TEACHING OUTSIDE THE CLASSROOM: Considerations for Effective Mentoring

Valére Lambert, Geophysics, G3

Alexandra Barth, Chemistry, G2

> **Outcomes:** By the end of this session, participants will be understand…
> - Strategies for evaluating students' prior knowledge
> - How to communicate effectively with your mentee
> - How to set and adapt goals throughout the term of your mentorship

Teaching

Teaching encompasses a variety of activities:
- giving information about or instruction in (a subject or skill)

e.g. They teach science.

- providing such instruction professionally

e.g. They teach at Caltech.

- causing (someone) to learn or understand something by example or by experience

e.g. My upbringing taught me…

There are multiple ways to define teaching. However, **good** teaching is guiding students on *how* to think rather than *what* to think. A good teacher recognizes that they are a role model for students and respects that their students have the same potential to become subject experts.

Teaching versus Mentoring

These characteristics of great teaching are also what makes great mentoring. These aspects should be carried out through all stages of teaching, from **initiation** through **cultivation** until separation. There are, however, several differences between classroom teaching and mentoring:

Initiation in a classroom is facilitated by student enrollment in a course and delineation of expectations through a course syllabus. However, initiation of a mentorship relationship may be less structured. The mentee may apply to work for you or your institution, or contact you directly to arrange the relationship through email. The mentor-mentee relationship may be outlined in an orientation through a structured program, or you may need to set the structure of the relationship through a conversation with your mentee.

Cultivation in a classroom to facilitate student learning consists of coursework, assessments, and feedback. Similarly, mentees undertake a combination of research, presentation, and feedback. In the classroom, however, assessments are often scheduled and occur regularly, and feedback follows shortly after through grading. When mentoring, presentations may include informal reports to your mentee or sharing results at a group meeting. Feedback takes place when questions are asked of the

project or suggestions are made, and gauging whether there are gaps in the mentee's understanding.

Separation when teaching a course often ends with a final assessment, final grades, and receiving feedback through TQFR's. When mentoring, your relationship with the mentee may end with a final presentation, and planning future professional steps and letters of reference.

Redefinition takes place when your role as a mentor does not end completely, rather through the end of a research experience, graduation, or transitioning into a new job. Can your mentee still consult you for future professional references, advice applying to graduate school, career advice, or future collaborations? Redefining the relationship is important and necessary to avoid misunderstandings and miscommunication.

Mentors and Mentees

When mentoring, it's important to remember that there are differences between you and your mentee. For example, you are relatively expert in your field, and your mentee is a novice. As an expert, you have a broader understanding as to how ideas are interconnected, while your mentee may initially make fewer connections and struggle to see the big picture at first.
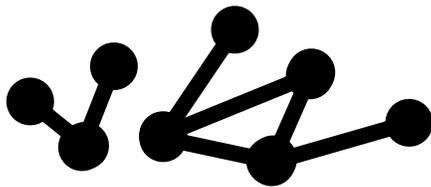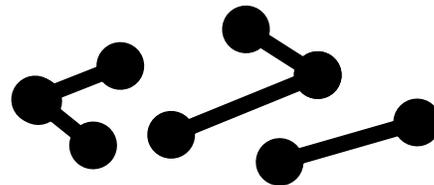
Mentor Concept Map   Mentee Concept Map

Understanding Your Students

Understanding your students is valuable for establishing where your students are at, how they process and connect their current research experiences, and how the experience is bringing them closer to their eventual goals.

Mentee Prior Knowledge: What do your mentees already know?
Prior knowledge can be established through conversation with the mentee. For undergraduates, this may mean inquiring what courses they have completed combined with that research experiences they may have, if any. For graduate students, this may reflect their prior research experiences and undergraduate coursework. It is also important to establish whether the mentee feels comfortable and confident with these prior experiences, or whether they can identify weak areas in their existing training.

Mentee Knowledge Organization: How well do your mentee understand what they know?
As the students are involved in their research experience, it is important that they begin to realize the interconnectedness of their present research and prior experiences.

These connections can be evaluated through conversations about future directions for the project, or questions challenging decisions that were made during the research process. This connectedness should also encourage exploration of the current literature to understand how the research fits into the field at large.

Mentee Long-Term Motivation: What motivates your mentee to learn science?
Understanding your mentee's long-term motivation can help you understand how to design or focus the research project to emphasize the components that are important to them. Additionally, conversations about the goals of the experience can help you determine if they are intentionally pursuing a career in research, exploring a career in science, or using the academic experience to prepare for careers in a different field.

Effective Communication
Communication is imperative for effective mentoring. In person or via email, it is important to maintain respect and communicate expectations for your relationship and your project.

An ***effective mentor*** serves as a resource for their mentee's technical skills and professional skills:
- ***Technical Skills*** include instrumental knowledge, lab protocol, data acquisition, and data analysis.
- ***Professional Skills*** include writing an abstract, presenting a poster, preparing a *curriculum vitae*, applying for fellowships, and applying for graduate school.

As a mentor, you provide insight into your career as a research scientist and are responsible for cultivating the technical and professional skill set for the next generation of scientists in your profession.

Learning Outcomes
Research requires adaptation. Unlike teaching in a classroom, the progress of the project can be mapped out in advance, but there is never a guarantee that things will work exactly as expected. You may be left with a limited amount of time, and have to edit your research plan to fit the available time remaining.

Therefore, it is important to develop **learning outcomes** for the term of your mentorship: what are the pivotal pieces of knowledge or understanding that you want your mentee to come away with?

Designing Learning Outcomes
"Learning objectives (outcomes) articulate the knowledge and skills you want students to acquire by the end of the course or after completing a particular assignment"
(How Learning Works)

Learning outcomes should be **student-centered, break down task and focus on specific cognitive processes, use action verbs,** and **be measurable.**

Combine the **Target Group+ Action Verb + Targeted, Measurable Learning Outcome.**

    (Example) By the end of this experience, mentees will be able to …