**2026 SABER Annual Meeting**
Pre-Conference Workshops
www.saberbio.org/annual-meeting

All workshops will be presented in person on the Michigan State University campus on Thursday, July 9, 2026, from 9 am to 12 pm CT. All participants must also register for the full conference. All workshops will be held concurrently.

**Workshop A:** Training the Next Generation of Biology Education Researchers: A Workshop on Building Student-Centered, Evidence-Based Research Training Programs and Mentoring Practices

**Workshop B:** Structuring Reflections around Failure to Encourage Students' Scientific Troubleshooting Skills

**Workshop C:** From Learning Biology to Becoming Biologists: Purpose-Driven Career Exploration and Skill Building in the Biology Classroom

**Workshop D:** How to develop formative assessments that target mechanistic reasoning

Click here to register for a BER pre-conference workshop

**Place-Based Workshop A:** Learning from Place: Nokomis Cultural Heritage Center

**Place-Based Workshop B:** Bizarre Botany

Click here to register for a Place-Based pre-conference workshop

**Workshop A:**

**Title:** Training the Next Generation of Biology Education Researchers: A Workshop on Building Student-Centered, Evidence-Based Research Training Programs and Mentoring Practices

**Facilitators:** Janet Branchaw (University of Wisconsin - Madison)*; Joseph Ayoob (University of Pittsburgh)

**Abstract:** Becoming a researcher is a long and challenging process. The diverse backgrounds, knowledge, interests, and skills that research mentors and mentees bring to their relationships create a rich, yet complicated research training environment. Consequently, each student's research training journey is unique. Given this, it can be challenging to design research training programs and employ mentoring practices in research teams that ensure all students learn what they need to become successful researchers. In this workshop, Biology Education Research (BER) training program directors and research mentors will learn to use published frameworks, assessment tools, research training curricula, and strategies shared by their peers to develop and iteratively refine student-centered research training programs and mentoring practices using a guided backward design process (Wiggins & McTighe, 2005). Each participant will revise one element of their current training program or mentoring practice during the workshop and draft a plan for applying the process to revise additional elements of their program or practice after the workshop.

The workshop is modeled after the Center for the Improvement of Mentored Experiences in Research (CIMER) Curriculum Development Institute (cimerproject.org/research-curriculum-development) and grounded in research published by the workshop facilitators and other research education scholars. During the workshop, participants will first be introduced to several resources and how to use them, including the Comprehensive Researcher Development Framework (CRDF; Branchaw, Butz & Ayoob, 2025), the evidence-based and student-centered Entering Research and Entering Mentoring curricula (Branchaw, Butz & Smith, 2020; Pfund, Branchaw, & Handelsman, 2015), published and validated research training assessment tools (cimerproject.org/assessment-resources), and a research training ecosystem model the facilitators have adapted from Bronfenbrenner's Ecological Framework for Human Development (Bronfenbrenner, 2005). After this orientation, participants will identify one element of their research training program and/or mentoring practice and refine it through active engagement with the resources. More specifically, working in small groups, they will review the resources, identify one or two student learning outcomes closely related to their element of interest, map their current

practices for assessing and tracking student achievement of the learning objective(s), and identify the learning experiences and mentoring practices available to support student achievement of the learning outcome(s). Reflecting on this element using a research training ecosystem model, they will identify strengths, weaknesses, and gaps in their program/practice and use the resources provided by the facilitators to address those gaps. Participants will devise a plan to implement developed changes and a timeline to review and revise other elements of their program/practice.

**Workshop B:**

**Title:** Structuring Reflections around Failure to Encourage Students' Scientific Troubleshooting Skills

**Facilitators:** Sandhya Krishnan (CU Boulder)*; Lisa Corwin (University of Colorado Boulder)

**Abstract:** Navigating failure is a learned skill, one that scientists agree is instrumental in successfully developing as a science practitioner, as found through investigating scientists' views of failure (e.g., Simpson & Maltese, 2017). Understanding both that failure is an essential part of science and how to productively "fail" and recover is important for students across all disciplines. However, the reality for most students is that failure is emotionally and financially difficult to bear - leading to disengagement with undergraduate courses, self-limiting behavior, and loss of future workforce potential (Bledsoe & Baskin, 2014; Seymour & Hunter, 2019).
In our workshop, we leverage learning from science education to create a space where educators across disciplines can reframe failures to promote students' thinking about their learning as well as develop transferable troubleshooting skills. Guided by conceptual change learning theory (Posner et al., 1982), our workshop builds on the idea that disruption or perturbation is a necessary building block to grow knowledge frameworks. As educators, we can reframe moments of disruption – like challenges and failures in classrooms and laboratories – to be learning opportunities for students. We will share with instructors evidence-based practices in supporting students to manage challenges and failures in the classroom, practices that encourage students to see failure as part of the learning process. In addition, we will explore non-cognitive factors like fear of failure, coping, attributions, and mindset that may impact how students approach and respond to the failure experience (Henry et al., 2019). We will then weave these together, as attendees work to develop reflective activities and lesson plans specific to their context that scaffold students' learning about learning (metacognition) in building constructive responses to failure and challenges. We will also integrate

instructor talk and action around failure and struggle as part of the scientific process, encouraging students to see their actions as skill-building.

