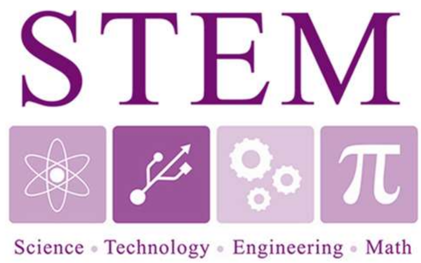
HARVARD | THE DEREK BOK CENTER FOR TEACHING AND LEARNING

"BOK GUIDE" CAPSTONE PROJECT
BOK PEDADOGY FELLOW IN STEM
2022-2023

HOW CAN I CONDUCT PEER OBSERVATIONS IN ANY STEM CLASS?

Peer observations are an extremely valuable resource for the observed and the observer. While it may feel like you are not qualified to observe classrooms that deviate from your exact field of study, as a dedicated teaching fellow (TF), you are already capable of providing insightful feedback to peers in any STEM field. It may seem daunting to observe a class outside your field, but learning is a universal process and there are many commonalities between fields where you can find familiarity. This guide may serve as a starting place so that you can feel comfortable and confident contributing to the teaching community by observing and providing feedback for any STEM course.



https://cz.usembassy.gov/us-embassy-on-stem/

What can I expect in a typical STEM class?

While STEM fields may feel disparate, there are shared key components that establish familiarity and can anchor your observations and consultations. Typically, you can expect a combination of a few components to constitute the full section or class time. It is helpful to work with TFs pre-observation to understand how their classroom combines and uses each component. Even if you have not taken a course in the field you are observing, you may recognize the general composition of the class time, which may include one or more of the following:

- **Lecture** – TFs cover class content on a board, with slides, or with a combination. Some sections cover new material that students have not seen in lecture, some sections provide detail and context for the broader content covered in lecture, and some sections review material previously covered in lecture – often focusing on material that was important and/or challenging. When combined with another component, the lecture material is often focused on material relevant and helpful to the next component (i.e., lab).
- **Problem set help** – TFs provide context or work through challenging parts of the current problem set. TFs may also work through an answer from a previous problem set that proved challenging or confusing for students.
- **Problem solving** – A staple of many STEM classrooms. Students work individually, in pairs or small groups, or as an entire class to solve problems. Depending on the class, the level of the problem set will vary; some courses use problem-solving in groups to tackle complex problems similar or more challenging than problems found on the homework. Other courses use problem-solving in section to reinforce major concepts from class often in a form that is simplified or more direct than problems found on the homework.
- **Lab** – The hands-on component of many STEM classes. Students work in small teams to practice and develop procedural skills relevant to the field. Labs reinforce, apply, and extend content introduced in lecture.
- **Literature discussion** – The class participates in a journal club-style discussion of a scientific article, often with a focus on analyzing figures, re-analyzing published data, and/or examining methods.

How can I provide helpful feedback on the different components of a STEM classroom?

Different components achieve unique purposes within the overall learning goals of the class. This can help guide how to provide feedback on the effectiveness of each component. TFs will often have specific components that they are interested in getting feedback on. You can establish this focus in your pre-observation meeting.

Classroom component	Purpose
Lecture (new material)	Fill in material from limited lecture time; provide new perspective/expertise
Lecture (review)	Highlight key concepts; clarify challenging concepts or processes
Problem Solving (individual)	Assess understanding and ability to apply concepts from lecture
Problem Solving (small groups)	Combine different knowledge, different strengths, and different ideas
Problem Solving (large group)	Poll class understanding; illuminate the thought process together
Lab	Hands-on experience to develop technical and critical thinking skills

What should I look for as an observer?

Focus on 2-3 specific and actionable pieces of feedback. During the pre-observation meeting, inquire about and listen for the attributes the TF decides need attention. These may serve as an anchor for your observation, but you can use your instincts and expertise to shift the focus, as necessary. The teaching attributes and guiding questions below, inspired by example STEM fields, may give you ideas for impactful feedback:

Chemistry: **Interactions** How does the instructor provide an inclusive class environment? How are the student-student and student-TF interactions?	Engineering: **Foundations** How is the focus and purpose of the class articulated? How does the TF prepare for class?	Mathematics: **Underlying Truths** How does the TF emphasize and introduce core concepts? Does your summary of key concepts match the learning objectives?	Physics: **Time** How quickly does the TF move between ideas? How often does the instructor pause to give time for student reflection?
Computer Science: **Logic** Are transitions between concepts explicit? How does the TF convey the reasoning and process behind each answer?	Biology: **Energy** How would you describe the classroom environment? How does the TF capture student attention?	Earth Science: **Sampling** How does the TF assess understanding and solicit feedback from students? Are the TF's questions specific and insightful?	Psychology: **Knowledge** How comfortable is the TF with the material? How does the TF handle student questions? How does the TF respond to not knowing an answer?

While not inclusive, these attributes serve as a starting place for framing your observations. All these attributes are relevant for all STEM classrooms, no matter the field. Notably, the focus of the observation is not content; the focus of an observation is the classroom environment and how the instructor meets their intended learning objectives.

How can I recognize effective teaching outside my field?

Principles of effective teaching and learning are universal. While often tailored to the specific norms and motivations of each field, STEM classrooms share key components that bridge fields. Therefore, your experience is valuable and convertible.

Importantly, you do not need any experience or content knowledge in the field you are observing. In fact, observing an unfamiliar field offers the instructor a fresh pair of eyes, unconstrained by field norms and expectations. The novice perspective can also be a great advantage; it positions you closer to the student experience, particularly in introductory or general education courses, where students are novices.

Trust your experience from your time as a student and as a teacher. If you are lost or uncertain, there is a great chance that there is a student in a similar position.

There is a wealth of wisdom to share and uncover from peer observations. Often, you may find great inspiration and innovative ideas from branching out and observing an unfamiliar class.

Additional Resources

- **Classroom Observation Protocol** from the Derek Bok Center
- Online Resources on the **Derek Bok Center Website**, especially:
    - **Problem Solving in STEM; Labs; Sections; Active Learning; Lecturing**
- **COPUS** (Classroom Observation Protocol for Undergraduate STEM) from UMaine and University of British Columbia for tracking classroom events during an observation
- **Eco-STEM Healthy Educational Ecosystem Toolkit** from Cal State Los Angeles for peer observations that focus on *climate*, *structure*, and *vibrancy*