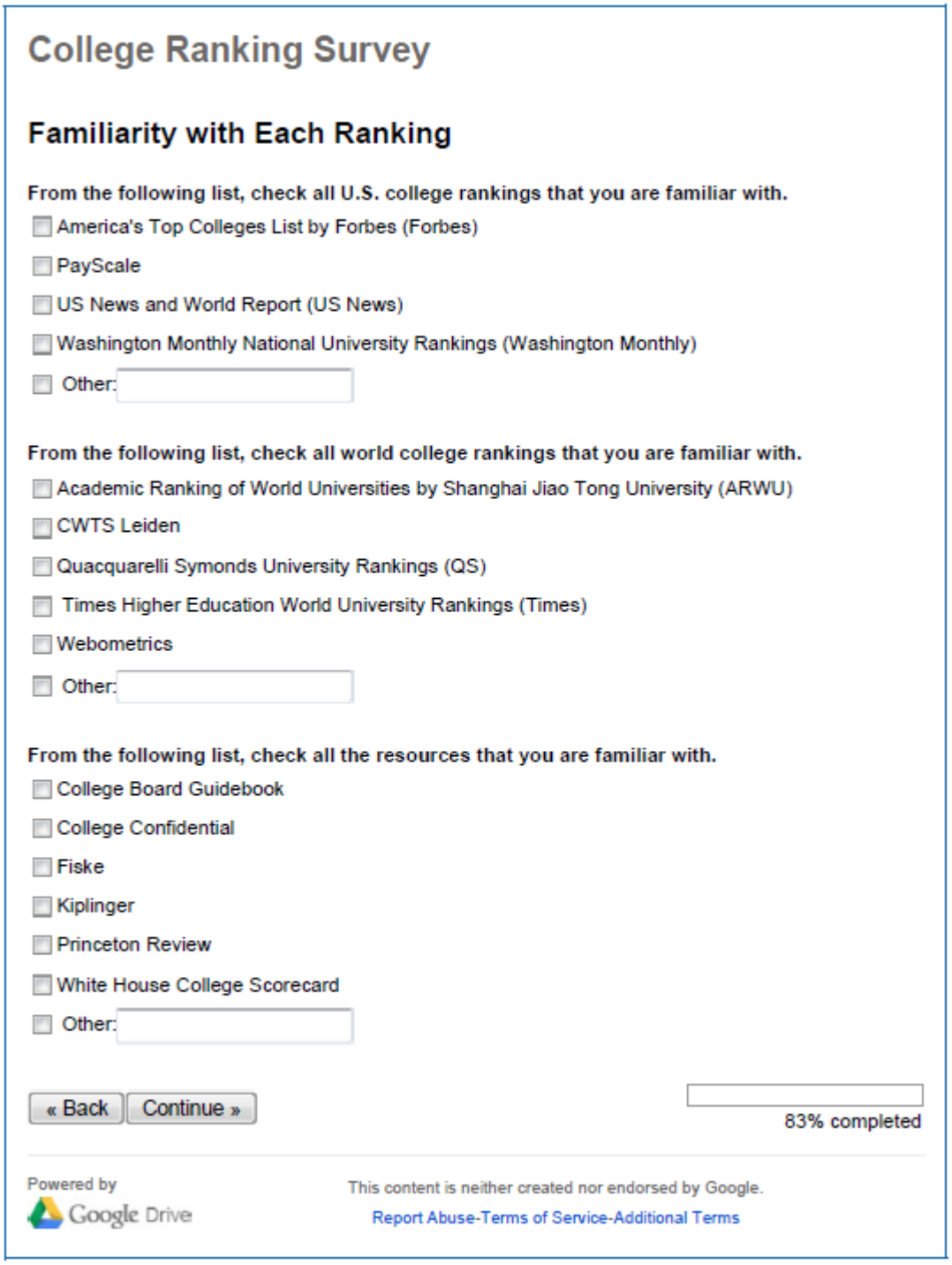

College Ranking Survey

Familiarity with Each Ranking

From the following list, check all U.S. college rankings that you are familiar with.

