

UCLA English Placement Result Analysis

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Abstract

English placement tests are widely used in universities across the nation. However, there is the possibility of social or economic factors that may affect students' performances (Lee and Greene 2007). The focus of this project is to find out if there is a correlation between student demographics information and their post-test survey result and final English placement result. In addition, we are also interested in the relationship between the post-test survey and their final placement class. Through different statistical tests and models we ran, we found out that there is a positive correlation between student's underrepresented minority status and their final placement result as well as post-test surveys. In addition, we found out that the post-survey result also has a positive correlation with final placement result, indicating that student confidence in writing affects student final placement result.

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Introduction

English placement tests have been used in many secondary schools and higher education to place students in the class that suits them the most. At UCLA, the English department utilizes a unique scoring method. At the beginning of every student's freshman year, they take a placement test and rate themselves in a survey after the test (students who were able to test out of the placement tests by using AP test scores are exempt from the placement test). They will decide on which English level they want to go into. Students will also complete a post-test survey on how confident they felt when they took the placement test. A faculty member will then evaluate the student's English level and place the student in a certain level. However, if the faculty member's result and the student's result do not agree, a third coordinator will then decide the final placement of the student.

There are many factors that can affect a student's English proficiency. According to Saifullah Muslim's study, many social and economic factors can contribute to a student's English proficiency level (Muslim, 2023). Therefore, in our study, we aim to perform various tests on the UCLA English placement test data to see if any of the demographic factors may have a strong effect on a student's final English course placement. In addition, we are also interested in the correlation between students' final placement results and their survey results. This correlation may give us some insights into students' confidence level on their writing and their final placement class.

Data Discussion

Data Cleaning

Our raw data consists of 10 columns and 1028 objects. The 10 columns include student UID, student's final placement result, student's preference course, IPP score, post IPP survey, URM (underrepresented minority), first-gen bachelors, Pell Grant receiver, residency status, and gender information. To clean our data, we consulted with our client, Professor Christine Holten about the empty values and NA values on our data. We came to an agreement to remove rows that had an empty value, an NA value, a NULL value, and a None value. Our motivation for removing these rows is so that we can perform proper analyses.

Initially, we modified placement results data that contained "1 and 4" and "2 and 4" into "1E" and "2E" respectively since these two sets of values are interchangeable. But after another consultation with Professor Holten, we merged those values to their respective classes (2E -> 2, for example) because of their limited appearance in our data that led to difficulty in performing further statistical tests. We encoded all categorical string variables into binary numerical variables for analysis purposes. Finally, we removed the student ID column since this column is not related

to the analysis and our research question. We also removed an outlier, a survey value of 0, which presumably was just a student who skipped through the survey, and was not reflective of the true survey score.

EDA

Our EDA includes looking at the distribution of each of our variables and their multicollinearity. Since our variables are mostly categorical, their distribution in the data can impact our final results. We included significant distributions of our demographic data below, since the distribution of the English placement result and survey scores was less relevant. Distributions of Pell Grant status and First Generation status were mostly even, therefore the included distributions were of interest to us. Based on our preliminary EDA, we can observe that our data consists of mostly CA residents, and also has almost 30% more females than males. This observation lines up with UCLA undergraduate student demographics, as the undergrad gender distribution is 38.2% male and 60.1% female. We also observe that 79.4% of undergraduate students are in-state, with 13% being out-of-state and 7.6% international (University of California, Los Angeles 2025). These demographics also correspond with our data, making it more trustworthy and representative of the true student body. Based on our VIF scores, we can also observe that none of our predictors have multicollinearity, which will make for more reliable models.

