

Analysis of Undergraduate Grade Distributions and University Rankings

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### **Abstract**

National universities have been ranked and compared with one another since their conception, and there are now a number of resources available that list these rankings. The U.S. News and World Report's listing of the *World's Best Universities*, the most prominent of these rankings, ranks the top universities based on a number of attributes. However, they overlook the aspect of objective quantification and comparison of these top schools by undergraduate academic performance. The objective of this study is to provide an in-depth analysis of grade distributions in three subject areas of several top universities. Preliminary results suggest that there is a positive correlation between university rank and average GPA earned per student. This study presents an objective procedure that analyzes and compares universities on the basis of grades earned by students, which could be used or considered by other reports to quantify university performance.

### Analysis of Undergraduate Grade Distributions and University Rankings

Every year, the *US News and World Report* publishes a report that ranks the top universities in the world on a number of criteria. The lists of rankings include the top national universities, the top colleges, the top graduate programs, the top world universities, and for use in this study, the top world universities by subject. These rankings, since their launch in 1983, have become a trusted and valuable resource viewed by millions every year. The reason for the popularity of the report is largely due to the reliable and in-depth analysis of many aspects of each school that then becomes the basis of the school's rank. The factors used to measure a school's rank are academic peer reviews, employer reviews, student-to-faculty ratio, citations per faculty member, and international students and faculty. These criteria are then standardized, weighted by significance, and subsequently added together to produce a final score for each university. This methodology has been applied and been used to compile the world's best schools into a comprehensive ranking system for many years, but it is possible that there are other factors and methods that could be used to determine the quality of a university with respect to others. This study uses data from the following universities: the University of California at Berkeley (UCB), University of California at Los Angeles (UCLA), and University of California at San Diego (UCSD). The current rankings of these schools are listed in Table 1.

The *US News and World Report's* primary source for university ranking information comes from the *QS World University Rankings*, published by Quacquarelli Symonds (QS). This company does all the primary research used by the *US News* rankings and has more in-depth rankings of its own. QS has rankings for schools specifically for English and Physics, as used in this study, as well as many others that could be used in subsequent studies.

One determinant that could be used to measure academic quality objectively is to compare undergraduate student performance as seen in grades earned. Determining whether or not undergraduate grades accurately reflect the overall quality of an institution could be valuable information for anyone interested in learning more about a given university. Significant data regarding a correlation between undergraduate grades and university rankings could be incorporated into future studies or ranking systems, such as the one published by the *US News and World Report*. If undergraduate grades are indeed an indicator of overall university quality, then one would expect to see students receiving higher average GPAs in the higher ranked schools.

Another factor that could possibly contribute to the academic excellence and, in turn, the prestigious ranking of a university, could be the presence of a higher percentage of highly motivated students. Many rankings systems, including the ones observed for this study, consider the placement of undergraduates into graduate schools and employment. Students that are accepted to such programs tend to be intrinsically motivated to excel in their given fields. Intrinsic motivation occurs when students are internally driven to work hard and excel because they either enjoy their work, believe they are working toward some greater significance, or they take great satisfaction upon completion of their work. Intrinsic motivation can lead to increased efficiency, quality, and overall performance in ones work. One would expect a highly ranked university to have a student body consisting of a higher percentage of intrinsically motivated students, the presence of which would be reflected in the students grades. Students with such strong inspiration to succeed are more likely to perform better than those who are extrinsically motivated by things such as test scores or grades. An effective way to measure this would be to determine which schools have the highest percentage of students that receive an A in a given

class. Analysis of such data shows a positive correlation between the ranking of a university and the percentage of student that receive As in a given class. Similarly to the GPA analysis, this would be conducted by subject.

In order to make a significant comparison between schools in regard to the grades earned by undergraduates, one would have to account for the fact that not all schools can be objectively compared because not all schools use the same grading systems, meaning that one cannot expect all subjects might grade students equally. This poses a number of challenges for someone attempting to judge the fairness of student's grades. To account for such discrepancies, the grades must be compared on a subject-by-subject basis. For example, students in a chemical engineering class could not be expected to be graded the same as those in an art history class. Another issue that would need to be addressed is that different universities may use different grading scales or methods of assessment. This would require some sort of standardization technique to compensate for these differences. In order to avoid these issues, this study uses three universities within the same school system, specifically UCB, UCLA, and UCSD.

The University of California (UC) is a public school system composed of 10 campuses around the state that have enrolled over 190,000 of some of the state's highest performing students. The UC schools are primarily focused on research in the various disciplines of academia and are consistently ranked among the top schools in the world. These schools achieve such recognition in academic excellence due to a number of factors, including the academic performance of the undergraduate student body. By using only UC schools, a fair comparison can be made regarding how the students are performing at each campus.

