Winter 2025 Stats 141XP Group 10 Final Report

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Abstract—This study investigates how UCLA's Informed Placement Process (IPP) aligns student self-placement in English composition courses with faculty assessments. Results indicate that the initial IPP exam score given by faculty members overwhelmingly predicts final placement, while confidence of English composition skills and experience primarily reflects self-placement but plays a smaller role in faculty decisions. Underrepresented minority (URM) students tend to place themselves lower but also receive comparatively more upward adjustments from faculty, suggesting an underestimation of ability. Nonetheless, the absence of performance or satisfaction measures limits the ability to refine IPP outcomes further.

I. INTRODUCTION

The University of California, Los Angeles is one of the largest and most prestigious higher learning institutions in the United States. It is made up of almost 50,000 students, both undergraduate and graduate levels. These students come from all 50 states and more than 100 other countries.

Given the wide-ranging roots of UCLA students, many fail to meet the English writing requirements needed to automatically place them into the appropriate level of English composition. For this reason, the Informed Placement Process (IPP) has been developed to assess and place these students. By meeting them where they are, the IPP ensures that students remain engaged in coursework tailored to their needs and complete their university education at a level on par with their classmates.

II. BACKGROUND

The IPP data set includes data that describe UCLA students who have not met the writing requirements to be placed into classes. Students in this population come from many different backgrounds including: foreign students, native born students, multilingual students, and underrepresented minorities.

The aim of this placement process is to accurately match a UCLA student's language skill with the appropriate language course fulfilling the institution's requirements for graduating. A combination of the student's own ideal course selection and scoring from independent raters determines where the student eventually ends up. Additionally, the student's confidence is determined by a survey regarding their writing level and experience, and the resulting score is included in the dataset.

The independent rating is in the form of a modified double-blind scoring in which a writing sample taken from the student is used to place him or her in an appropriate course for the demonstrated writing level. If the initial faculty rating disagrees with the student's self-assessment, the sample is reviewed by an additional faculty member to make a final determination. In the unlikely scenario in which all three parties come to different conclusions, the IPP coordinator is tasked with the final determination.

Attached to each anonymized student's scores and placement information are demographics used to explore patterns and causality explored in the following report. Ultimately, this information is used to refine the placement process and optimize learning outcomes for students.

A. Research Questions

- Alignment Between Student Preferences and Faculty Placement:
  - Analyzing cases where students' self-placed course preference matches or differs from faculty assessments.
- Demographic Factors Influencing Placement Decisions:
  - How do student demographics correlate with self-placement choices and faculty placement decisions?

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- Patterns of Underestimation and Overestimation:
  - Investigating the characteristics of students who place themselves higher/lower than their assessed writing level (underestimators).
- Survey Scores and Placement Correlations
  - Exploring the relationship between students' survey scores and their final placement.
  - Determining whether higher survey scores correlate with higher placement recommendations.

B. Dataset

The dataset consists of anonymized student placement data from the UCLA Writing Department's Informed Placement Process (IPP). The primary goal of the dataset is to record students' self-assessed course preferences, faculty-assigned placements, and demographic characteristics. The dataset comprises the following key variables:

- **Student UID**: student university ID.
- **Final ENG COMP Placement (Final Score)**: The final course placement decision determined by faculty members.
- **Student's Course Preference**: The student's self-assessed preferred course placement.
- **IPP Score 1**: The first adjudicator's assigned placement score.
- **Post-IPP Survey**: Student confidence on writing ability.
- **URM Status**: Underrepresented minority classification. ("URM" / "Not URM" / NULL)
- **First Generation Bachelor's**: Indicates whether a student is the first in their family to pursue a bachelor's degree. ("First gen" / "Not First Gen" / NULL)
- **Ever Pell Grant Recipient**: Whether the student has ever received a Pell Grant, indicating financial need. (Boolean)
- **Residency Status**: Whether the student is a resident or non-resident. ("Resident" / "Domestic Non-Resident" / "International" / NULL)
- **Gender**: Self-reported gender identity. ("Female" / "Male" / "Unstated, Unknown, Other")