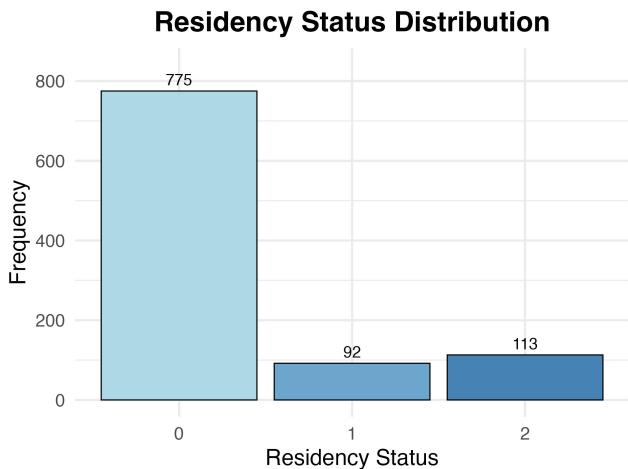


Figure 1: Residency Status Distribution
0: Domestic 1: Non-Domestic 2: International

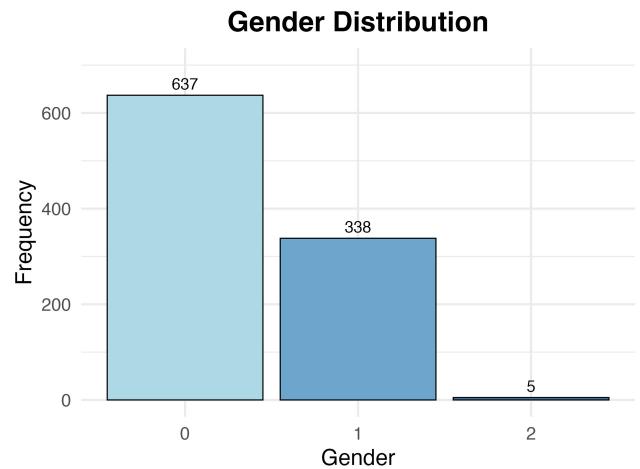


Figure 2: Gender Distribution
0: Female 1: Male 2: Unknown, Unstated

Important Findings and Methods

Methods

Our first research question investigates the correlation between demographics in our data and the survey and final placement results. We performed multiple tests for this investigation. The first test we performed is the multiple linear regression test for the relationship between the final placement result and the demographics variables. The result shows that the variable URM is significant in influencing the final placement ($\beta = -0.3223$, $p < 0.001$). Our results show that individuals who are not URM tend to be placed in a higher level of English Composition class than those who are URM. In addition, the variables of residency ($\beta = -0.0633$, $p = 0.0355$) and Pell Grant recipient status ($\beta = -0.1053$, $p = 0.0244$) showed slight significance in influencing the final placement result. Domestic residents and in-state residents tend to be placed in a higher level class than the international individuals (residency variable is coded as a 0).

Furthermore, the negative coefficient for Pell Grant recipients indicates that they are more likely to have a lower placement class level than non-recipients. We also used an ordinal regression test where we set all the placement results into levels. The two results align. The barplots below show the distributions of URM status, Pell Grant recipients, Residency status, and First Generation status, emphasizing their role in placement outcomes. Therefore, we were able to conclude that out of the demographics variables, URM has the strongest association with lower placement levels while the residency status and Pell Grant recipient status have a smaller impact on the final placement results.