- [ ] America's Top Colleges List by Forbes (Forbes)
- [ ] PayScale
- [ ] US News and World Report (US News)
- [ ] Washington Monthly National University Rankings (Washington Monthly)
- [ ] Other:

From the following list, check all world college rankings that you are familiar with.

- [ ] Academic Ranking of World Universities by Shanghai Jiao Tong University (ARWU)
- [ ] CWTS Leiden
- [ ] Quacquarelli Symonds University Rankings (QS)
- [ ] Times Higher Education World University Rankings (Times)
- [ ] Webometrics
- [ ] Other:

From the following list, check all the resources that you are familiar with.

- [ ] College Board Guidebook
- [ ] College Confidential
- [ ] Fiske
- [ ] Kiplinger
- [ ] Princeton Review
- [ ] White House College Scorecard
- [ ] Other:

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Survey Page 6

College Ranking Survey

* Required

Demographic Information

Age*

- under 18
- 18-25
- 26-35
- 36-45
- above 45

Gender*

- Male
- Female

In what region of the world is your residence? *

- United States
- Africa
- Asia
- Australia/Oceania
- Europe
- North America, excluding United States
- South America

Are you planning on attending a college/university?

- Yes
- No

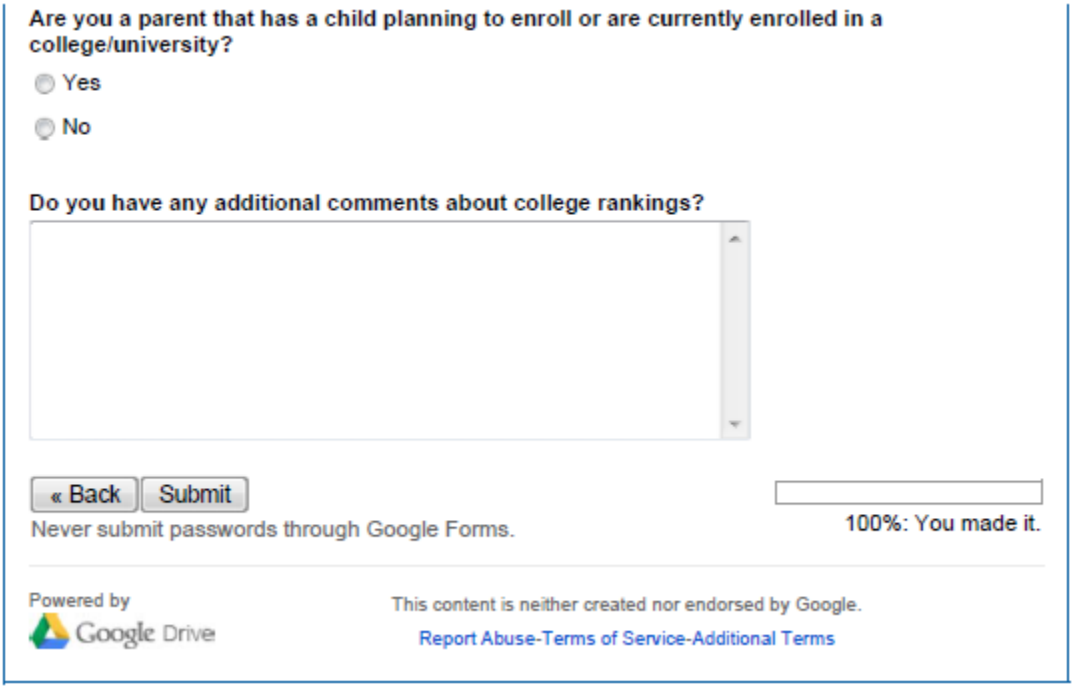
Are you currently enrolled in a college/university?

- Yes
- No

Have you previously enrolled in a college/university?

- Yes
- No

Survey Page 6 Continued



Are you a parent that has a child planning to enroll or are currently enrolled in a college/university?

- Yes
- No

Do you have any additional comments about college rankings?

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