The following cleaning steps were applied to ensure data consistency and usability:

- Removal of duplicate entries.
- Standardization of categorical variables (e.g., gender, URM status, and residency classification).
- Imputation of missing values where applicable.
- Added variables: **Score 1 Edge Case**: Flag indicating discrepancies between different adjudicators. **Score 1 Additional Notes**: Notes on the adjudicator's reasoning for placement. **Score 1 Unsure**: Boolean indicating if the adjudicator expressed uncertainty. **Final Score Additional Notes**: Additional notes on the final placement decision.

III. METHODS

A. Exploratory Data Analysis (EDA)

In this section, we present exploratory data analysis through visualizations and tables.
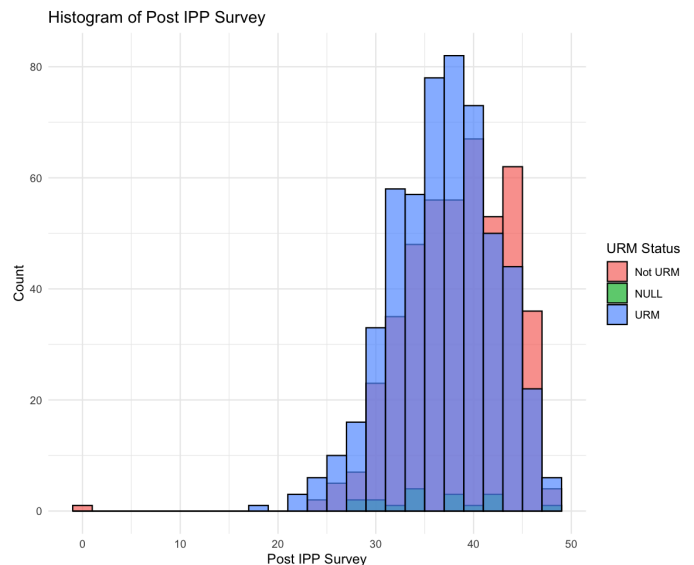

Figure 1: Histogram of Post-IPP Survey (grouped by the URM column)

There does not seem to be a huge discrepancy between the distribution of the post IPP survey based on whether someone is a URM or not. Although the 'Not URM' distribution may seem to have higher values, it is difficult to say that there is a statistically significant difference worth noting. Overall, students seem to be relatively confident with their scores with

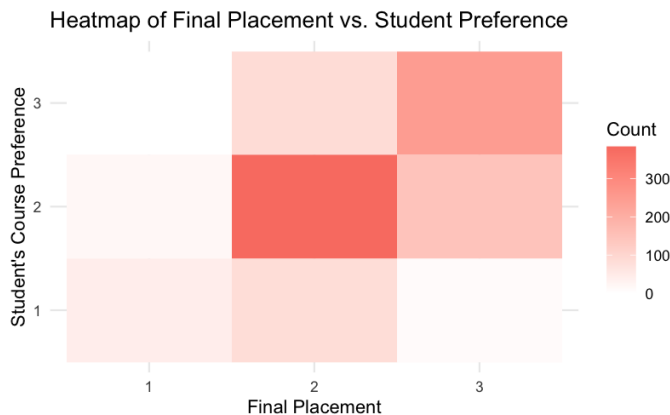the most common responses being between 38-44 out of 50.