Proportion of URM vs. Non-URM Students Across Final Placements

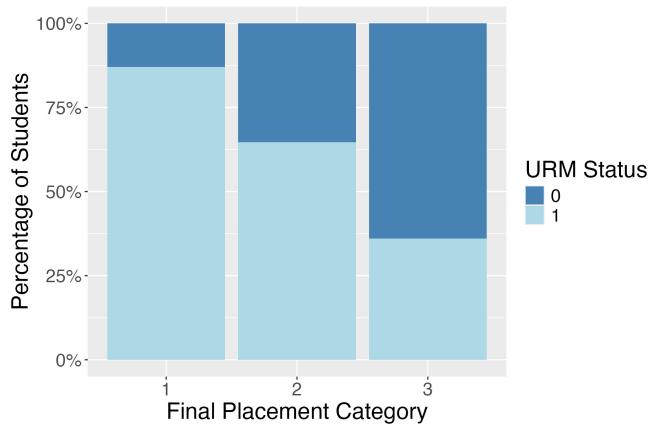


Figure 3: Student URM Status vs. Final English Placements

Proportion of Pell Grant Students Across Final Placements

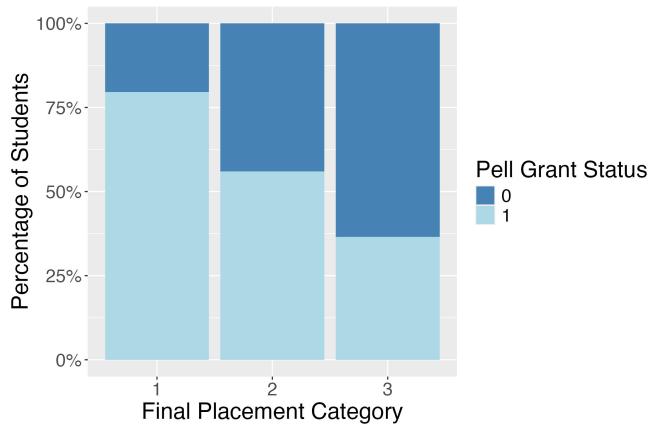


Figure 4: Student Pell Grant Status vs. Final English Placements

Proportion of Residency Status Across Final Placements

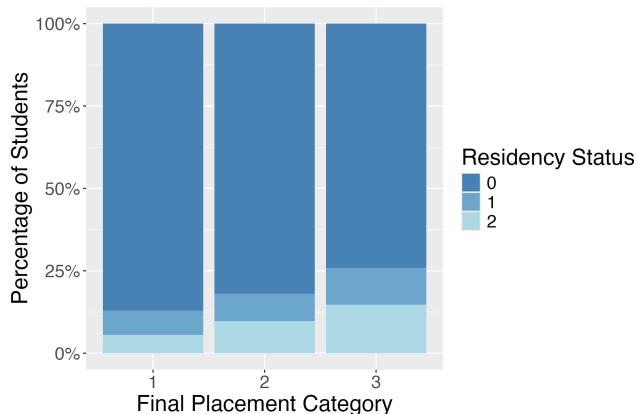


Figure 5: Student Residency Status vs. Final English Placements

Proportion of Residency Status Across Final Placements

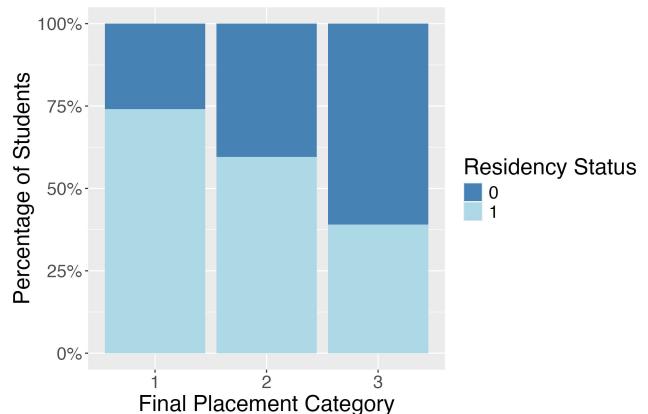


Figure 6: First Gen Student Status vs. Final English Placements

For the correlation between demographics and survey score results, we used t-tests, which revealed URM students have significantly lower scores, relating to lower confidence than non URM students ($p = 2.44\text{e-}05$). Furthermore, first generation students and Pell Grant recipients also received significantly lower scores ($p = 1.57\text{e-}11$ and $p = 8.89\text{e-}06$). Additionally, ANOVA was performed to evaluate the impact of categorical demographic predictors of gender and residency.

Gender had a relatively significant influence on survey scores ($p = 0.0342$); residency status was not significant ($p = 0.731$). Moreover, results of multinomial regression and t-test provide evidence that underrepresented minority status (URM) is strongly associated with lower survey scores which aligns with lower confidence and lower English placement. As such, these findings highlight the important role demographics play in confidence levels and placement outcomes. Table 1 presents the statistical test results, illustrating significant relationships between demographic factors, survey scores, and final placement outcomes.

