Collaboration within Engineering Education Research’s Community of Practice

Scottie-Beth Fleming
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Methodological & Theoretical Contributions to Engineering Education
American Society for Engineering Education
Engineering Education Research (EER) as an Interdisciplinary Field

- Multidisciplinary distribution of expertise and backgrounds
- Common themes of interdisciplinary collaboration
- Recent emergence of specialized EER labs, centers, and departments

Borrego & Newswander, 2008; Borrego & Bernhard, 2011; Borrego 2007; Jesiek, Newswander & Borrego, 2009
Examine collaboration patterns within the Engineering Education Research (EER) community of practice

How does the availability of formal, on-campus EER resources impact collaboration?

Are EER knowledge and expertise resources being effectively leveraged throughout our community of practice?
Methodology: Social Network Analysis

- Quantitatively and qualitatively describes hidden social interaction patterns
- Co-authorship indicates formal collaboration patterns

*Symbol shape, size, and color* indicate specific data attributes
*Line thickness* indicates frequency of interaction

Kadushin, 2012; Borgatti, Everett, & Johnson, 2013
Data Source

- Journal of Engineering Education
  - Impact Factor: 1.925
- Years 2008-2012
- Imported from Web of Science
- Cleaned in VantagePoint
- 146 articles by 394 authors

Attributes

- University/Organization
- Organization Type
- Academic Department
- Number of Articles
- Number of Times Cited
- **Availability of EER Resources**
  - Engineering Education Department
  - EER-Devoted Center
  - No Formal EER Resources
<table>
<thead>
<tr>
<th>Attribute</th>
<th># Orgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EER-Oriented Department</td>
<td>5</td>
</tr>
<tr>
<td>Eng/STEM Ed Research Center</td>
<td>18</td>
</tr>
<tr>
<td>No Formal On-Campus Resources</td>
<td>90</td>
</tr>
</tbody>
</table>

![Bar chart showing the distribution of organizations, authors, and publications by attribute.](chart.png)
Network Importance & Influence

- Availability of EER resources is not significant $F(2, 363)=0.830$, $p>0.05$

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Author</th>
<th>University</th>
<th>EER Resources</th>
<th>Affiliation</th>
<th># JEE Articles</th>
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<tr>
<td>2.5</td>
<td>Ohland, M.</td>
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<tr>
<td>1.7</td>
<td>Sheppard, S.</td>
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<td>Center</td>
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<td>Designing Education</td>
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</table>

Top 10 ranked authors primarily have access to EER resources.
Bridging Collaboration Gaps
or, Connecting Other Researchers

- High Betweenness Centrality indicates that an individual is bridging connections between researchers

Availability of EER resources is significant: $F(2, 332) = 11.204$, $p < 0.001$
Collaboration Outside & Inside My Network

➢ Range varies from -1 to +1
  o +1: authors tend to collaborate with others outside their network
  o -1: authors tend to collaborate with others inside their network

Availability of EER resources is significant: \( F(2, 91) = 9.715, p<0.001 \)
Network Map: Organized by University

- Universities with EER departments tend to be more central to network
- Universities with formal EER centers are further out
- Universities with no formal EER resources tend to be scattered on the edges
Summary

- Researchers with access to an engineering education department are central and influential collaborators within EER.
- Researchers without access to formal EER resources have inadequate access to ‘expert’ EER network.
- Collaboration among researchers on campuses with formal EER centers aren’t distinguishable from those who don’t have access to formal resources.
Future Questions for the Community

➢ How can we better support access to EER “expert” community of practice?
➢ How can we create more opportunities for formal collaboration between institutions?
➢ What is the goal of formal EER centers?
➢ What is the impact of “informal” collaboration & mentorship?
Acknowledgements

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