Figure 2: Heatmap of IPP score and student course preference

This chart shows that there are no students who were placed in the level 1 class while preferring the level 3 class. It also shows that students who preferred the lowest level were rarely placed in the highest level class. Students who preferred the middle class were probably placed in that class. This was also true for many of the students who preferred the highest-level class. This chart does not determine whether students prefer the class in which they think they got into or whether their placement was impacted by their preference.
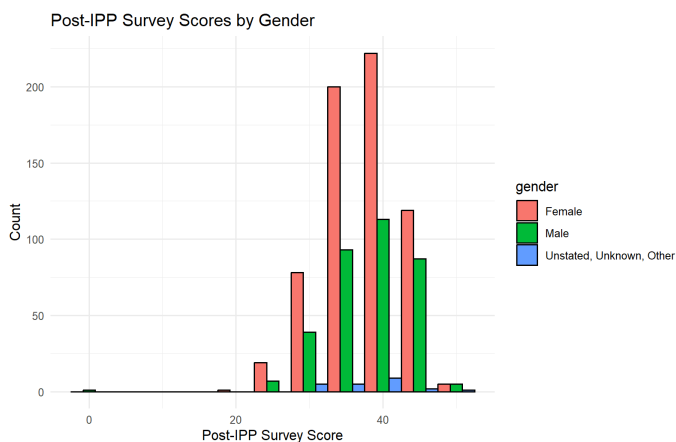

Figure 3: Histogram of Post-IPP Survey (grouped by the gender column)

The histogram suggests that the trends in the post-IPP survey score among male and female students are roughly similar. Most of the students scored between 30 and 45 in the post-IPP survey. The highest proportion of respondents are female, which could reflect UCLA enrollment patterns and/or a propensity for female students to utilize the English placement testing system instead of satisfying general education writing requirements with AP, IB, dual enrollment, or other pre-college credits. More research is needed on freshman course enrollment patterns.

B. Method for Question 1

This study employed:

- **Exploratory Data Analysis (EDA)**: Summary statistics, contingency tables, and visualizations to assess placement trends.
- **Boxplot Analysis**: Examined Post-IPP Confidence Scores by final placement level.
- **Mosaic Plot**: Visualized faculty overrides vs. student self-placement preferences.

C. Model Selection for Question 2

To examine how demographic factors (underrepresented minority status, first generation status, Pell Grant eligibility, and gender) relate to student placement decisions, we leverage *ordinal logistic regression* and focus on three outcome variables.

1) **Final (Faculty) Placement:** The actual course level assigned by the placement committee or raters.
2) **Discrepancy:** The difference between faculty placement and self-placement (encoded with levels $\{-2, -1, 0, +1, +2\}$).

Since each of these outcomes reflects a natural ordering (from "lowest" course to "highest" or in the case of discrepancy from "faculty lower than self" to "faculty higher than self"), an ordinal logistic model is appropriate. It assumes that predictor variables (demographics, IPP scores, survey responses) shift the odds of a student being in or below a given category of the outcome in a proportional manner.

Variables Used:

- *Demographics*:
  - `urm` (Underrepresented Minority Status): "URM" vs. "Not URM"
  - `first_gen_bachelors`: "First Gen" vs. "Not First Gen"

- **ever_pell_fl**: Pell Grant indicator (TRUE/FALSE)
- **gender**: "Male", "Female", or "Unstated/Other"

- *Test/Survey Measures*:
  - **IPP.Score.1**: A reading/writing test score from the IPP evaluation
  - **Post.IPP.Survey**: A numeric measure of students' confidence/experience (range 0–48)
- *Outcome Variables*:
  - **Student.s.Course.Preference** (Self-placement)
  - **Final.ENG.COMP.Placement. .Final.Score.** (Faculty placement)
  - **discrepancy** (Difference: final minus self)

D. Method for Question 3

The study employed:

- **Exploratory Data Analysis (EDA)**: Boxplots, contingency tables, and barplots to investigate patterns in the data.
- **ANOVA (Analysis of Variance)**: Statistical test used to determine if there are significant differences between group means.
- **Data Transformation**: Created a new variable to measure overestimation and underestimation based on previous data.

E. Method for Question 4

The IPP survey scores serve as a measure of students' writing habits, experience, and confidence in their own abilities. Students were asked to indicate their preferred course placement based on their self-assessment. Analysis of survey scores in relation to self-placement choices reveals key patterns in how students perceive their own readiness for college-level writing courses.