Variables Tested	Test	p-value
Final Placement vs. Survey Scores	Spearman's Test	$p = 4.16e-37$
Final Placement vs. URM	Multiple Linear Regression	$p = 1.96e-12$
Final Placement vs. Residency	Multiple Linear Regression	$p = 0.0355$
Final Placement vs. Pell Grant	Multiple Linear Regression	$p = 0.0244$
Survey Scores vs. URM	t-test	$p = 2.44e-05$
Survey Scores vs. First Gen	t-test	$p = 1.57e-11$
Survey Scores vs. Pell Grant	t-test	$p = 8.89e-06$
Survey Scores vs. Gender	ANOVA	$p = 0.0342$
Survey Scores vs. Residency Status	ANOVA	$p = 0.731$

Table 1: Statistical Tests and Results

Our second research objective is to find out if there is a correlation between the post-test survey scores and the final English Composition placements. As mentioned above, survey scores reflect the student's confidence level in their test, while the final placement class levels range from 1-3 and reflect the student's final English placement. In order to test the relationship between the two, we performed a series of tests. First, we used Spearman's Test and observed a slight positive correlation ($p = 0.39$, $p < 0.05$) implying that the student confidence moderately predicts actual placement, though less strongly than IPP scores (initial faculty placements).

To further test our hypothesis, we used multinomial regression, which confirmed that as survey scores increased, so did the placement categories. For 1-unit increase in survey score, the odds of being in placement 2 instead of 1 increases by 12% and the odds of being in placement 3 instead of 1 increases by 31% ($\beta_2 = 0.1177$, $\beta_3 = 0.2697$). The higher the score (the more confident the student), the more likely the student was placed in a more advanced English course. Our hypothesis is further supported by the boxplots shown below in Figure 7, as they depict a positive correlation between survey scores and final English placements.

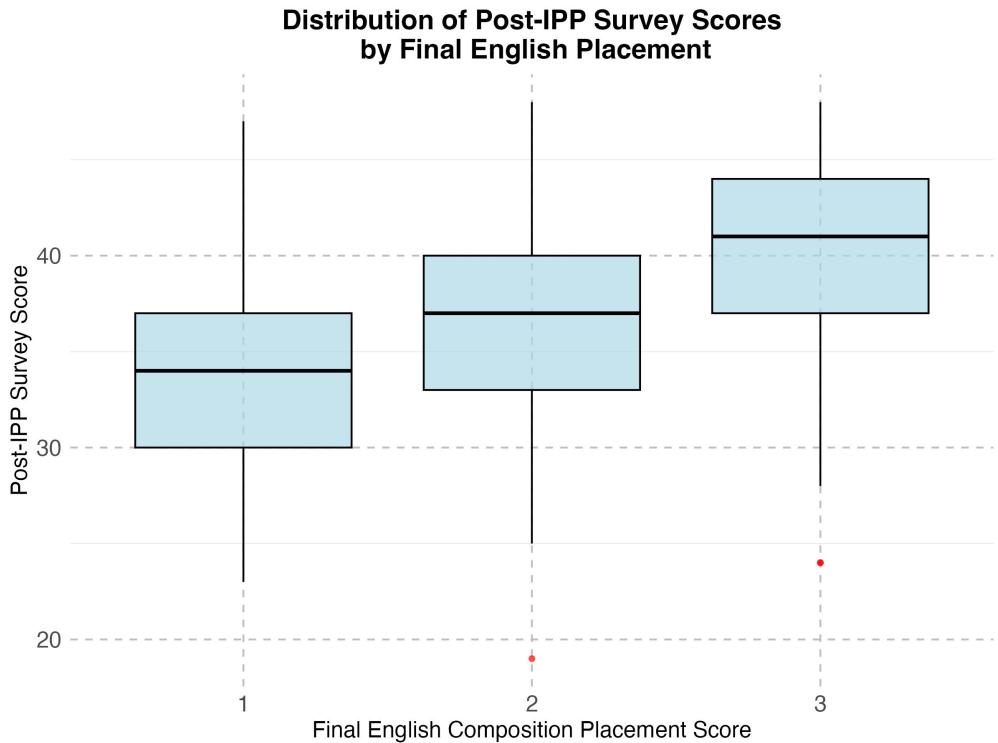


Figure 7: Distribution of Survey Scores by English Placement

Predicting Final Placements

To determine whether demographics and survey scores could predict final English placement alone, we tried Random Forest classification models with different predictor sets and evaluated their accuracy. The full model, which included all variables, achieved 83.03% accuracy and a 14.12% misclassification rate, with IPP score emerging as the strongest predictor, followed by course preference and Post IPP survey. To test the impact of demographic and confidence factors alone, we ran a model using only demographic variables, which resulted in 61.07% accuracy, and another model combining demographics and survey scores, slightly improving to 61.96% accuracy. To refine our models, we systematically removed weaker predictors. Eliminating gender (which was found to be irrelevant) increased accuracy to 87.4%, while removing IPP score and gender together significantly dropped accuracy to 67.18%, reinforcing the dominance of IPP scores in placement decisions.