Our workshop is guided by backwards design principles: with our outcomes (for attendees to create activities / lesson plans that scaffold student learning from failure). The workshop will be actively facilitated – with background learning and knowledge presented through an interactive format. For example, when exploring non-cognitive factors, attendees will be given student vignettes and discuss what is communicated about how a student may approach learning and challenges. Attendee learning will be interspersed with activities – prioritizing time for attendees to work on their own goals for the workshop.

**Workshop C:**

**Title:** From Learning Biology to Becoming Biologists: Purpose-Driven Career Exploration and Skill Building in the Biology Classroom

**Facilitators:** Shahnaz Masani (Michigan State University)*

**Abstract:** What if disciplinary learning helped students explore who they are becoming, not just what they are learning? Opportunities for students to think about and explore future pathways are often separated from disciplinary learning. When reflection and exploration live outside the classroom, students can struggle to see how their coursework connects to who they are becoming and what possibilities lie ahead. Further, this siloed structure means that opportunities for exploration and skill development, which we know are important for students' long-term well-being and success, are often limited to stand-alone or elective experiences, creating a structural barrier.

In this session, we share the In Real Life (IRL) curriculum, which was embedded into an introductory biology lab course, and that engages students in purpose-driven reflection, exploration, and skill building (Foster et al., 2025). Participants will work through selected IRL activities, examine how underlying theoretical frameworks inform curricular design and assessment, and practice adapting these activities for their own disciplinary and teaching contexts. Thus, through this session, participants will work in groups to enage in evidence-based design of activities that will engage their students in: (a) identifying and articulating their purpose, defined as the intersection of their values, interests, skills, and the societal impact they wish to make; (b) purpose-driven exploration and planning; and (c) making meaning of in-class experiences within the

context of their purpose and professional journeys, including the development of supportive networks. Finally, we will share our findings on how IRL impacts students' constructs known to be important in career decision making (self-efficacy, outcome expectations), as well as their sense of purpose, openness and belonging (Foster, 2025; Guzy et al., in preparation). Participants will then pair their theory- and evidence-informed designs with an assessment plan that aligns with their instructional goals and context.

**Workshop D:**

**Title:** How to develop formative assessments that target mechanistic reasoning

**Facilitators:** Keenan Noyes (Michigan State University)*; Jennifer Doherty (Michigan State University)

**Abstract:** As biology instructors, one of our goals is to help students learn to explain and predict how and why phenomena occur. In other words, engage in mechanistic reasoning. Despite the fundamental nature of mechanistic reasoning as a thinking strategy in science (Machamer, 2000) which has been shown to support problem solving in novel contexts (Southard et al., 2017; Houchlei et al., 2021; Franovic et al., 2023;), students often struggle to reason mechanistically (Bachtiar et al., 2022). Formative assessments are designed play an important role in supporting student learning (Shepard, 2000). Formative assessments centered on mechanistic reasoning give students opportunities to practice this thinking strategy and provides instructors with information they can use to give targeted feedback and plan future instruction.

Developing formative assessments targeting mechanistic reasoning can be difficult. A recently published chapter highlights design principles for developing these types of materials (Noyes et al., 2026). The goal of this workshop is for participants to (1) develop a robust understanding of mechanistic reasoning as a tool for making sense of novel biological phenomena, (2) learn guiding principles of formative assessment and rubric design focused on mechanistic reasoning, and (3) gain confidence in applying these principles in their own instruction.

Prior to the workshop, participants will identify a topic relevant to their course, a phenomenon related to that topic, and a corresponding student learning outcome. During the workshop, they will develop a formative assessment (e.g., homework, in-class activity, discussion worksheet) that engages students in mechanistic reasoning to support learning of that topic and phenomenon. Participants will also develop a draft

rubric for assessing students' engagement in mechanistic reasoning. This rubric will serve as a starting point for characterizing students' mechanistic reasoning, though it will require revision once instructors see actual student responses. Through this experience, participants will develop tangible learning materials (formative assessment and draft rubric) and learn the skills needed to apply these design principles to develop future formative assessments that students' use of mechanistic reasoning.

**Place-Based Workshop A:**

**Title:** Learning from Place: Nokomis Cultural Heritage Center
8:30 am - 2:00 pm | *Fee: $25-100 (suggested) to cover transportation and appreciation of our partners.*
Join us for a placed-based experience in partnership with the *Nokomis Cultural Heritage Center* and the *Native American Institute at Michigan State University*. Participants will learn directly from the place and people on whose land we visit for our conference convening. The day will include a guided tour of the Nokomis Center, presentations from Indigenous scholars, experiential learning through crafting, a tour of the Three Sisters and Medicine Garden, and a shared meal with community members. Participants will be encouraged to reflect on how their own teaching and research can support Indigenous futurity and interrupt the erasure and devaluation of Indigenous Science Knowledge. Workshop will be limited to approximately 30 participants. The Nokomis Center is about 10min drive from campus, and we are in the process of arranging transportation options—stay tuned for details! If the suggested fee is prohibitive, please put down $0. If you have the means, please consider donating more so that we can thank our generous hosts who are providing their time and a lunch without charge.

**Place-Based Workshop B:**

**Title:** Bizarre Botany

**Facilitator:** Maeve Bassett

Join Maeve Bassett, Ethnobotanist and Education Director at Beal Botanical Garden, for a hands-on tour and workshop exploring how the dark, funny, weird, gross, and fascinating history of plants can be used in education and to facilitate connections between people and the natural world. Tours consist of walking on unpaved turf grass. Please let us know if there are any accessibility or mobility issues, and we will accommodate as best we can. *Free to attend. Time: 9-10:30 am.*