Since the course placement data consists of ordinal and discrete variables, we used boxplots, Spearman's rank correlation, and the Kruskal-Willis test to understand the non-linear correlation between the placement and survey predictors. Spearman's correlation does not assume linearity, but detects whether higher IPP survey scores are associated with higher course placement levels. The Kruskal-Willis test assesses whether the distribution of IPP survey scores is significantly different among the three course placement options.

IV. RESULTS

A. Alignment Between Student Preferences and Faculty Placement
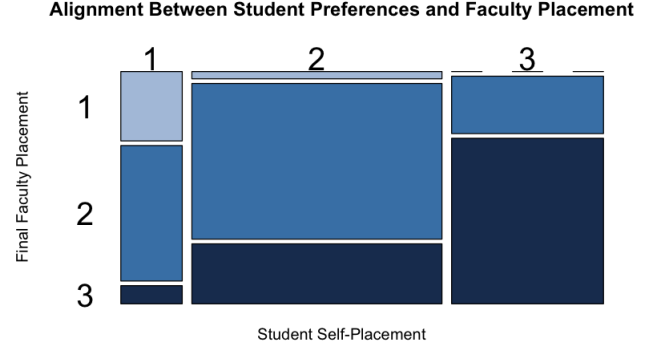

Figure 4: Mosaic Plot: Student Preferences vs. Faculty Placement

The mosaic plot visually confirms these patterns, highlighting how faculty overrides tend to shift students upward rather than downward. This suggests that self-placement may be conservative, leading faculty to adjust students to higher levels when necessary.

Table I: Comparison of Matched vs. Overridden Students.

Placement	Avg Conf	Med Conf
Matched	38.44	39
Overridden	37.31	37

Placement	L1	L2	L3	Total
Matched	42	384	248	674
Overridden	93	166	86	345

The table comparing matched vs. overridden students reveals trends in faculty placement decisions. The matched students had slightly higher confidence scores (avg. 38.44 vs. 37.31), but the difference is very small, suggesting that confidence plays a minimal role in faculty overrides.

Overrides were most common for students who self-placed themselves in Level 1 (93 overridden vs. 42 matched), indicating that faculty often believe these students underestimate themselves. In contrast, students who self-placed themselves in Level 3 were more likely to be matched (248 matched vs. 86 overridden), suggesting that faculty trust higher self-assessments.

Faculty overrides were most common for students who placed themselves in Level 2 (166 overrides), suggesting that while many students in Level 2 remain there, faculty make frequent adjustments for those who may need to move up or down. This indicates that Level 2 is a transition zone in which some students are confidently placed, but others require further refinement.

Overall, these results suggest that faculty overrides are structured rather than random, with a tendency to challenge students who place themselves at lower levels while largely trusting higher self-assessments.

B. Demographic factors influencing placement decisions

1) Student Self-Placement Model: Table II displays the estimates of the key parameters. "Estimate" refers to the log-odds coefficient; "SE" is the standard error around that estimate; "t-value" quantifies the ratio of estimate to its error (for significance); and "OR" is the odds ratio $\exp(\text{Estimate})$.

Table II: Ordinal Logistic Regression for **Student Self-Placement**

Predictor	Estimate	SE	OR
urmURM	-1.1176	0.1787	0.3270
first_gen	0.0685	0.1875	1.0709
ever_pell_flTRUE	-0.1111	0.1834	0.8949
genderMale	0.0816	0.1528	1.0850
Other	0.6076	1.1140	1.8359
Post.IPP.Survey	0.3127	0.0184	1.3671
Intercepts:			
1|2	8.4454	0.6534	–
2|3	12.4398	0.7447	–

Interpretation:
- **URM status** (`urmURM`) is significantly negative (-1.1176, p-value $\ll 0.01$), with an

odds ratio of 0.33. This suggests that, holding other factors constant, underrepresented minority students are less likely to place themselves into higher-level composition courses compared to non-URM students.
- **Post.IPP.Survey** has a large positive coefficient (0.3127) and an odds ratio of 1.37 per unit increase on the survey scale, indicating that higher self-reported confidence strongly increases the chance of self-selecting a more advanced course.
- Other demographic factors (first-generation status, Pell, gender) do not show statistically strong shifts in self-placement under this model (t-values near zero).

