The Impact of Geography on Work-Related Experiential Activities in Engineering and Computer Science

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What is a WREA?

- Work-related experiential activity
  - Internship
  - Cooperative placement
  - Job shadow

- In-Person, Remote, and/or Hybrid

- WREAs a high impact activity, valuable in applying knowledge learned in the classroom, strengthening skills, developing professional networks
  - **Positive academic gains** (Binder et al., 2015; Knouse et al., 1999; Kuh, 2008; Parker et al., 2016)
  - **Student career learning** (Dirienzo, 2016; McGee & Spiro, 2000)
  - **Increased employability** (Callanan & Benzing, 2004; Gault et al., 2010; Knouse et al., 1999; Nunley et al., 2016)
  - **Differences exist based on structure** (Hora et al., 2017)
What Prevents WREA Participation?

- Many barriers exist to participation (Bathmaker et al., 2013; Dirienzo, 2016; Frenette et al., 2015; Hora et al., 2017, 2019; Hora, Chen, et al., 2020)

- Hora et al. (2019) found that many barriers prevent students from participating
  - Financial (e.g., need for pay or transportation)
  - Sociocultural (e.g., cultural screening)
  - Institutional barriers (e.g., course loads or scheduling)

- Not much known about role of geography
- We hypothesized that physical location significantly impacts access to WREAs
WREA Study

- 3+ year mixed-methods study funded by The NSF to examine the impact of geography on students’ access to work-related experiential activities (WREAs)

- Gathered data from:
  - 2,300 students across six institutions spring 2021 and spring 2022 surveys
  - Individual interviews with students (N=48), career planning directors (N=6) and focus groups with company officials (21)
  - Majors in engineering and computer science (because many enter FT workforce after bachelor’s degree)
  - First year data collected during Covid-19 pandemic
  - Thankful for research team colleagues who worked with us
  - So far, we have xx conference presentations, 6 peer-reviewed journal articles, and numerous unpublished reports
The Effect of Geographic Locale on Access to Work-Related Experiential Activities (WREAs)
Research Methods
Spring Surveys and Survey Data Analysis

- Career & Employment Planning Survey administered sp21 & sp22 – 5 institutions
  - 2300 usable responses for 10.4% response rate

- Initial cleaning of data, used only second year responses for those who completed both years

- Descriptive statistics and early comparisons

- Regression models

- Geospatial analyses
Qualitative Data

- Semi-structured protocols used; developed unique protocol for each group; conducted over Zoom
- Interviews with career center administrators (CCAs) (N = 6)
  - Lasted between 30-60 minutes
  - Conducted by PI and co-PI
- Focus groups with employers and recruiters. (N = 21)
  - Hour-long focus groups
  - Companies span the country but frequently more local. Range from public to private and large to small organizations.
  - Led by co-PI and her research assistant
- Students (N = 75)
  - 30-75 minutes
  - Juniors or seniors in engineering or computer science
  - Conducted primarily by the co-PI and her research assistant
Data Analysis

- **Survey data** were cleaned, analyzed
  - Descriptive and advanced statistics as well as maps and other geospatial images created

- **Qualitative data** were analyzed by the co-PI and her research assistant

- **Iteratively developed codes**
  - Inductively coded
  - Met to discuss codes
  - Reconcile disagreements
  - Recode with agreed code list and definitions (inter-coder agreement)
Findings (brief)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percent of valid responses</th>
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<tbody>
<tr>
<td>Participated in a WREA</td>
<td></td>
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<tr>
<td>Yes</td>
<td>61.4</td>
</tr>
<tr>
<td>WREAs completed since entering college</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>38.4</td>
</tr>
<tr>
<td>Two +</td>
<td>61.6</td>
</tr>
<tr>
<td>Full-Time Job with WREA Company</td>
<td>25.8</td>
</tr>
<tr>
<td>FT Job with Another Company</td>
<td>34.2</td>
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<tr>
<td>Modality of WREA</td>
<td></td>
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<tr>
<td>Remote</td>
<td>27.3</td>
</tr>
<tr>
<td>In-Person</td>
<td>54.6</td>
</tr>
<tr>
<td>Both</td>
<td>18.1</td>
</tr>
</tbody>
</table>
Survey Results (cont'd)

