The Development of Best Practices in Mentoring Undergraduate Research

Christopher M. Estepp, Byron C. Housewright, & Mary R. Bennett – Sul Ross State University
Introduction

- Benefits of undergraduate research experiences have been highly touted
- National Research Council (2009) recommended implementing undergraduate research experiences into colleges of agriculture
- While benefits are known, a dearth of literature exists regarding effective mentoring practices
Effective Teaching

- Clarity
- Variability
- Enthusiasm
- Task-oriented behavior
- Organization
- Approachability
- Opportunity to learn
- High expectations
  - Rosenshine & Furst, 1971

- Contact between student and faculty
- Active learning
- Emphasizes time-on-task
- Prompt feedback
- High expectations
  - Chickering & Gamson, 1987
Theoretical Framework

- **Ohio State University Leadership Model** (Halpin, 1957; Stogdill, 1963)
  - **Initiating structure**
    - Leadership traits associated with getting tasks accomplished
  - **Consideration**
    - Leadership traits associated with rapport and trust building
The purpose of this study was to determine best practices in mentoring undergraduate research.
Methods

- Delphi study
  - Expert group was professors at SRSU who had successfully mentored undergraduate research projects
  - McNair Scholars Program
  - N = 28

- Sampling frame was provided by the director of the McNair Scholars Program
  - Potential participants notified via email
  - Online administration of instrument
Participants

- Mean age = 48.67 (SD = 12.93)
- Male 60%; Female 40%
- Degree attained
  - M.S. = 13.3%
  - Ph.D. = 80%
  - Ed.D. = 0.0%
  - Other degree = 6.7%
- Rank
  - Instructor = 6.7%; Assistant professor = 33.3%; Associate professor = 26.7%; Professor = 26.7%; Other = 6.7%
First-Round

Two open-ended questions based on the Ohio State University Leadership model

- What practices have you found that have worked particularly well in helping undergraduate researchers accomplish the tasks associated with conducting research?
- What practices have you found that have helped you develop as a mentor to undergraduate researchers?

\[ n = 19; \text{ 67.8\% response rate} \]
Round-Two

- Questions from round one compiled into two lists based on the original questions
  - 24 statements regarding accomplishing tasks
  - 28 statements regarding development as a mentor
- Round two measured level of agreement
  - 5 point Likert-type scale from “strongly disagree” to “strongly agree”
- Statements had to receive at least a 3.50 mean to move to third round
  - $n = 18$; 64.3% response rate
Participants indicated whether they agreed or disagreed with the statements
- 23 statements regarding accomplishing tasks
- 26 statements regarding developing as a mentor

Agreement of 70% required for a statement to be included in the “best practices”
- $n = 15$; 53.6% response rate
  - 10-15 respondents is acceptable for Delphi study
    (Nistler, Lamm, & Stedman, 2011)
Results
<table>
<thead>
<tr>
<th>Items</th>
<th>% Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being a good listener</td>
<td>100.00</td>
</tr>
<tr>
<td>Giving students responsibility for their own success</td>
<td>100.00</td>
</tr>
<tr>
<td>Regularly scheduled face-to-face meetings</td>
<td>100.00</td>
</tr>
<tr>
<td>Having good support from undergraduate research coordinator</td>
<td>100.00</td>
</tr>
<tr>
<td>Provide examples of typical article formats</td>
<td>100.00</td>
</tr>
<tr>
<td>Show examples of others’ research to help students get ideas</td>
<td>100.00</td>
</tr>
<tr>
<td>Make sure the student has a clear understanding of the scope of the research</td>
<td>100.00</td>
</tr>
<tr>
<td>Develop a good prospectus</td>
<td>100.00</td>
</tr>
<tr>
<td>Help students find materials for their research</td>
<td>100.00</td>
</tr>
<tr>
<td>Hands on participation with the student researching in the lab/field</td>
<td>93.33</td>
</tr>
<tr>
<td>Letting students choose topics of interest to them</td>
<td>93.33</td>
</tr>
<tr>
<td>Set specific weekly goals and tasks</td>
<td>93.33</td>
</tr>
<tr>
<td>Monitor students’ progress closely</td>
<td>93.33</td>
</tr>
<tr>
<td>Reading students' work prior to meetings in order to set an agenda for the meeting</td>
<td>86.67</td>
</tr>
<tr>
<td>Using previous models and designs as templates to build new projects</td>
<td>86.67</td>
</tr>
<tr>
<td>Frequent contact via email</td>
<td>73.33</td>
</tr>
<tr>
<td>Working in a topic area that is familiar to the mentor</td>
<td>73.33</td>
</tr>
<tr>
<td>Items</td>
<td>% Agreement</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Allow students to explore areas that interest them</td>
<td>100.00</td>
</tr>
<tr>
<td>Regular interactions with students</td>
<td>100.00</td>
</tr>
<tr>
<td>Listening to the students to understand their interests</td>
<td>100.00</td>
</tr>
<tr>
<td>Give students primary responsibility for completing all aspects of the project</td>
<td>100.00</td>
</tr>
<tr>
<td>Frequent review of work</td>
<td>100.00</td>
</tr>
<tr>
<td>Good time management</td>
<td>100.00</td>
</tr>
<tr>
<td>Good organizational skills</td>
<td>100.00</td>
</tr>
<tr>
<td>Clear expectations</td>
<td>100.00</td>
</tr>
<tr>
<td>Listening to students' needs</td>
<td>100.00</td>
</tr>
<tr>
<td>Finding interesting problems to investigate</td>
<td>100.00</td>
</tr>
<tr>
<td>Constant feedback to students</td>
<td>93.33</td>
</tr>
<tr>
<td>Asking questions to spot students' strengths and weaknesses</td>
<td>93.33</td>
</tr>
<tr>
<td>Knowing the students' strengths and weaknesses through prior classroom interaction</td>
<td>92.86</td>
</tr>
<tr>
<td>Being available for assistance and counseling</td>
<td>86.67</td>
</tr>
<tr>
<td>Basing mentoring on how students respond to different tasks</td>
<td>80.00</td>
</tr>
<tr>
<td>Positive reinforcement, but no tolerance for excuses</td>
<td>80.00</td>
</tr>
<tr>
<td>Becoming more collegial with students</td>
<td>80.00</td>
</tr>
<tr>
<td>Discussing things with students other than the project</td>
<td>73.33</td>
</tr>
</tbody>
</table>
Conclusions

- Many of the effective mentoring practices aligned with effective teaching practices
  - Clarity, setting expectations, organization, feedback, providing opportunity to learn, approachability, quality and quantity of contact between mentor and student

- Some overlap between initiating structure responses and consideration responses
  - Some consideration responses focused on task accomplishment
  - Possibly due to wording of questions
  - Possible perception that “effective” mentors accomplish tasks
Recommendations

- Due to limitations of this study, results are not generalizable
  - Specialized program
  - Hispanic Serving Institution
  - Small number of participating faculty members

- Further research should:
  - Investigate these RQs in other settings
  - Use survey methodology to examine task accomplishment and mentorship separately
  - Seek out student perspectives on mentoring
Recommendations

- Mentors of undergraduate researchers should:
  - Develop and use practices that build rapport
  - Follow practices of effective teaching to promote optimal student learning in the research process
  - Seek out assistance from others with mentoring experience
  - Set clear expectations for students
  - Be consistent and organized
Thank you!

- Questions?