The activities you have chosen for your customized curriculum are drawn from *Entering Research* (2nd edition; Branchaw, Butz, & Smith, 2019; Macmillan). The *Entering Research* materials were developed, reviewed, and tested by many partners across the country. Activity developers are acknowledged in the footer of each page. A full listing of partners and funders can be found at CIMERProject.org and in the *Entering Research* book.

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SWIRM_2024_Session 4 Tools

1. Barriers to Effective Communication-Complete
2. The Power of Social Persuasion (Self-Efficacy)-Complete
3. Messages Sent and Received-Complete
4. Research Careers: The Informational Interview-Complete
5. Research Documentation Process-Complete
BARRIERS TO EFFECTIVE COMMUNICATION

Learning Objectives

Trainees will:

► Learn strategies for improving communication (in person, at a distance, across multiple mentors, and within proper personal boundaries).

Answer these questions on your own, then pair with a peer and share.

1. In what ways and how often do you communicate with your mentor?

2. How do you know when communication with your mentor is good?

3. What are the signs that communication with your mentor is not good?

4. What strategies do you use or would you like to use to improve communication with your mentor when things are not going as well as you would like?


A few examples of barriers to effective communication between mentors and trainees are listed below. Write down a solution for each barrier.

<table>
<thead>
<tr>
<th>Barrier to Effective Communication</th>
<th>Solutions to Overcome Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your mentor has very little time to meet with you one-on-one.</td>
<td></td>
</tr>
<tr>
<td>Your mentor only provides verbal feedback on your work, and you often fail to catch everything that he/she suggests.</td>
<td></td>
</tr>
<tr>
<td>You perceive the feedback you receive from your mentor as particularly critical.</td>
<td></td>
</tr>
<tr>
<td>You are anxious about asking your mentor questions during meetings.</td>
<td></td>
</tr>
<tr>
<td>English is not your mentor’s first language and at times you are unsure that you understand him/her.</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>

THE POWER OF SOCIAL PERSUASION

Learning Objectives

Trainees will:
► Assess the influence that mentors have on confidence in abilities.
► Devise strategies to cope with and respond to feedback that negatively influences trainee confidence.

Self-efficacy refers to the confidence that you have in your ability to perform a given task. Individuals evaluate their self-efficacy based on their past accomplishments and experiences, the successes and failures of others, their emotional and physiological state, and the messages that they receive from others (i.e., social persuasions). In this activity, we are going to focus on the messages that you receive from your mentor. Feedback and criticism are an inevitable part of the mentoring relationship, especially when it comes to writing and presenting research. In this activity, consider the influence that feedback from mentors may have on your self-efficacy, and devise strategies to maintain confidence in the face of criticism.

Directions: You have written the first draft of a manuscript for which your mentor is a coauthor. You spent a lot of time working on the manuscript and are really pleased with the progress that you have made on this paper. You send the manuscript to your mentor for feedback. Imagine that you have received an email from your mentor with this feedback:

I have included some edits for grammar and clarity in the document. The manuscript needs substantial work before I see it again. You have cited a lot of prior research in the introduction and literature review, but it is disorganized and difficult to follow. The methods and results are okay, but the manuscript will not be ready to submit to the editor until the discussion is further developed. Once you have made these changes, let me know and I will take another look. I do not want to waste any more of my time reviewing this until the manuscript has been drastically improved.

Questions for Discussion
► How do you feel right now? Write down some of the emotions and/or physical responses you are feeling.
► What are the assumptions that you find yourself making about the person giving you this feedback?
► How would this feedback influence your confidence in your ability to continue to prepare this manuscript for publication?
► How would it influence your confidence in your ability to write successful manuscripts in the future?
► How might you go about looking to other sources (i.e., individuals, messages, or experiences) that could increase your self-efficacy to revise this manuscript?

Consider the same feedback framed in a different way:

This is a good first draft of the manuscript. I have included some edits for grammar and clarity in the document. I can tell that you have put in a lot of time and effort into reviewing the literature. The methods and results are clearly articulated and are explained in a way that should be accessible to a broad audience, which should please the journal editor when we submit it. The discussion section needs some work, particularly where you are trying to make the case for how our study extends what is currently known. I think you could also spend a little more time in the introduction setting up the study and doing a little foreshadowing for the reader. I would like to review the manuscript again once you have addressed these comments, but I have every confidence that you can get this manuscript to where it needs to be.

