The Time is Now: A Study Promoting STEM Faculty Use of Culturally Inclusive Teaching

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Literature Review

• STEM privilege (Patton, 2016)
• Perpetuating inequities through research (Pawley, 2017)
• Disidentification with STEM (Collin, 2018)
• Culturally Inclusive Teaching practices (Milem, 2003; Salazar, Norton, & Tuitt, 2010)

Theoretical Frameworks

• Culturally relevant pedagogy (Ladson-Billings, 1995a, 1995b, 2004)
• Culturally responsive teaching (Gay, 2003)
• Themes of Culturally Relevant Education (Aronson & Laughter, 2016)
  – Academic skills and concepts
  – Critical reflection
  – Cultural competence
  – Critique of discourses of power

Research Questions

1. How much do faculty in STEM, compared to non-STEM faculty, emphasize CIT in their courses?
2. How does the emphasis of CIT vary by socio-demographic, academic employment status, and course characteristics in STEM fields? In what ways do these patterns compare to faculty in non-STEM fields?

Data Source

• Secondary Data Analysis
• Faculty Survey of Student Engagement 2017
  – Instructional faculty teaching at least one undergraduate course at four-year institutions
  – Ask faculty about their use of educational practices linked with student learning and development
  – Data used for institutional improvement efforts
  – 154 four-year institutions, 24,000 respondents
• Optional topical module: Inclusiveness and Engagement with Cultural Diversity
  – 30 institutions chose this option, 4,000 respondents

Faculty Sample (N=2,988)

Demographics
• 75% White, 9% PNR, 5% Asian, 4% Multiracial, 3% Black or African Am., 3% Hispanic/Latino
• 48% Man, 47% Woman, <1% Gender Variant
• 98% US citizen or permanent resident

Academic Characteristics
• 27% STEM
• 28% Full, 23% Associate, 24% Assistant, 25% Lecturer
• 61% Upper Div students
• 53% GEC
## CIT Scale Development

- Mapped topical module survey items to CRE framework (Aronson & Laughter, 2016)
- EFA factor loadings
- Internal reliability
- Intra-class correlation

### Research Questions

- Descriptive Statistics (RQ1)
- OLS Regression (RQ2)
  - Two models: STEM & Non-STEM
  - Standardized dependent variable (DV)
  - Dummy coded categorical independent variables (IV)
  - Reference group identified by lowest unadjusted mean

### Analyses

#### By Discipline

**STEM (n=811)**
- Biological Sciences
- Ag. & Natural Resources
- Physical Sciences
- Mathematics
- Computer Science
- Engineering

**Non-STEM (n=2,177)**
- Arts & Humanities
- Social Science
- Business
- Communications
- Health Professions
- Other fields

### CIT Item Set

Earlier, you answered some questions based on one particular undergraduate course section that you are teaching or have taught during this academic year. Thinking again about that course, how much does it emphasize the following?

<table>
<thead>
<tr>
<th>Item Components</th>
<th>Min</th>
<th>Max</th>
<th>Item Mean (SD)</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Developing the skills necessary to work effectively with people from various backgrounds</td>
<td>1</td>
<td>4</td>
<td>2.71 (1.01)</td>
<td>.817</td>
</tr>
<tr>
<td>b. Recognizing students' cultural norms and biases</td>
<td>1</td>
<td>4</td>
<td>2.52 (1.14)</td>
<td>.907</td>
</tr>
<tr>
<td>c. Students sharing their perspectives and experiences</td>
<td>1</td>
<td>4</td>
<td>3.75 (1.08)</td>
<td>.838</td>
</tr>
<tr>
<td>d. Exploring students' backgrounds through projects, assignments, or programs</td>
<td>1</td>
<td>4</td>
<td>2.21 (1.15)</td>
<td>.804</td>
</tr>
<tr>
<td>e. Learning about other cultures</td>
<td>1</td>
<td>4</td>
<td>2.35 (1.18)</td>
<td>.845</td>
</tr>
<tr>
<td>f. Discussing issues of equity or privilege</td>
<td>1</td>
<td>4</td>
<td>2.29 (1.17)</td>
<td>.841</td>
</tr>
<tr>
<td>g. Respecting the expression of diverse ideas</td>
<td>1</td>
<td>4</td>
<td>2.85 (1.13)</td>
<td>.854</td>
</tr>
</tbody>
</table>

Cronbach's Alpha = .93
ICC = 2.8%

### Descriptive Statistics

<table>
<thead>
<tr>
<th>STEM Faculty</th>
<th>Non-STEM Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD = .77</td>
<td>1.77</td>
</tr>
<tr>
<td>SD = .36</td>
<td>2.81</td>
</tr>
<tr>
<td>Very Little</td>
<td>Quite a bit</td>
</tr>
<tr>
<td>Some</td>
<td>Very much</td>
</tr>
</tbody>
</table>

**Table 2. Inclusive Teaching Practice Item—Components, Scale Properties, and Interclass Correlation**

Item prompt: Earlier, you answered some questions based on one particular undergraduate course section that you are teaching or have taught during this academic year. Thinking again about that course, how much does it emphasize the following? (4-point response options; 4=Very much, 3=Quite a bit, 2=Some, 1=Very little)
Descriptive Statistics

- Very much
- Quite a bit
- Some
- Very little

**Independent Variables**

**Socio-demographics**
- Gender identity
- Race-ethnic identity
- US citizenship

**Academic characteristics**
- Rank/Tenure

**Course characteristics**
- General education requirement
- Class size
- Division level

**Model Results by Race-Ethnicity**

- STEM:
  - CIT Coefficient Estimates
  - Reference group: White faculty
  - *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001
  - Statistically significant coefficient estimates controlling for socio-demographics, academic, and course characteristics

- Non-STEM:
  - CIT Coefficient Estimates
  - Reference group: White faculty
  - *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001
  - Statistically significant coefficient estimates controlling for socio-demographics, academic, and course characteristics

**Model Results by Rank**

- Reference group: Full rank faculty
  - *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001
  - Statistically significant coefficient estimates controlling for socio-demographics, academic, and course characteristics

**Model Results by Gender Identity**

- Reference group: Men
  - *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001
  - Statistically significant coefficient estimates controlling for socio-demographics, academic, and course characteristics
Discussion

• Dominant faculty are less likely to emphasize culturally inclusive teaching

• CIT doesn’t appear to be a high priority in STEM

• Little variation between Hispanic/Latino, Black, and White STEM faculty
  – Perceptions of departmental climate

• Lecturers are leading the way

Next Steps

• Room for improvement in scale development

• Identify multi-pronged solutions: institutional, department, faculty level
  – Influence of the promotion and tenure processes
  – Start early, T&L course in graduate education
  – What motivates/prevents STEM faculty in making instructional improvements? Applying culturally relevant pedagogy?

THANK YOU!

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