

MENTORING SPARK

Quick ideas to light up your doctoral conversations.

► ADAPTIVE PROBLEM-SOLVING



SOLUTIONS FOR STUDENTS

Students graduating with an advanced degree will obtain a variety of jobs. Regardless of the job, having the ability to **collect, analyze, evaluate,** and **report data** will be critical to their success. In addition, they may quickly be asked to (*or need to for grants*) design a study – not just follow a plan. For many students, the transition from enacting a research plan to designing a study based on an ambiguous ask (*or need*) is a struggle, and can leave them feeling anxious about their ability and/or about the quality of the research plan.

A major goal of this document is to help students think about and evaluate their adaptive problem-solving skills, with the result of ensuring they are capable of designing and conducting independent problem-solving. That is, being able to make meaning, find the “*so what*,” and make unique contributions. This also increases a student’s confidence in translating their



► LEVEL 3

LEVEL 1: FRAMING THE PROBLEM

LEVEL 2: MAKING MEANING

LEVEL 3: DESIGNING YOUR APPROACH



FACULTY FYI

This **Spark** is intended to help students think about designing their own research plans and/or demonstrate the ability to design a research plan to support their thesis.

The first two **Sparks** on this topic involved students’ ability to frame ill-defined problems, determine data needed, and to provide solutions. This **Spark** relates to the “*final*” step of recognizing a need and developing an approach to solve the need (*including developing the questions that must be answered to ensure the problem is accurately addressed*).

The Adaptive Problem-Solving series is an opportunity to help students develop their critical-thinking skills, and to transition from evaluating and synthesizing to CREATE on Bloom’s Taxonomy.



ACTIONS FOR FACULTY

- Discuss the demarcation/potential demarcation between **paid work** and thesis research. How similar is the work and what are expectations for the differences?
- Be purposeful in discussing the process of designing a research plan capable of providing the information needed to advance a research project, or whatever work scenario is presented. Instead of presenting students with a plan and asking them to follow it, ask the students at this level to critique the plan or help design it.
- Discuss **Bloom’s Taxonomy** with the student in the context of them being an expert, creating the ability to advance knowledge on a subject, and the importance of evaluation and synthesis.

A RESOURCE FROM:



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



CONTINUED ...



DIGGING DEEPER

- Keep records or a log book of methodological designs, data collection, and interpretation of results. This tool serves several purposes: *1) it allows for self-reflection, 2) it provides a method to help organize one's work, and 3) it becomes a reference of what research and analysis designs were used.*
- Resources include looking at what “good” looks like by having students read articles from the top-tier journals for your specialty area, and noting how the analysis sections are written.
- Introduce students to charter statements to help organize their plan.
- **NSF Grant Award** abstracts – provides examples of well formulated and funded research plans.

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



EXERCISES FOR STUDENTS

1. Have the student fill out a research plan charter document to **propose a project** (*may be related to their thesis*). Have the student discuss their “pain points” and how they resolved them while developing their research plan charter statement. Discuss with the student the strengths and opportunities for improvement of their work.
2. Have students present their charter documents to other members of the research group. Have the students practice critiquing the research plan and practice defending their plan.
3. Have students present their progress at key points (*e.g., initial end of data collection*), an evaluation of the progress (*analysis to date, etc.*), and why or why not changes are planned.



REFLECTION & NEXT STEPS

- **Student:** How might improving your adaptive problem-solving skills help to improve your critical thinking skills?
- **Student:** What is your confidence level to not only design plans, but also how to design through uncertainty/ambiguous requests?
- **Faculty:** What analysis gaps are common amongst your students and how can you use your research group to minimize the gap for future students?



ACTIONS FOR FACULTY

- Continue to foster a research group environment of using a structured process to present arguments, define analysis plans, and debate their effectiveness.
- Support a research group structure of the more senior students taking a more active role in assisting students with less analysis background; *i.e., have the more senior students begin to take an expert and educator role in a planned and structured manner.*
- Help students to understand that if the data collected or initial analysis results suggest the research question may not be sufficiently answered, then corrections should be made. Help them to understand that as part of the process, recognizing a course correction is not a failure, and that the path to success is frequent reviews and (*if necessary*) course corrections as soon as possible.
- Support students in how they can present their work in a manner that explicitly states its value/ unique contribution.
- **GOAL Setting:** Agree on a goal for the student related to designing an approach to solve a real-world problem.

Continue
to foster a
research group
environment...



This document series was supported by the National Science Foundation under grants No. 2029796, 2029784, 2029782, and 2029785. Any opinions, findings, and conclusions or

recommendations expressed in this material do not necessarily reflect the views of the National Science Foundation.