Lastly, we tested a model excluding both gender and course preference, achieving 87.66% accuracy, suggesting that while course preference plays a role, faculty decisions are largely driven by IPP scores, and demographics also correlate to the final placement. The feature importance graph

below illustrates these findings, depicting IPP as the most important predictor, followed by student course preference (Figure 8). These models demonstrate that while confidence and demographics influence placement, IPP test scores remain the most predictive factor, making faculty decisions highly data-driven.

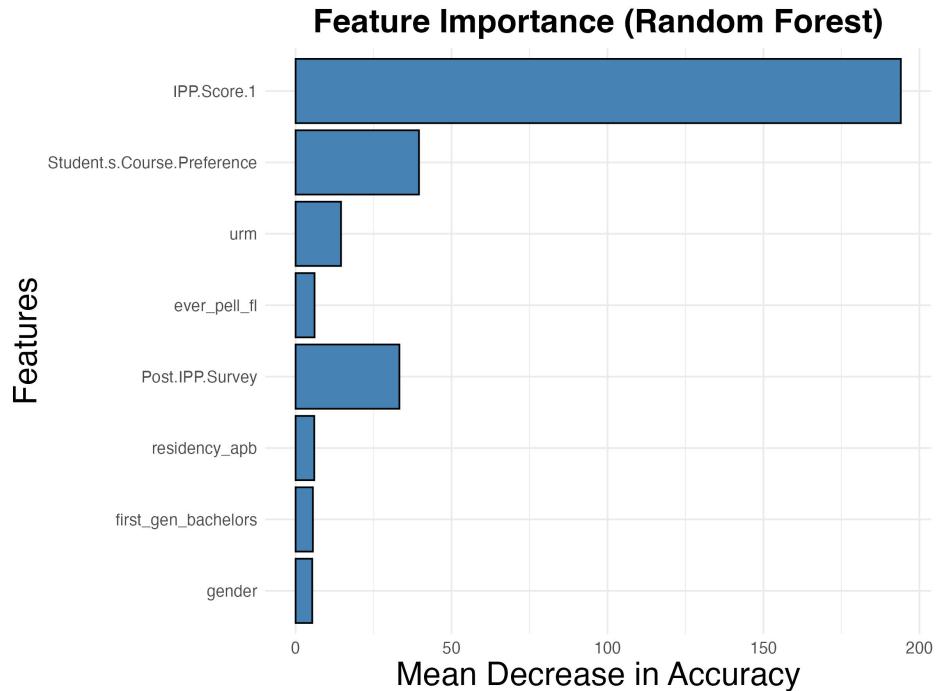


Figure 8: Feature Importance (MDA)

To optimize the Random Forest model, we systematically tested with different hyperparameters, including the number of trees ($\text{ntree} = 100, 200, 500, 1000$), number of features considered per split ($\text{mtry} = 2, 3, 4$), minimum samples required to split ($\text{min_samples_split} = 2, 5, 10$), and minimum samples per leaf ($\text{min_samples_leaf} = 1, 3, 5$). The results indicate the Out of Bag Error (OOB) stabilizes around 500 trees, suggesting additional trees won't reduce bias or improve generalization. Adjusting (min_samples_split and min_samples_leaf mtry) had minimal impact on the model as well. Overall, the default selection of (500 ntree and 2 mtry) provided the best result and further tuning did not yield meaningful performance improvements.

Conclusion and Limitations

There are several key points in the relationship between survey scores, demographics, and final English composition placement results. First of all, there is a moderate positive correlation between survey scores (student's confidence level) and the final English placement result. Multinomial regression confirmed that students who feel more confident tend to be placed in more advanced courses. However, this relationship is not as strong as the influence of IPP test scores. Demographics also play a role in both placement results and survey scores. URM status is significant for final placement, while residency and Pell Grant status show a somewhat significant correlation.

