Examining Differences in Student Written Communication Skills by Race and Gender through Statistical Analysis

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First, a show of hands...

- How many of you are from:
  - Public Institution?
  - Private Institution?
  - 2-year College?
  - 4-year University?
First, a show of hands...

- How many of you are:
  - Assessment Professional
  - Faculty
  - Administrator
  - Other?

Institutional Profile of SHSU

- 4-year, public university approximately 1-hour north of Houston, Texas

- Current enrollment of approximately 22,000 undergraduate and graduate students
  - 91 bachelor’s degree programs, more than
  - 57 master’s degree programs, and
  - 10 doctoral programs

- Classified by the Carnegie Commission on Higher Education as a “Doctoral Research University” and a “Community Engaged” University
2019 Excellence in Assessment Designee

- SHSU was one of seven institutions recognized in 2019.
- SHSU was one of twenty-seven total institutions awarded since 2016.
- SHSU is the **FIRST** Texas institution to be recognized.

Co-sponsored by:
- Voluntary System of Accountability (VSA),
- National Institute for Learning Outcomes Assessment (NILOA)
- Association of American Colleges and Universities (AAC&U)

Recognizes institutions that are successfully:
- Integrating assessment practices throughout the institution
- Providing evidence of student learning outcomes
- Using assessment results to guide institutional decision-making and improve student performance

Focus is on processes and uses of assessment data, rather than on student performance or accomplishment.
General Education Learning Outcomes at SHSU

- Critical Thinking
- Communication
- Empirical and Quantitative Reasoning
- Teamwork
- Personal Responsibility
- Social Responsibility

Communication Skills

- To include effective development, interpretation, and expression of ideas through written, oral, visual communication

- Focus of this presentation upon the written communication portion of that larger general education outcome
Broader Issues Surround Student Written Communication Skills

- Written Communication skills are increasingly important for students as they graduate college and enter the workforce

- Many perceive that students are graduating from college lacking necessary written communication skills

Issues of Equity in Student Learning

- There are also broader concerns regarding equity of student learning and student success
  - (Montenegro & Jankowski, 2017, THECB, 2016)

- Institutions are not examining student learning data through an equity lens
  - In a 2015 survey of AAC&U institutions:
    - 70% tracked student learning data
      - 31% set equity goals for different racial/ethnic groups
      - 24% set equity goals for different socioeconomic groups
      - 14% set equity goals by parental educational level
    - 17% actually examined their data by these factors
      - 16% by race/ethnicity
      - 9% by socioeconomic status
      - 6% by parental educational level
By examining student data institutions can “respond to the doubts of skeptical publics” (Kuh et al., 2015, 8–9).

In particular, Kuh et al. (2015) noted that:

...if academic institutions are collecting and using evidence of student learning to inform decisions and guide change that can help students and institutions improve performance, the confidence of the American public is likely to follow (p. 12).

Assessment of General Education Outcomes at SHSU

- Mixture of Direct and Indirect Assessment Measures both Within the Curriculum **AND** at End-of-Experience
  - **Examples of Direct Measures**
    - Assessment of Written Communication (AWC)
    - Critical Thinking Assessment Test (CAT)
    - Course Embedded American/Texas Government Tests
  - **Examples of Indirect Measures**
    - National Survey of Student Engagement (NSSE)
    - Teamwork Self-Reflection Instrument (TSRI)
Assessment of Written Communication (AWC) Project

- Student artifacts collected from end-of-experience courses (i.e., 3000- and 4000-level courses)
  - Preferred artifacts from writing-enhanced, gateway or capstone courses

- All colleges at SHSU evaluated on a 3-year, rotating cycle

- Artifacts scored with a locally developed written communication rubric

AWC Scoring Rubric

- Rubric created by an interdisciplinary faculty committee with expertise and experience in teaching and assessing written communication
  - Promotes Content Validity

- AAC&U Written Communication VALUE Rubric was influential in identifying the domains measured by the rubric
  - Promotes Theoretical Validity
Rubric measured student written communication across four separate domains
- Ideas/Critical Thinking/Synthesis
- Style
- Organization
- Conventions