- The top three items with the highest scores for benefit from their WREA participation were:
  1. interacting with others in a professional setting
  2. establishing relationships with employers
  3. being guided by a mentor
- Overall, not a lot of significant predictors in the regression analyses
- Older students and first-generation students were more likely to choose in-person WREAs over remote opportunities (similar relationships exist between in-person and hybrid, though the relationship is weaker)
- Students’ geographic location played a significant role in access to WREAs
Qualitative Findings

- Generally, interview and focus group findings followed survey results.
- Also more nuanced, richer information:
  - e.g., Women did not appear to hesitate to look for/take on WREAs.
  - Personal preferences matter (location, amenities).
- Students remarked on the challenges of Remote WREAs:
  - Isolation/Communication.
  - Space (mental and physical).
  - Lack of replicability/quality of experience.

- Employers and Career Center Directors Acknowledged that remote is likely here to stay—need to focus on improving remote experiences.
- Atlanta is a significant industry and opportunity hub.
- Non-metro institutions struggle with lower resources and fewer employers in their area.

** Disparities in the structure of opportunities for students across institutions were most visible when more elite institutions were compared to less well-resourced institutions across the state.
Geospatial Analyses

- Mapped the location of WREA activities (State and beyond)
- Examined WREAs located near home and institution of enrollment
- Used a variety of data (e.g., census, American Community Survey, Longitudinal Employer-Household Dynamics, and state government offices)
  - to examine if/what amenities and services were wanted
  - To calculate a Work Sustainability Index (WSI)

We thank Prof. Jerry Shannon, primary contributor to the geospatial analyses, developer of geovisualizations.
Work Suitability Index (WSI) Score
By County in Georgia

WSI included:
- Amenities per 1k people
- % employed in STEM
- % with BA degree
- Median age
- % Rent burden
For Georgia Tech, 65% of all WREAs occurred in census tracts identified as WSI hotspots, while only 4% occurred in cold spots.

Another 31% of WREAs took place in tracts that were not statistically significant in LISA analysis.

The rate of hot spots was lower for the University of Georgia and Mercer (38% and 16% respectively), with a correspondingly greater amount in tracts that were not significant hot or cold spots (54% and 78%).
WSI scores for tracts near each University

Universities (30 min drive time)

- GA Tech
- Kennesaw St
- Mercer
- Savannah St
- UGA
- Valdosta St
Conclusions
Overall Summary

- Students perceived their WREA participation as helpful in preparing them for post-grad employment
- Stakeholders agree that remote WREAs will stay
- Geography played a significant role in access to WREA opportunities
- Covid changed our plans to a degree; weren’t able to observe career fairs
- Low response rates didn’t give us robust information on some questions like impact of WREA on job offers
Implications

- WREAs are perceived to be valuable by both students and employers - need to collaborate with employers

- Need increased attention on intentionally in design and selection of modality (especially remote)

- Geographic location impacts students’ access to WREA - rural institution staff must work harder to build bridges, create opportunities

- Institution officials should continue addressing larger barriers to WREA participation
Institutional Research Focus

- IR/IE practitioners can collaborate with career center and faculty researchers on this or other related topics.
- We relied on IR directors at each institution to provide us with student addresses (following FERPA guidelines).
- Workforce, employment are big topics and IR is often involved in these studies.

- Benefit of multiple data sources and stakeholder groups
- Collaborations with academic and student affairs offices
- Asking complex questions and providing complex answers
- Looking at unique needs of your student population
Good Practices For Survey Research in IR

- Understand the literature on survey research, consider relevant theory
- Be knowledgeable about the topic, research design, and analytic methods
- Consider Survey Format
  - Mode of delivery - internet access, accessible across phone & laptop
  - Wording - succinct length of survey, easily understood language
- Collaborate - work with different organizations/offices/etc. to allow access from multiple angles, know other open surveys
- Have a plan and then carry out accurate analysis and reporting
Questions?
Members of WREA Research Team

- Prof. Jerry Shannon, UGA Geography Dept, Geospatial expert
- Prof. Marguerite Madden, Director UGA Geospatial Research Center
- David Tanner, Associate Director, Carl Vinson Institute of Government, UGA
- Doctoral Students
  - Collin Case (GRA, 3 yrs)
  - Matthew Grandstaff (GRA, 3yrs)
  - Amanda Aragon (GRA, 2yrs)
  - Alexa Amdt
  - Bilijana Birac
  - Sarah Burman
Thank you

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References