► How do you feel after receiving this feedback?
► What are the assumptions that you find yourself making about the person giving you this feedback?

# Messages Sent and Received

## Learning Objectives

Trainees will:

- Identify the intent behind statements and questions.
- Practice effective ways to communicate with their research mentor.

### Instructions: Fill in the blank columns for two or three statements below.

<table>
<thead>
<tr>
<th>Statement or Question</th>
<th>What is the likely intention of this statement?</th>
<th>How might the statement be heard?</th>
<th>How could you respond to this statement in a constructive manner?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Be on time to our group meetings from now on.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“How much longer do you think it will take you to finish that project?”</td>
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<tr>
<td>“You will never get anywhere in this field if you don’t dig in and stick with problems until you solve them.”</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>“If you think you are busy now, wait until you’re a faculty member.”</td>
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</tbody>
</table>


### Statement or Question

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>“Clean up your work area.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“I haven’t seen you around the lab much. Are you taking time off?”</td>
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<tr>
<td>“I’m not sure you have your priorities in order.”</td>
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<td></td>
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<tr>
<td>“What’s it like to be a minority in this program, anyway?”</td>
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<tr>
<td>“It seems you might be better suited for an ‘alternative’ career.”</td>
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</table>


RESEARCH CAREERS: THE INFORMATIONAL INTERVIEW

Learning Objectives

Trainees will:

► Explore possible research careers and consider how the skills learned by doing research may be transferable to other types of careers.

The skills learned doing research are important when preparing for a research career, but also for many other types of careers. Below is a list of careers for which research training is important.

Select a career on the list (or one that is not on the list), identify an individual with this career, and do an informational interview via email or in person with that person.

Possible Careers

► Museum professional
► Consultant
► “Big data” analyst
► Entrepreneur
► Editor
► Science writer
► Patent lawyer
► Government scientist
► Science policy advisor
► Private industry scientist
► Research university professor
► Research university professional staff (researcher, instructor)
► Teaching university/college professor
► Outreach coordinator (private or academic)
► Clinical researcher (e.g., clinical chemist, hospital clinic manager)
► Academic or private administrator/leader
► Others ____________

Use the email template on the next page to contact the interviewee. Send the email at least 2 weeks before this assignment is due and email the name of the interviewee to your facilitator. It may be useful to contact more than one individual to ensure that you receive a response.

Once a response is received, write a summary and reflection essay about what you learned using the question prompts on the next page.


INFORMATIONAL INTERVIEW EMAIL TEMPLATE

Dear Dr./Mr./Ms. ____________,

I am a student at ____________ and am writing to request an email interview. We are studying different careers that research training can prepare us for, and I am interested in your career as a ____________. If you are willing to answer the few questions listed below, I would really appreciate it. If you do not have the time, perhaps you could forward this to a colleague who might?

Sincerely, ____________

Interview Questions

1. What do you do in your job?
2. What kind of education or training is needed for your career? Is research training needed? Why or why not?
3. What is a typical starting salary in your career?
4. How much time do you have for personal, noncareer interests?
5. What advice do you have for young people interested in pursuing your career?

Summary and Reflection Essay Prompt

After you receive a response to your interview questions, write a brief summary of the responses. Then reflect on and answer the following questions:

► Why did you explore your chosen career?
► What, if any, preconceived ideas about the career have changed based on what you learned?
► What specific research thinking and technical skills are required for the career you explored?
► Based on the informational interview, are you interested in pursuing this career? Why or why not?
RESEARCH DOCUMENTATION PROCESS

Learning Objectives

Trainees will:
- Explain why it is important to accurately document research.
- Identify key elements in research documentation.
- Identify commonalities and differences in documentation associated with different research fields.
- Understand the ethical implications of documenting research.

Trainee Level:
undergraduate or graduate trainees novice trainees

Activity Components and Estimated Time for Completion

- Trainee Pre-Assignment Time: 1 hour
- In Session Time: 1 hour
  Total time: 2 hours

When to Use This Activity

This activity should be used very early in the novice trainee’s research career, preferably as soon as they start working with a research group to establish good research documentation practices. It can be implemented before or after a trainee selects a mentor.

