MENTORING SPARK

Quick ideas to light up your doctoral conversations.

ADAPTIVE PROBLEM-SOLVING

- LEVEL 1: FRAMING THE PROBLEM
- LEVEL 2: MAKING MEANING
- LEVEL 3: DESIGNING YOUR APPROACH

SOLUTIONS FOR STUDENTS

Early in a student/advisor relationship there may be a gap between the amount of detail a student needs, and how much information an advisor provides. As an example, some students have conducted experiments per instructions, while others have spent time designing experiments. This ***Spark*** is intended to help students ensure the problem/request is framed sufficiently. When insufficiently framed, both the requestor and student become frustrated, assumptions about ability may be made, and schedules are often delayed.

This first ***Spark*** in the Adaptive Problem-Solving series focuses on expectations *(framing the problem)* as related to an advisor's study group or lab group.

FACULTY FYI

Students bring different undergraduate and life experiences to a graduate program. Thus, it is easy for there to be a gap between an advisor's expectations and a student's ability to understand expectations early in the faculty/student relationship. This ***Spark*** is intended to help identify potential gaps in framing a problem, and to assist the student in maturing their adaptive problem-solving skills to close the gap.

Adaptive problem-solving is included in the Mentoring Spark series to help faculty work with students as they move **from solving well-defined problems to solving amorphous situations.** This category helps faculty scaffold students towards independent research.

> *Tools to help with problem-solving are vast and varied...*

ACTIONS FOR FACULTY

- It is important for faculty to inculcate adaptive problem-solving skills, and how to frame both problems and expectations. Thus, several suggestions below are related to expectations of students in an advisor's research group or lab.
- Help students understand that research, by its very nature, does not always go as planned. Students may face added time to determine why, make adjustments to the plan, collect added data, re-analyze, and repeat as necessary until a unique contribution to the field is made. Thus, ***have advisor/advisee discussions early and often regarding progress and the definition of "good enough."***
- Discuss expectations on the depth of data and analyses that are expected of the student *(and timing for proficiency and expertise).*

CONTINUED ...

A RESOURCE FROM:

RISING DOCTORAL INSTITUTE

Dissertation Institute

Use this QR code to access this and other *Mentoring Spark* tip sheets:

DIGGING DEEPER

- Tools to help with problem-solving are vast and varied, as are methods to frame problems. It is not the intent of this Spark to list different types of equipment, books, or methods. We suggest you pull from your library, or ask the student to research state-of-the art equipment and/or books that are widely accepted for the type of research and problem-solving done in the student's academic field.
- What analytical tools are expected to be used? *(e.g., Python, MATLAB, others)*
- A whiteboard to draw and map the problems or research plans adds a depth to a verbal conversation, and helps each participant to know if they are being understood accurately.

Please visit the RDI Mentoring Sparks website for examples and links to these tools and resources!

EXERCISES FOR STUDENTS

1. Have the student read the project description for research similar to what they will conduct.
   - Have the student write down what problem is being investigated and several strengths of the research plan. Ensure the student discusses *Why* the strengths are strengths related to the research plan.
2. Provide the student with a prior research project method and results.
   - Ask the student to justify the approach and describe how the data analysis was conducted. Ask the student to provide a couple of potential weaknesses to the approach.
3. Have a student review a real lab or other assignment and rewrite it in their words based on ***a) what they think is being asked, b) what additional information they would want, and c) a step by step instruction.*** Discuss gaps in what was intended and what the student interpreted, and how to mitigate the gaps moving forward.

REFLECTION & NEXT STEPS

- **Faculty:** Are there any analysis tools the student should focus on mastering?
- **Student:** Reflect on the notion that it is one level of knowledge to critique other peoples' work, and another to design your own research and analysis plan.
- What steps should be taken to transition from *performing* research and analysis tasks to designing one's *own* research and analysis?

ACTIONS FOR FACULTY

- Help students understand key questions to ask for adaptive problem-solving: ***a) what problem are they trying to solve, b) what data are needed to solve the problem, c) how can the data be collected, d) what data will help verify or strengthen the main data, e) what method will be used to analyze the data?*** This suggestion can occur even if students are following an already developed scope of work *(See the first suggested exercise.)*
- Once data are collected, work with the student on understanding what can happen if data collection and analysis techniques are mixed and matched *(or unmatched)*, and how to know enough data are collected.
- As a pragmatic example, consider using student on-boarding. What on-boarding is required for a student to be part of your research group and/or lab? For example, if a student will be using lab equipment, ensure they are tested out on the equipment, including understanding OSHA and EHS requirements of the lab space, equipment, and themselves. Will existing data be used that requires IRB, customer, or other approvals before starting? How are data protected, and where are they stored?
- **GOAL Setting:** Agree on a goal for the students related to their adaptive problem-solving growth, such as developing a "formula" or "process" to frame problems/ requests.

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