A student’s scores across all four domains were combined to create a single, overall average score for the student artifact
- Data from the overall student score for analysis
Data Sources

- Data were collected from 2015, 2016, and 2017 academic years
- Data were available for six of the seven academic colleges at SHSU

Comparison of Sample Population Characteristics

- 1,284 junior- and senior-level students
  - **Gender**
    - Male (n=457, 36%)
    - Female (n=827, 64%)
  - **Race/Ethnicity**
    - White (n=825, 64%)
    - Black (n=224, 17%)
    - Hispanic (n=235, 18%)
  - **First Generation Status**
    - First Generation (n=512, 40%)
    - Not First Generation (n=448, 35%)
    - Unknown (n=324, 25%)
  - **Socio–Economic Status**
    - Pell Eligible (n=600, 47%)
    - Not Pell Eligible (n=684, 53%)

- Comparable junior- and senior-level students enrolled in Fall 2016 (n=9,416)
  - **Gender**
    - Male (n=3,594, 38%)
    - Female (n=5,822, 62%)
  - **Race/Ethnicity**
    - White (n=5,699, 61%)
    - Black (n=1,655, 18%)
    - Hispanic (n=2,062, 21%)
  - **First Generation Status**
    - Comparison Data Not Available
  - **Socio–Economic Status**
    - Comparison Data Not Available
Reliability Analysis

- In rubric-based assessments, the consistency of the raters’ scores is an important measure of reliability
  - Banta & Palomba, 2015; Millett, Payne, Dwyer, Stickler, & Alexiou, 2008

- Inter-rater reliability was then calculated using one-way, random intra-class correlation (ICC) coefficients (Fleiss, 2003; Shrout & Fleiss, 1979).

- ICC values (Cicchetti, 1994),
  - < .40 = poor agreement
  - .40 – .59 = fair agreement
  - .60 – .74 = good agreement
  - > .74 = excellent agreement

- The ICC value for the overall paper score was .70, which indicated **good** agreement between the raters.

Analysis Technique and Assumptions

- Multiple regression was used for analysis
  - Prior to analysis, appropriate checks were made of necessary assumptions (Field, 2009, Onwuegbuzie & Daniel, 2002)

- Standardized skewness and kurtosis values were within ranges of normality +/-3 (Onwuegbuzie & Daniel, 2001)

- The possible presence of multicollinearity was addressed by examining Tolerance values and VIF
  - Tolerance values were above .10 and the VIF values were very close to 1

- Significant residual autocorrelation was examined using the pooled Durbin–Watson statistic
  - Pooled Durbin–Watson statistic was .02, indicating this assumption was violated.
First-Generation Variable

- As first-generation status was self-reported, data were missing for approximately 25% of students
  - Multiple Imputation Analysis was employed to account for missing data
    - 3–5 Imputations are typically sufficient (Schafer, 1997)
    - 5 Imputations were used for this study

- Multiple Imputation is “one of the best options for handling missing data”
  - Schlomer et al., 2010, p. 5

Results

- The overall regression model was predictive of differences in student written communication skills, $F(5, 1278) = 2.58, p < .001$
  - Pooled adjusted $R^2$ was .028, indicating 2.8% of the total variance in written communication skills could be explained by student demographic characteristics
  - This value was small (Cohen, 1988)
Results, ctd.

- Two variables were statistically significant in the model

- On a 4-point scale:
  - Scores for male students were 0.14 points, or approximately 3%, lower than female students
    - Effect size was small (Cohen’s $d = 0.31$)
  - Scores for Black students were 0.17, or approximately 5%, lower than those of White students
    - Effect size was small (Cohen’s $d = 0.25$)

- Scores for Hispanic students, first-generation students, and students who were Pell-eligible were not statistically significantly different

Summary of Pooled Multiple Regression Results of Predictor Variables Upon Student Written Communication Performance