Inclusion Considerations

Consider learning styles, differences, and disabilities when discussing best practices in research documentation. Ask whether trainees have concerns about traditional best practices to empower them to talk about any of these barriers or concerns with their mentor or another advisor.


Implementation Guide

Trainee Pre-Assignment (1 hour)
► Have trainees complete the “Research Documentation Process” assignment, which requires them to discuss with their mentor how research is documented in their group. Trainees should bring their outlines to the session.
► Before the discussion, you may also distribute Guidelines for SCIENTIFIC RECORD KEEPING in the Intramural Research Program at the NIH, which is available as a PDF and is a good resource on scientific notebook keeping. (https://oir.nih.gov/sites/default/files/uploads/sourcebook/documents/ethical_conduct/guidelines-scientific_recordkeeping.pdf)

Workshop Session (1 hour)
► Research activities are diverse; thus the documentation of those activities can vary, including both written and electronic forms. What is outlined below may include documentation of activities that none of the trainees in the cohort are doing. Other trainees may have documentation needs that are not addressed. However, the underlying principle of documenting all work done so that it can be repeated should come through in the discussion.
► If this activity is used with graduate students in a program that has rotations, include a discussion about watching for similarities and differences as they rotate among groups. Graduate students may also discuss comparisons to groups in which they worked as undergraduates.

► Activity: What to document?
• Ask each trainee to name one thing that should be included in each research notebook entry. Generate a comprehensive list for the subsequent discussion. (5 minutes)
  This list might include:
  • Date
  • Hypothesis
  • Explanation of goals/rationale for the experiment
  • Detailed procedures identifying experimental and control treatments
  • Reagents
  • Key for labeling and identifying tubes, animals, etc.
  • Data, both successful and unsuccessful results
  • Analyses of data
  • Interpretation and thoughts about what to do next
  • Computer scripts for data mining and data analysis
  • Locations of transects and other field notes
  • References to locations of specimens and electronic data
  • Citations for methods, reagents, analyses, etc.
• Using the list of items generated above, discuss the commonalities and differences across trainees’ research groups. (20 minutes)


• Discussion Questions
  • Why is it important to keep a research notebook?
    - to be able to repeat the experiment
    - to be able to write up the results for publication
    - to document for patents
    - to defend against accusations of fraud

• What format is required?
  - Does the lab use paper copies or electronic copies?
    - If paper copies, what happens to any photo, video, or other computer output?
    - If electronic copies, how is the electronic copy maintained? How are the data backed up?

• Who owns the data? Where is the notebook to be kept?
  - All data belongs to the research group and university or company.

• How will the notebook be used in the future? How does planning for the future influence how notes are kept?
  - The notebook needs to be detailed for you or other lab members to do follow-up experiments.
  - Discuss obligations for sharing data post publication (both the scientific ethics of sharing and publication requirements).

• What elements of research need to be documented? This could lead to a discussion of:
  - procedures, including descriptions of experiments, observations, and computer scripts
  - raw data
  - data analysis, including the procedures used to analyze the data
  - processed data
  - Are there elements that are used in other research groups that you may find helpful to your own research?
  - How do your group’s research documentation protocols reflect the culture in your research group? How do they reflect the communication style in your research group?

➤ Wrap-up (5 minutes)
  • Summarize key points of the discussion with trainees. Encourage trainees to clarify with their mentor any parts of the documentation process that are unclear to them.


RESEARCH DOCUMENTATION PROCESS

Learning Objectives

Trainees will:

► Explain why it is important to accurately document research.
► Identify key elements in research documentation.
► Identify commonalities and differences in documentation associated with different research fields.
► Understand the ethical implications of documenting research.

Meet with your mentor to go over the protocol you must follow when documenting your research. Aspects of research that need to be documented may include a description of the methods followed, the raw data results, the analysis used, and the results of analyses. Discuss the level of detail expected in the documentation for your research group and ask your mentor to identify a research team member who keeps an exemplary notebook, or to show you another excellent example. The specifics of what and how to document research will vary depending on the nature of the research (e.g., field or lab based, computational, library).

Write an outline of the documentation protocol that you are to follow when doing research and identify the parts of the process that are common to your entire research group and the parts that are specific to your project. In addition, address the following questions:

► What kinds of notes are kept? Are they hard-copy documents or electronic files?
► Where are the notes kept?
► What parts of the research are documented? What level of detail is needed in documenting experiments?
► How are data to be recorded?