2) Final (Faculty) Placement Model: Table III shows parameter estimates for how faculty ultimately placed students (ENG COMP 1, 2, or 3).

Table III: Ordinal Logistic Regression for **Final (Faculty) Placement**

Predictor	Estimate	SE	OR
urmURM	-1.2651	0.2735	0.2822
first_gen	0.0576	0.2821	1.0593
ever_pell_flTRUE	0.2392	0.2791	1.2703
genderMale	0.3481	0.2336	1.4164
Other	0.0052	1.7314	1.0053
IPP.Score.1	4.8470	0.2480	127.36
Post.IPP.Survey	0.1740	0.0237	1.1900
Intercepts:			
1|2	11.2274	1.0477	–
2|3	19.1070	1.2947	–

Interpretation:
- **IPP.Score.1** has a remarkably large positive impact (odds ratio ≈ 127), suggesting that performance on the IPP reading/writing task is the dominant predictor of higher placement of the course by faculty.
- **URM status** remains negative (-1.2651, OR ≈ 0.28), indicating that URM students are again less likely to receive higher-level faculty placements, even after controlling for IPP scores and survey confidence.
- **Post.IPP.Survey** is also significantly positive, though more modest (OR ≈ 1.19), suggesting some incremental role of student confidence in

influencing faculty decisions beyond the IPP Score.

3) Discrepancy Model: Table IV reports how the same predictors affect the *difference* between final and self-placement (discrepancy). Negative values (e.g. -1, -2) mean that the faculty places the student lower than the students placed themselves; positive values (e.g., $+1$, $+2$) mean the faculty places them higher.

Table IV: Ordinal Logistic Regression for **Discrepancy** (Final $-$ Self)

Predictor	Estimate	SE	OR
urmURM	0.4358	0.1825	1.5462
first_gen	-0.0235	0.1937	0.9768
ever_pell_flTRUE	0.1035	0.1905	1.1090
genderMale	-0.0321	0.1557	0.9684
Other	-0.4557	1.1919	0.6340
IPP.Score.1	2.4342	0.1639	11.406
Post.IPP.Survey	-0.2200	0.0173	0.8026
Intercepts:			
-2|-1	-14.661	8.6200	–
-1|0	-5.2656	0.6513	–
0|1	-0.6440	0.6234	–
1|2	3.1943	0.6729	–

Interpretation:

- **URM** has a positive effect (OR ≈ 1.55). This means that underrepresented minority students are more likely to end up with a final placement *above* their self-placement, on average. In other words, URM students place themselves relatively low compared to faculty judgments.
- **IPP.Score.1** is again strongly positive (OR ≈ 11.41). Students whose IPP scores outperform their own self-assessment are often "bumped up" by faculty.
- **Post.IPP.Survey** is negative here (OR ≈ 0.80). Confident students place themselves higher from the start, so the final minus self (discrepancy) tends to be lower (less chance of a faculty "bump").

4) Summary: The three models together suggest:

- **URM students** tend to self-place lower (Table II) and receive lower final placements on average (Table III). However, in relation to their own self-placement, they are more likely to be placed higher by the faculty (Table IV). This suggests a potential underestimation of their abilities.
- **IPP Scores** dominate faculty decisions (odds ratios > 100 in the Final Placement model), indicating that the official test measure is the strongest determinant of being placed in higher courses.
- **Self-reported confidence** (Post.IPP.Survey) strongly influences self-placement but also appears in final decisions, albeit with a smaller effect than the IPP exam.