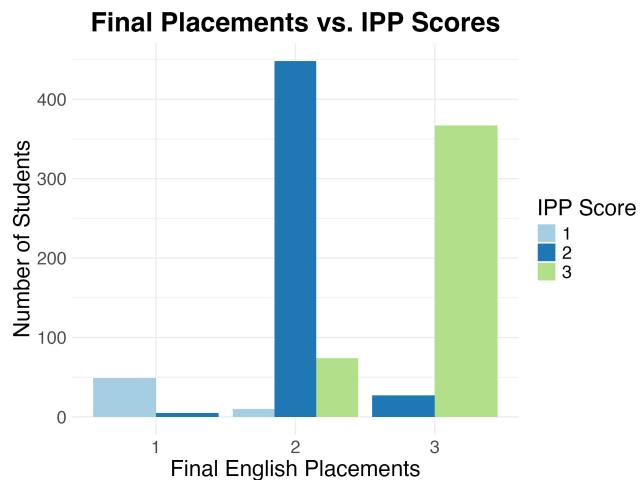


Figure 9: IPP Scores vs. Final English Placements

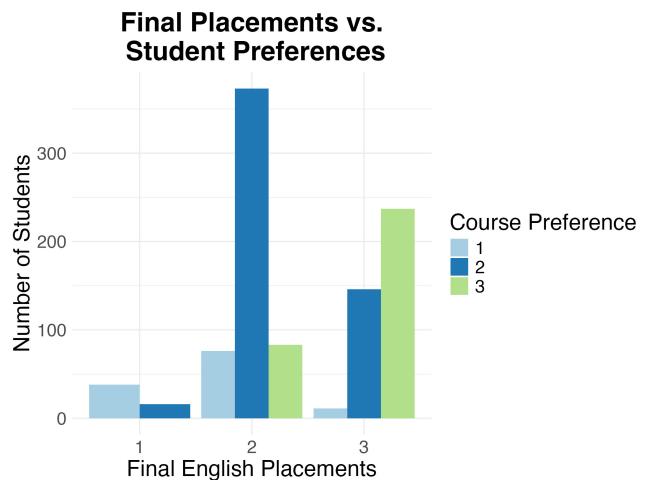


Figure 10: Student Preference vs. Final English Placements

Moreover, survey scores are significantly affected by URM, first-generation status, and Pell Grant status, as shown with multiple t-tests. Gender shows a somewhat significant influence, and residency is not significant in ANOVA tests. Through Spearman's and Chi-Square tests, we concluded that IPP placement test scores are very reliable predictors of final English composition placements, as further illustrated in Figure 9. Students' course preferences have a moderate influence on their actual placement, as shown in Figure 10, indicating that students' preferences align somewhat accurately with their actual placements. Therefore, faculty decisions rely more heavily on IPP test scores than student preferences. When analyzing predictive models, we found that the IPP score is our strongest predictor, followed by course preference and then the post-test survey scores. The demographic variables are still indicative of a final placement result but are not very influential when looked at with all of our predictors.

Limitations

While the tests above provide valuable conclusions, there are several limitations that need to be considered. First of all, we cleaned the dataset by removing all NAs, NULL values, and merging categories such as 1E and 2E to their respective placement, which means that some data that might provide additional information got excluded. This may have influenced the results due to the reduced variability in placement outcomes. Moreover, this study is based on UCLA's own testing system, which may not be representative of other universities. Another limitation is that most of the surveyed students are California residents, which may cause bias. Students from different educational backgrounds or out-of-state schools might perform differently, and a shortage of non-residents in the dataset would limit the generalizability of the findings.

Furthermore, this was a voluntary and anonymous survey, meaning we cannot guarantee the quality or honesty of responses. Some students may have overestimated or underestimated their confidence levels, which could affect the observed correlation between survey scores and placement results. Without a way to verify responses, the accuracy of self-reported data remains uncertain. Despite these limitations, our findings offer a useful perspective on English placement at UCLA. Future studies could be improved by including more non-resident students, and comparisons with other universities' placement systems to enhance the generalizability of the results.

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