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.51</td>
<td>0.03</td>
<td>77.14</td>
<td>&lt; .01</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-0.15</td>
<td>0.03</td>
<td>-0.13</td>
<td>-4.70</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Black</td>
<td>-0.18</td>
<td>0.04</td>
<td>-0.12</td>
<td>-4.10</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.06</td>
<td>0.04</td>
<td>-0.04</td>
<td>-1.35</td>
<td>.18</td>
</tr>
<tr>
<td>Pell Eligible</td>
<td>-0.03</td>
<td>0.04</td>
<td>-0.03</td>
<td>-0.88</td>
<td>.38</td>
</tr>
<tr>
<td>First Generation</td>
<td>&lt; -0.00</td>
<td>0.04</td>
<td>&lt; -0.01</td>
<td>-0.03</td>
<td>.97</td>
</tr>
</tbody>
</table>

Note. The performance of Black and Hispanic students are both compared to that of White Students.
### Descriptive Statistics for Student Writing Scores by Student Group

<table>
<thead>
<tr>
<th>Student Group</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Population</td>
<td>1,284</td>
<td>2.40</td>
<td>0.56</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>825</td>
<td>2.43</td>
<td>0.56</td>
</tr>
<tr>
<td>Black</td>
<td>224</td>
<td>2.26</td>
<td>0.52</td>
</tr>
<tr>
<td>Hispanic</td>
<td>235</td>
<td>2.39</td>
<td>0.59</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>457</td>
<td>2.31</td>
<td>0.57</td>
</tr>
<tr>
<td>Female</td>
<td>827</td>
<td>2.45</td>
<td>0.55</td>
</tr>
<tr>
<td>Socio-Economic Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pell Eligible</td>
<td>600</td>
<td>2.36</td>
<td>0.55</td>
</tr>
<tr>
<td>Not Pell Eligible</td>
<td>684</td>
<td>2.42</td>
<td>0.57</td>
</tr>
<tr>
<td>First Generation Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Generation</td>
<td>512</td>
<td>2.39</td>
<td>0.57</td>
</tr>
<tr>
<td>Not First Generation</td>
<td>448</td>
<td>2.39</td>
<td>0.54</td>
</tr>
</tbody>
</table>

### Discussion of Results
First, the good news!

- The small percentage of variance explained by the model is a positive, as it indicates these variables potentially had limited effect.

- No statistical significant differences were seen in the scores between:
  - White and Hispanic Students
  - First Generation and Non-First Generation Students
  - Pell Eligible and Non-Pell Eligible Students

Now the bad news...

- Model did reveal that the scores of Black students and of Male students were statistically significantly lower than the scores of White students and of Female students:
  - These findings align with Arum and Roska (2011) for race/ethnicity and Priess et al. (2013) for gender.

- Findings are a departure from Roberts et al. (2017), who examined different students at the same university from a different time:
  - Mean differences were similar between studies, but were not statistically significant in Roberts et al. (2017).

- Performance of all students was lower than desired, at a 2.40 on a 4-point scale.
### Comparison of Means

<table>
<thead>
<tr>
<th></th>
<th>Current Study</th>
<th>Roberts et al., 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td>White (n=825) – 2.43</td>
<td>White (n=249) – 2.69</td>
</tr>
<tr>
<td></td>
<td>Black (n=224) – 2.26</td>
<td>Black (n=51) – 2.53</td>
</tr>
<tr>
<td></td>
<td>Hispanic (n=235) – 2.36</td>
<td>Hispanic (n=56) – 2.54</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male (n=457) – 2.31</td>
<td>Male (n=143) – 2.59</td>
</tr>
<tr>
<td></td>
<td>Female (n=827) – 2.42</td>
<td>Female (n=251) – 2.66</td>
</tr>
</tbody>
</table>

### Implications
Replication/Continued Study are Needed

- Continued examinations of student written communication skills are needed to better understand the performance of all student groups
  - Particularly at the individual domain levels

- Studies are needed to explore the interaction between different demographic variables upon written communication skills

- Future studies will be needed to examine the impact of any interventions for improvement

Further Exploring Questions of Equity

- All student groups underperformed with regard to university expectations

- The results *did* reveal an equity gap in the performance of Black students when compared to White students

- The results *did* reveal an equity gap in the performance of male students when compared to female students
How does the institution work to improve student written communication skills, in general, while also working to close specific equity gaps?

Questions?

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References
References, ctd.