C. Patterns of Under & Over-estimation

A key topic we wanted to explore in our analysis had to deal with patterns of underestimation and overestimation. In our definition of self-assessment in our dataset, we define a student who has a course preference lower than their final placement as an *underestimator*, a student who has a course preference higher than their final placement as an *overestimator*, and a student who has a course preference equal to their final placement as *accurate*. We display the distribution of these students as a table of percentages below.

| Category	Percentage
Accurate	66.14
Overestimator	10.21
Underestimator	23.65

Table V: Distribution of Self-Assessment Categories

Following this, we wanted to see if any of the demographic factors would serve any significance as a predictor for predicting whether or not a student would be accurate, an overestimator, or an underestimator. We started with URM status.

From this graph, you can't notice much of a difference between students who are a URM or not a URM.

We then tried the same procedure for the `first_gen_status` column.

To examine the relationship between students' self-assessment accuracy and their confidence levels, we conducted a statistical analysis using a boxplot visualization and an ANOVA test.

Self-Assessment by URM Status

Self-Assessment by First Gen Status
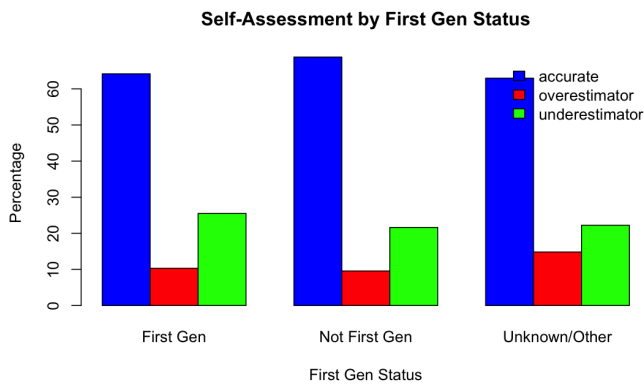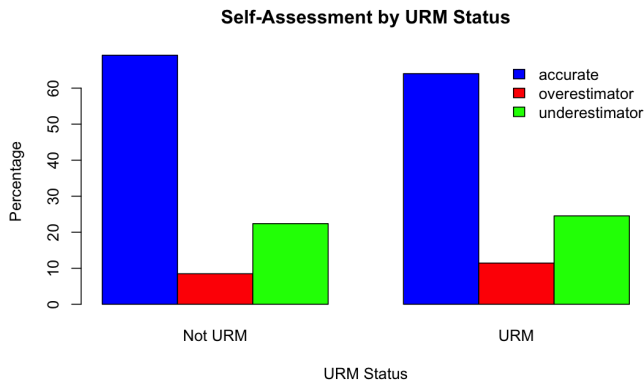
A boxplot was created in order to visualize the distribution of the Post-IPP survey confidence scores across the three self-assessment categories.

Confidence Score by Self-Assessment

This boxplot showcases an intuition that makes a lot of sense – students who are underestimators also have a lower confidence score in their Post-

IPP scores, students who are overestimators also have a higher confidence score in their Post-IPP scores, and students who are accurate are in between the two. Our ANOVA test is also able to back up the visualization, with the p-value of the test being 7.85×10^{-16}, meaning that the observed differences among groups are statistically significant.

D. Survey Scores and Placement Correlations

The IPP survey scores serve as a measure of students' writing habits, experience, and confidence in their own abilities. Students were asked to indicate their preferred course placement based on their self-assessment. Analysis of survey scores in relation to self-placement choices reveals key patterns in how students perceive their own readiness for college-level writing courses.

