Doctoral Students’ Faculty and Peer Interaction Patterns: Relationships to Researcher Self-Efficacy and Skill Acquisition

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Theoretical Framework: Doctoral Socialization

Background

Faculty and peers are important agents of the socialization process.

- Background is defined as “a process of internalizing the expectations, standards, and norms of a given society, which includes learning the relevant skills, knowledge, habits, attitudes, and values of the group that one is joining” (Austin & McDaniels, 2006, p. 400)
Doctoral students’ interactions with their faculty and peers are positively related to their scholarly activities, motivation, and degree completion.

Little is known about how these interactions are established in the early stages of doctoral training, and how individual students differ in the ways in which they interact with their faculty and peers.
Research questions

RQ1
Patterns of student-faculty and student-peer interactions

RQ2
Demographic characteristics
(1) international status
(2) gender

RQ3
(1) Research self-efficacy
(2) Research skills
Research methods

- **Participants**: 261 second-year doctoral biology students from 53 universities (42 R1 institutions) in the U.S.

- Male (n=100) 38%
- Female (n=161) 62%
- Domestic (n=206) 79%
- International (n=55) 21%
### Research methods

**Measures:**

<table>
<thead>
<tr>
<th>Interaction with faculty and peers (8 items)</th>
<th>Weidman &amp; Stein (2003)</th>
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<tbody>
<tr>
<td>“Is there a professor (item1,2,3,4) or any student (item5,6,7,8) in your department with whom you...”</td>
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<tr>
<td>Item1,5. Sometimes engage in <strong>social conversation</strong></td>
<td></td>
</tr>
<tr>
<td>Item2,6. Often discuss <strong>topics in his/her field</strong></td>
<td></td>
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<tr>
<td>Item3,7. Often discuss <strong>other topics of intellectual interest</strong></td>
<td></td>
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<td>Item4,8. Ever talk about <strong>personal matters</strong></td>
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<tr>
<th>Research self-efficacy (10 items)</th>
<th>“To what extent do you feel you can observe and collect data?” Kardash’s (2000) Research Experience Self-Rating Scale</th>
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<tr>
<th>Performance in research skills (13 skills)</th>
<th>Written <strong>research proposals</strong> or reports using a rubric (Feldon et al., 2011)</th>
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</table>

- **Research self-efficacy** (10 items)
- **Performance in research skills** (13 skills)
Analyses

RQ1
Patterns of student-faculty and student-peer interactions

Latent class analysis

RQ2
Pearson's chi-square tests

RQ3
2 × 3 MANOVA
(Interaction effects, controlling for Year1 research performance and nesting of participants within institutions)

Demographic characteristics
(1) international status
(2) gender

(1) Research self-efficacy
(2) Research skills
Results

- (RQ1) Three interaction patterns obtained by LCA

![Graph showing conditional response probabilities for student-faculty and student-peer interactions]

- High interaction with faculty and peers
- High interaction with peers only
- Low interaction with faculty and peers

- Student-faculty interactions
- Student-peer interactions
(RQ2) Relations between interaction patterns and demographic characteristics

- **No difference** in interaction patterns **by gender**, $\chi^2 (2, 261) = 0.89, p = 0.642.
- **Significant difference** in interaction patterns **by international status**, $\chi^2 (2, 261) = 28.79, p < 0.001.
Results

- (RQ3) Effects of interaction patterns on research self-efficacy and research skills
- No main or interaction effect for international status and interaction patterns
- **Significant interaction effect** of gender and interaction patterns on research skills

<table>
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<tr>
<th>Interaction Patterns</th>
<th>Male (n=100)</th>
<th>Female (n=161)</th>
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</thead>
<tbody>
<tr>
<td>High interaction with faculty and peers</td>
<td>12.157</td>
<td>12.075</td>
</tr>
<tr>
<td>High interaction only peers</td>
<td>18.07</td>
<td>18.271</td>
</tr>
<tr>
<td>Low interaction with faculty and peers</td>
<td>6.472</td>
<td>5.973</td>
</tr>
</tbody>
</table>

- High interaction with faculty and peers (n=150)
- High interaction with peers only (n=78)
- Low interaction with faculty and peers (n=53)
Discussion

- **International students** reported **low interaction** levels with both faculty and peers.

- Association of **greatest growth in research skills** from Y1 to Y2 with **high peer-only interaction**; **the importance of peers** in skill development, especially **female** students

- Further research should determine if this phenomenon is a reflection of changing norms in science knowledge production to **team-based science**.

- Future research should examine **how the interaction patterns change** over time (i.e., latent transition analysis).