Due to recent legislation, the grades of students earned at public universities are now available to the public through websites such as myEdu.com, which will be the primary source of

data for this study. myEdu.com is a valuable resource because it documents the grade distributions of most classes offered at UC schools, as well as many others over the last few years. This new data allows anyone to assess the academic performance of students in a variety of schools and subjects and, in this case, will provide a basis to compare the average grades of students at different UC campuses. The grade distributions for a predetermined number of upper division classes in each department were averaged and plotted by school in order to determine the overall department performance in reference to its given rank.

### **Methods**

In order to analyze grade distributions between the schools, grades were collected on a class-by-class basis from myEdu.com. To find class information by school, the search filter tool was used to first select the desired school. Then, the desired subject code was entered in the search bar. The codes were as follows: UCB (ENGLISH, PHYSICS, POL SCI); UCLA (ENGL, PHYSICS, POL SCI); UCSD (LTEN, PHYS, POLI). This yielded a list of all classes within that department. Each class was then selected one by one, and the “grade trends” link was opened for each class. In the grade trends link, the average GPA per semester and the average of the percent of students that received an A in the class for all listed years was recorded. In order to obtain significant data, every class with available data was used. Although myEdu.com lists all the classes offered by a given department, it does not display data for a class with fewer than 10 students grades recorded in order to protect its users. This proved to be somewhat detrimental when recording grades for physics classes.

When the data had been collected for every available class, the average GPAs per class were added and taken as an average to determine the average GPA per subject. Also, the average percent of As earned by class were added and taken as an average to determine the average

percent of As earned by students by department. This information and the number of classes recorded per subject can be found in Tables 2-4 and Figures 1 and 2.

The data regarding university rank was obtained primarily from the *US News and World Report: World's Best Universities* list and from the QS. This information is recorded in Table 1.

### **Results**

As predicted, the results show a positive correlation between university subject rank and the average GPA earned per student (Figure 1, Tables 2-4). UCB, being the highest ranked in all three subjects, showed the highest average GPA per class in every subject. This is congruent with both the *US News* rankings and the *QS* rankings (Table 1). UCLA had the second highest average GPA, and UCSD had the third highest average GPA in all subjects with the exception of political science. Although the discrepancy in political science does not directly support the hypothesis, it does not necessarily oppose it either. This is due to the fact that UCLA is ranked above UCSD in social sciences, (*US News*) which includes political science.

Figure 2 shows conclusive data that supports the prediction that the higher ranked schools will have a higher percent of students that receive A grades per class. UCB showed the highest percentage of As received for each subject, UCLA showed the second highest percentage of As received, and UCSD showed the third highest percentage. This data suggests that the higher ranked schools have a higher percentage of top performing students.

### **Discussion**

At the outset of the study, it was hypothesized that there would be a positive correlation between university subject rank and average GPA earned per student per class. It was also predicted that higher ranked schools would have higher performing students, and, therefore, a higher percentage of students would receive As per class by subject. These predictions were

observed in the graphical analyses of the grade distribution data. UCB was clearly the top ranked school in all the subjects observed, and as predicted, it showed the highest average GPA and highest percentage of students that received As. With the exception of the GPA average for political science, UCLA and UCSD had the second and third highest averages respectively.

It is possible that the reason that the UCLA and UCSD political science GPA averages did not follow the hypothesis is that the university rankings were based on social sciences and the data obtained was only from political science classes. There are a number of different departments at each school that may contribute to the social science rank that were not accounted for, such as sociology and anthropology. Unlike the English and physics departments, there is no *QS* ranking for political science to reference.

Apart from the political science discrepancy, these results have implications that the average GPAs and average percentage of students that receive As may be a viable factor that could be incorporated into university ranking systems. The results clearly showed that the higher ranking school had higher performance statistics. The results also suggest that schools with a higher university rank are more likely to have higher performing, possibly more intrinsically motivated, students.

The study was not without potential sources of error and limitations. Possibly the most significant flaw of the study was the sample size. Particularly with the physics classes, only about 11 classes were recorded as data. The class information is limited, particularly in departments that have smaller class sizes, because myEdu.com does not post grade distribution information for classes that do not have enough student records due to student privacy concerns. Another improvement that could be made is to increase the sample size of universities used in

the study. This may prove difficult to do with schools outside of the UC system due to grade inflation and other discrepancies.

The information obtained by studies such as this one could prove to be valuable information for a number of interested parties such as reports like the *US News* and *QS* and for prospective students looking to learn more about a university.