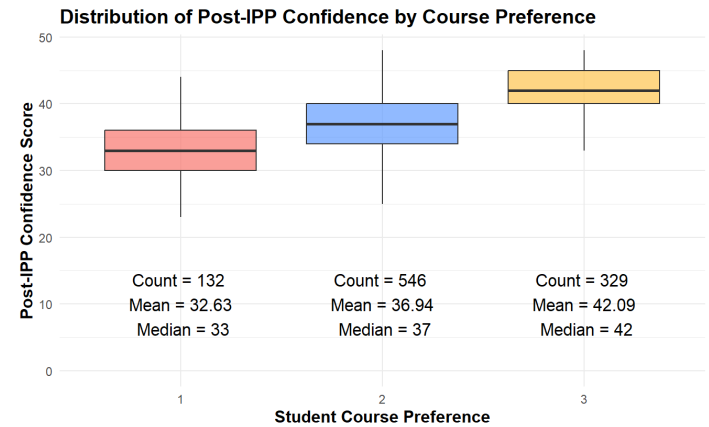Distribution of Post-IPP Confidence by Course Preference

Figure 5: Boxplot of Post-IPP Survey Scores vs. Student Course Preference

The boxplot of survey scores by student course preference (Figure 1) indicates that students who preferred higher-level courses reported higher survey scores on average. This suggests that students with greater confidence in their writing abilities tend to place themselves into more advanced courses, while those with lower confidence prefer lower-level placements.

Table VI: Test Results for Survey Scores by Placement Level

Test	Statistic	DoF	p-val
Kruskal–Wallis	386.190	2	$< 2e^{-16}$
Spearman's	0.619	2	$< 2e^{-16}$

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The Spearman correlation test (Figure 2; $\rho = 0.40$, $p \leq 2e^{-16}$) suggests a moderate positive relationship between survey scores and final placement, indicating that students with higher self-reported writing confidence tend to receive more advanced course placements. The Kruskal-Wallis test (Figure 2; χ^2 = 163.58, $p \leq 2e^{-16}$) demonstrates that the differences in survey scores between placement levels are statistically significant, meaning that survey scores are not randomly distributed across placements. These results suggest that final course placements generally align with self-reported confidence, but do not rely on it alone.

V. Conclusions & Limitations

Initial exploration of the Informed Placement Process Data revealed that most students that place themselves in the 2 or 3 level English composition course end up in that course. Similarly, students rarely moved up or down more than one level (from a preferred 3 to an assigned 1 or vice versa). However, the contingent of students matched with higher- or lower-level courses is still substantial. Our goal was to explore what factors led to students being matched with their preferred level, as well as discrepancies between self-selected and faculty-selected English composition levels.

This report found that students' self-reported confidence level with their existing English composition skills following the IPP writing tasks had a minimal affect on their final placement in a writing course at UCLA. Instead, this confidence survey simply mirrored the course level students chose for themselves. However, some trends were revealed in the demographic analysis in the IPP. Underrepresented minorities were found to be less likely to place themselves in higher-level writing courses, leading to an underestimation of their ideal course load. On the other hand, first-generation students, Pell Grant recipients, and students of either gender did not exhibit any significant pattern of over- or underestimation.

Our research confirmed the assumption that the faculty's determination of writing level in the IPP first score was the dominant factor in the final placement of each student. In cases where students' self assessment did not match their higher performance demonstrated in the writing sample, modeling conclusively showed that students were upgraded to a higher level writing course. URM status also significantly contributed to final placement, with students in this category tending to receive a lower-level faculty final placement. This is despite the finding that URM students tended to be placed in a higher level than what was self-assessed.

Some significant challenges arose from the analysis of the IPP dataset and the IPP process as a whole. For one, there is no mechanism to ensure that students are satisfied with the English composition course with which they are eventually matched or whether they succeed in that course. In order to accurately and efficiently improve the IPP process, some sort of survey or grade outcome should be included with the data set. Additionally, the UCLA online learning environment (Canvas' 'Bruinlearn') does not allow for in-depth analysis of the Post-IPP Survey, limiting output to a final confidence score without nuance or specific responses to questions in the survey. This is a potential oversight, as students may have different sources of uncertainty that could affect their learning outcomes or hold them back from more advanced coursework.

References

[1] Wikipedia contributors, *Ordinal regression — Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/wiki/Ordinal_regression (accessed March 12, 2025).