

Exploring Writing Achievement and Genre in Postsecondary Writing

Jill Burstein

Educational Testing Service
jburstein@ets.org

Daniel McCaffrey

Educational Testing Service
dmccaffrey@ets.org

Norbert Elliot

University of South Florida
nelliot3@usf.edu

Beata Beigman Klebanov

Educational Testing Service
bbeigmanklebanov@ets.org

ABSTRACT: Writing achievement is a complex skill set as characterized by the sociocognitive writing framework, including writing domain knowledge (e.g., sentence structure), general cognitive skills (e.g., critical thinking) and intra- (e.g., interest) and interpersonal (e.g., collaboration) subfactors. During students' postsecondary careers, they need to write in different genres. Yet, we have limited understanding about the contribution of genre mastery to students' writing achievement which can affect their broader success (e.g., GPA). Partnering with six, diverse 4-year universities, we collected student responses to a *standardized* writing assessment and *authentic* course writing assignments which were coded for *genre* as: *standardized*, *persuasive*, *inform/explore*, and *reflective*. Using automated writing evaluation, we extracted approximately 50 linguistic features (e.g., vocabulary usage) from the 1,426 writing samples. We present findings for genre-based feature distributions, cross-genre correlations, and implications for postsecondary writing education.

Keywords: natural language processing, writing analytics, higher education

1 INTRODUCTION

Writing achievement is a complex skill set as characterized by the sociocognitive writing model (Flower, 1994; Hayes, 2012). The model considers multiple subfactors, including writing domain knowledge (e.g., sentence structure), general cognitive skills (e.g., critical thinking), and intra- (e.g., interest) and interpersonal (e.g., collaboration) subfactors. Postsecondary writing achievement studies are needed to critically examine how students apply and develop their writing domain knowledge in different genres, since writing achievement may affect broader success measure, e.g., GPA (Burstein, McCaffrey, Beigman Klebanov, Ling, & Holtzman, 2019). Such studies have typically examined expository essay writing genre (Allen, Snow, Crossley, Jackson, & McNamara, 2014; MacArthur, Traga Philippakos, May, & Compello, 2019). Burstein, et al. (2019) used standardized writing assessment and coursework writing to examine relationships between automated writing evaluation (AWE) features and academic success measures (e.g., GPA); yet, genre was not studied. Our study compares writing subconstruct features in student writing as captured by state-of-the-art AWE technology (*withheld for anonymity*) between genres.

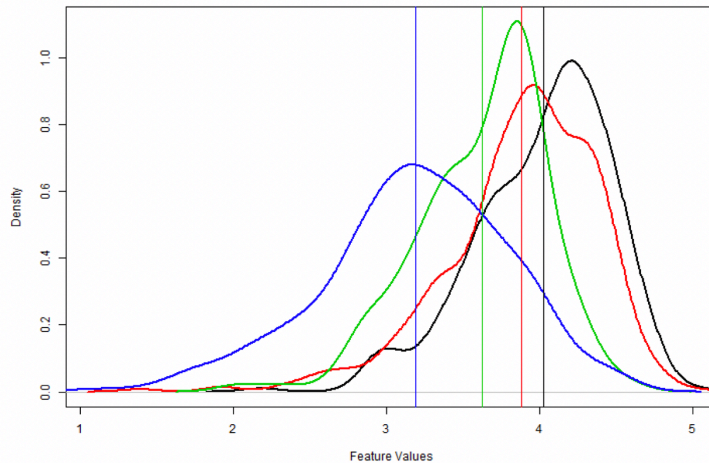


Figure 1: Standardized writing (blue) has lower sentence variety values than reflective (green), persuasive (red), or informative/exploratory (black) sentence variety values.

2 METHODS

2.1 Data

At six diverse, 4-year partner universities, 735 students participated. We collected 1,426 writing samples. A subset of students completed a *timed, standardized writing assessment* requiring an argumentative essay ($n=366$). A partially overlapping subset of students ($n=435$) submitted coursework writing ($n=1060$) from one course in which their instructor had agreed to participate for the study. Courses were primarily first-year English courses, but also included Biology, Business, Exercise Science, History, and Sociology courses. Data are available here: <https://github.com/EducationalTestingService/ies-writing-achievement-study-data>.