### References

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## Tables &amp; Figures

Table 1

*Rankings of each UC department in US News and QS*

| <b>Department</b>      | <b>US News Rank</b> | <b>QS Rank</b> |
|------------------------|---------------------|----------------|
| UCB English            | 4                   | 4              |
| UCLA English           | 7                   | 9              |
| UCSD English           | 71                  | 51-100         |
| UCB Physics            | 5                   | 5              |
| UCLA Physics           | 15                  | 13             |
| UCSD Physics           | 37                  | 41             |
| UCB Political Science  | 5                   | N/A            |
| UCLA Political Science | 11                  | N/A            |
| UCSD Political Science | 48                  | N/A            |

Table 2

*Data Collected for English amongst the UCs*

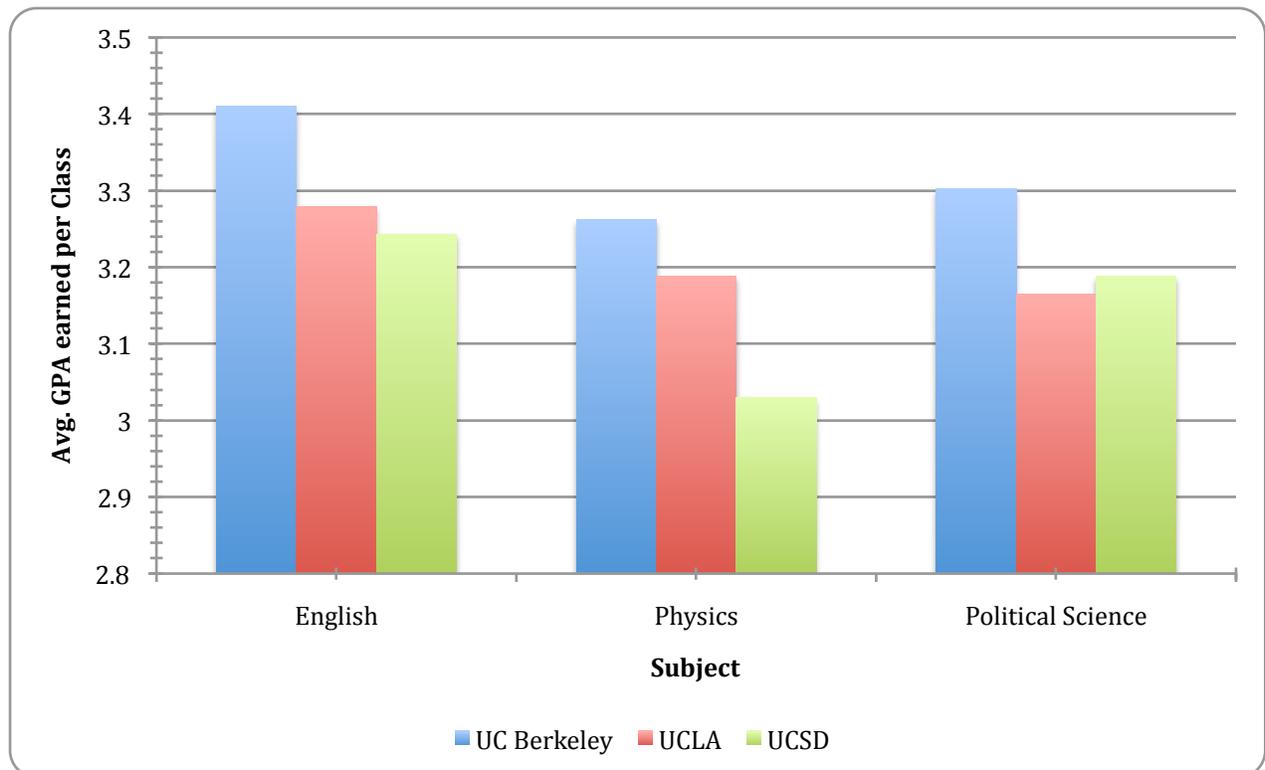
| <b>English</b>    |                           |                           |   |
|-------------------|---------------------------|---------------------------|---|
| <b>University</b> | <b># Classes recorded</b> | <b>Avg. GPA per class</b> | <b>Avg. % students that received "A"s</b> |
| UCB               | 30                        | 3.40967                   | 50.99567                                  |
| UCLA              | 24                        | 3.279583                  | 44.49375                                  |
| UCSD              | 27                        | 3.243333                  | 42.7763                                   |

