PLANNING AND MANAGING REMOTE RESEARCH TASKS

Cécile A.C. Chazot, Max L'Etoile, Jessica Sandland

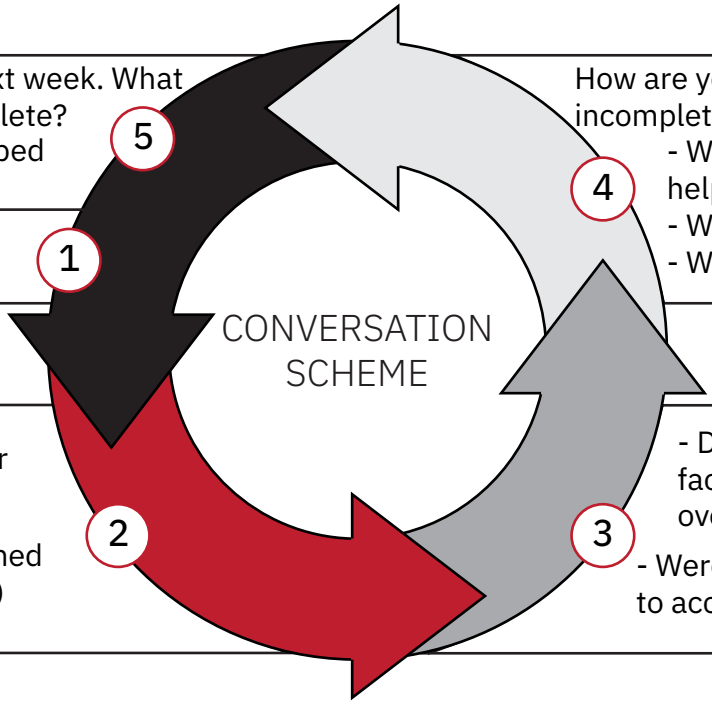
MICRO
Materials Initiative for Comprehensive Research Opportunity

INTRODUCTION

This worksheet was designed by MIT Materials Initiative for Comprehensive Research Opportunity (MICRO) to guide research mentors and undegraduate researchers through their regular check-in conversations. It contains key questions to bring up during the semester and ways to enhance the mentee's learning experience. This worksheet also introduces ways to assist the student in gaining confidence in their skills and structure the data they share with their mentor and colleagues.

CHECK-IN CHECKLIST (1)

This conversation scheme provides mentors and mentees guidance for their regular conversations during the semester. Weekly check-ins are strongly encouraged and should focus on the student's accomplishments and the challenges they faced. Discussion should close on planning tasks for the following week.



1 PLAN

- Define your goals for the next week. What do you plan to examine/complete?
- How has this past week shaped your plan?

What did you plan to work on or accomplish?

2 ACCOMPLISHMENTS

- What did you work on and/or accomplish?
- What are some lessons learned (good or bad, scientific or not)

3 CHALLENGES

- Describe any challenges you faced this week and how you overcame them?
- Were there things you had planned to accomplish, but did not?

4 WAY FORWARD

How are you planning to accomplish any incomplete goals?

- What training/guidance would help you?
- What resources might you need?
- What can I do to help?

5 PLAN

- Define your goals for the next week. What do you plan to examine/complete?
- How has this past week shaped your plan?

What did you plan to work on or accomplish?

ENHANCING MENTEE CONFIDENCE (2)

Confidence plays an important role in enhancing learning. Enhanced confidence is also the result of producing high-quality science. Insecurities often arise in situations of stress: when research is "not working", when we receive a poor grade, etc. This is where a mentor can make a difference, providing external support to the mentee who may have lost internal reinforcement. This table provides suggestions to enhance the mentee's confidence as well as the associated potential challenges encountered as a mentor.

OPPORTUNITIES	CHALLENGES
- **Engage in active listening.** Try to understand the student's difficulties or sources of stress. - **Set high standards for the mentee and help them meet them** through reinforcement and coaching. - **Express your faith** in the mentee's success and their ability to meet the standards.	- **Be mindful to keep your mentee engaged while minimizing their stress level.** Tasks too far out of reach or too easy can damage their confidence. - **Do not measure the mentee against your own strengths** e.g. "I never needed so much support so why should I have to give it to my student?"

Sources: (1) Condensed Facilitationg Effective Research Workshop for UROP Mentors, MIT UROP Office. (2) Entering Mentoring: First Edition, Christine Pfund, Janet Branchaw, and Jo Handelsman, W. H. Freeman, 2015, ISBN:9781464184901.

ASSESSING UNDERSTANDING [2]

Formative assessment is the process by which a mentor assesses their mentee's understanding during the learning process. It has two main positive outcomes for the mentor and mentee.

1. This leads to the **identification of lack of understanding or misconceptions** at an early stage of the research experience, while the student is acquiring their knowledge and skills. This enables the development of appropiate strategies to enhance student learning and development as a researcher.
2. This **empowers the mentee** to think about their weekly tasks in the broader picture of their research project, and **engages them in critical thinking**. It also helps to shift information from short term memory to long term memory, contributing to lasting learning.

Objectives	ASSESS UNDERSTANDING	IDENTIFY DIFFICULTIES	ENHANCE UNDERSTANDING
Activities	- Ask the mentee to explain in their own words what the results are and how they got there. - Ask questions that foster meta-cognition, such as: • How did you come to that conclusion? What evidence supports it? • What experience or literature made you choose that course of action? • Can you illustrate your thinking process on this project?	- What reasons might there be for a mentee having difficulty understanding? - Consider assumptions you have made about what your mentee knows or does not know. How can you acknowledge these assumptions and remain open-minded? - Consider the difference between an expert perspective and a novice perspective. For example, as an expert, you may leave out steps in an explanation which are second nature.	- Take time to remember what it was like not to understand (novice perspective). - Identify diversified clarification strategies that can be used in one-on-one meetings, over emails, etc. - Explain to a peer from outside your discipline and identify all the terms they do not understand. - Ask the mentee to explain something to another trainee, or to organize information in graphics, flowcharts, etc.

STRUCTURING DATA ACQUISITION AND SHARING [3]

Managing remotely-generated research data can constitute a challenge due to lack of documentation and/or delocalized data on multiple computers. However, data organization and communication can greatly enhance the mentee's scientific understanding.

ENHANCED LEARNING THROUGH DATA MANAGEMENT

ACQUISITION	DOCUMENTATION	PRESENTATION
- Enable code version control and sharing eg. GitHub/Dropbox - Use integrated development environments e.g. Jupyter notebooks, Matlab live editor	- Emphasize commenting code for better understanding - Encourage written summaries e.g. "read me" files, tutorials, method section	- Engage in oral presentations within the lab - Promote written reporting and outside involvement e.g. poster sessions, abstract writing, etc.

Sources: (3) Mentoring Computational UROPs, Divya Ramamoorthy, BE Teaching Development Fellow, 2020

RES.3-006 MICRO Mentoring Resources and Materials Science Curriculum

Spring 2021