2.2 Genre Annotation

Three research assistants annotated the writing samples with four genre labels. All *timed, standardized writing assessment responses* were labeled as “*standardized*” (**S**) and *coursework writing* was coded as one of “*persuasive*” (**P**) (33%), “*informative/exploratory*” (**IE**) (47%), “*reflective*” (**R**) (14%), or “*other*” (5%), using an annotation protocol developed for the study. “*Other*” assignments did not align with the 3 *coursework* genres, and are not included in this discussion.

2.3 Data Analysis, Results & Discussion

Using AWE, we extracted about 50 linguistic features from the standardized and coursework writing samples. The feature set represented six writing subconstructs: *vocabulary usage, argumentation, organization & development, English conventions, sentence structure, and personal reflection*.

Feature Density & Genre. Using visual comparisons of smoothed density plots, and the Kolmogorov-Smirnov test for differences in the distributions for the different subconstructs, we observed statistically-significant ($p < 0.001$), genre-based differences in AWE feature distributions. For instance, more pronouns (i.e., *personal reflection*) were observed in *reflective* writing than *standardized, persuasive, or informative/exploratory* writing. Analyses suggested that *standardized* writing (a)

contained less sentence variety (i.e., *sentence structure*) than the coursework genres (e.g., Figure 1), (b) used less sophisticated vocabulary (i.e., *vocabulary usage*) than coursework genres, and (c) tended to discuss one longer topic, (i.e., *development*), whereas coursework genres contained more topic variety.

Cross-Genre Correlations. We generated ‘*subconstruct scores*’ for the six writing subconstructs. *Subconstruct scores* were equal to the average of the AWE feature values for the features in each subconstruct. Feature values were standardized to have a mean zero and standard deviation 1 prior to averaging. Six factor scores were assigned to all writing samples. We ran cross-genre correlations to examine relationships between the *subconstruct scores* for writing samples in each genre pair (e.g., R/IE). Coursework genre pairs had the highest correlations for *vocabulary usage* (0.35 for P/IE, and 0.31 for IE/R), *English conventions* (0.33 for P/IE and 0.35 for IE/R), and *sentence structure* (0.30 for IE/R) subconstructs. Correlations between S and the *coursework genres* all fell below 0.30.

Implications. Findings from both analyses suggested differences in students’ application of writing features across genres. Offering opportunities for students to practice writing in different genres can provide instructors and institutions with a more comprehensive picture of students’ writing domain knowledge (i.e., writing feature use) and writing achievement. The findings illustrate the limitations of observable writing domain knowledge from *single-genre* standardized writing assessments.

ACKNOWLEDGMENTS

Research presented in this paper was funded by the Institute of Education Science, United States Department of Education, Award Number R305A160115 any opinions, findings, conclusions, or recommendations are those of the authors and do not necessarily reflect the views of the IES. This project would not have been possible without the support of Hillary Molloy, Patrick Houghton and Zydrune Mladineo who led and performed the genre annotation.

REFERENCES

- Allen, L. K., Snow, E. L., & Crossley, S. A., Jackson, G. T., & McNamara, D. S. (2014). Reading components and their relation to the writing process. *L'année psychologique/Topics in Cognitive Psychology*, 114, 663-691.
- Burstein, J., McCaffrey, D., Beigman Klebanov, B., Ling, G. & Holtzman, S. (2019). Exploring Writing Analytics and Postsecondary Success Indicators. In *Companion Proceedings 9th International Conference on Learning Analytics & Knowledge* (pp. 213-214). Retrieved from http://solaresearch.org/uploads/LAK19_Companion_Proceedings.pdf
- Flower, L. (1994). *The construction of negotiated meaning: A social cognitive theory of writing*. Carbondale and Edwardsville, IL: Southern Illinois University Press.
- Hayes, J. R. (2012). Modeling and remodeling writing. *Written Communication*, 29, 369–88. <https://doi.org/10.1177%2F0741088312451260>
- MacArthur, C. A., Jennings, A., Philippakos, Z. A. (2019). Which linguistic features predict quality of argumentative writing for college basic writers, and how do those features change with instruction? *Reading and Writing: An Interdisciplinary Journal*, 32(6), 1553-1574. <https://doi.org/10.1007/s11145-018-9853-6>.