Table 3

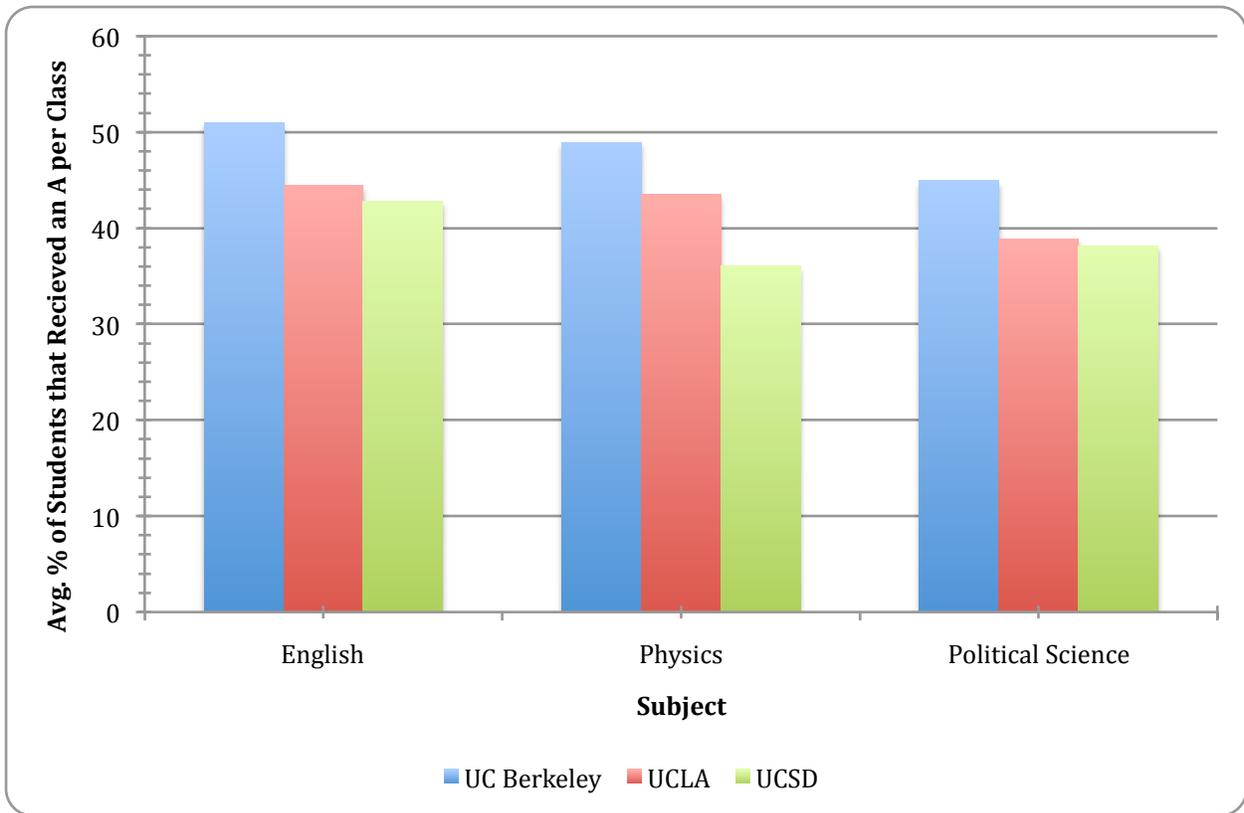
*Data Collected for Physics amongst the UCs*

| <b>Physics</b>    |                           |                           |   |
|-------------------|---------------------------|---------------------------|---|
| <b>University</b> | <b># Classes recorded</b> | <b>Avg. GPA per class</b> | <b>Avg. % students that received "A"s</b> |
| UCB               | 12                        | 3.262727                  | 48.9                                      |
| UCLA              | 11                        | 3.188182                  | 43.50545                                  |
| UCSD              | 11                        | 3.03                      | 36.09545                                  |

| Political Science |                    |                    |                                    |
|-------------------|--------------------|--------------------|------------------------------------|
| University        | # Classes recorded | Avg. GPA per class | Avg. % students that received "A"s |
| UCB               | 24                 | 3.302083           | 44.93292                           |
| UCLA              | 30                 | 3.165417           | 38.89533                           |
| UCSD              | 24                 | 3.18875            | 38.17292                           |



**Figure 1. Distribution of subjects at each UC by average GPA earned per class.** This figure shows how the average GPA earned by subject decreases with its respective university rank, with the exception of UCSD political science (explained in results and discussion).



**Figure 2. Average percent of students that received As.** This figure shows how the average percent of students that receive As by subject decreases with the respective university rank.