



Poster Session

22nd Annual POGIL National Meeting
Saturday, June 22, 2024
8:00-9:00 PM

1. **Assessing Mindset, STEM Identity, and Community in Chemistry Students**

Teresa Bixby – Lewis University (IL)
Alec Warner – Lewis University (IL)

Half of STEM majors leave their program without earning a degree. Many of those who leave do so within their first two years of study. A series of exploratory investigations of the mindset, identity, and sense of community of undergraduate students were completed. Differences in mindset were found between underclassmen and upperclassmen, where upperclassmen tended towards growth mindset traits and often described undergoing a shift from fixed to growth mindset during their undergraduate career. Participation in undergraduate research was found to be a driving factor of persistence with numerous benefits, most significantly STEM identity development and sense of community.

2. **What happens when the funding ends? The future of POGIL-PCL**

Sally Hunnicutt – Virginia Commonwealth University (VA)
Alex Grushow – Rider University (NJ)
Rob Whitnell – Guilford College (NC)

POGIL-PCL (POGIL for the Physical Chemistry Laboratory) represents a community of over 250 instructors involved in the development and implementation of experiments for this course. POGIL-PCL also comprises a set of over 20 tested and six under-development experiments based on POGIL principles that emphasize modeling of macroscopic and microscopic chemical phenomena, student design and refinement of experimental protocols, and data pooling to assist in uncovering physical chemistry principles. This work was funded in two grants (2012-15 and 2017-23) from the National Science Foundation. We present a summary of the grant outcomes, including our model for workshops that encourage participants to conceive, write, and implement experiments and lead to community growth. Both the in-person and online workshops offer participants the full experiment experience including teamwork, experiment design, and data analysis. Participants prefer face-to-face workshops for their opportunities for stronger collaborative connections, yet the POGIL-PCL community continues to grow and instructors continue to implement POGIL-PCL experiments when workshops are virtual. Now that the funding period has ended, we are exploring new ways of engaging the PCL community such as monthly journal clubs and new workshops. The challenges associated with continuing the successes of POGIL-PCL without funding will be discussed.



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3. Exploring the Impact of POGIL on Student Engagement and Conceptual Understanding

Clif Kussmaul – Green Mango Associates (PA)
Helen H. Hu – Westminster University (UT)
Chris Mayfield – James Madison University (VA)
Pat Campbell – Campbell-Kibler Associates (MA)

Evidence-based teaching strategies, such as Process Oriented Guided Inquiry Learning (POGIL), lead to better student outcomes. Our research seeks to understand what actually happens in the same classrooms that use POGIL and other pedagogies, how practices change over time (e.g., during an academic term), and the impact on student engagement, perceptions of learning, and other outcomes. We seek to measure the engagement of the same students in different class periods taught by the same instructor, using different pedagogies (e.g., POGIL, interactive lecture, and computer laboratory). We combine data from student surveys, instructor surveys, and classroom observations (both live and video recorded). This poster describes FASTOP, our new classroom observation protocol, intended to monitor the Focus (e.g., solo, pair, team, or whole class) and Action (e.g., discuss, speak/present, watch/listen, or distracted) of Students and Teachers (instructors). FASTOP and the student survey have strong concurrent validity in terms of student self-reports of their behaviors and their actual behaviors. Both also have content and construct validity. Initial data analysis has found that students are much more involved in POGIL classes than they are in other classes (interactive lectures and labs) taught by the same instructors.

4. Scaffolding & Tools for Instructors in Guided Inquiry Learning (STIGIL) Guided Inquiry Learning with Technology (GILT)

Clif Kussmaul – Green Mango Associates (PA)
Rick Moog – The POGIL Project (PA)
Pat Campbell – Campbell-Kibler Associates (MA)

GILT is a web-based platform to support POGIL-style classroom activities. The NSF IUSE STIGIL project supports instructors to use GILT and adapt learning materials for GILT, and studies how such tools affect instructor experiences and student outcomes using detailed real-time data collected by the platform; instructor interviews; a student survey; team answers; and course grade distributions.

This poster includes an overview of the GILT platform and some of the dashboards and other features to support instructors and students in POGIL-



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style classes. It also presents some of our initial findings from analyzing the large amount of data collected by GILT.

5. **SkillBuilder Project: Developing Strategies for Providing Scalable and Actionable Feedback to Students on Process (Professional) Skill Development**

Juliette Lantz – Drew University (NJ)

Suzanne Ruder – Virginia Commonwealth University (VA)

Susan Hammond – Lipscomb University (TN)

The goal of the SkillBuilder project is to help students develop and improve their process (professional) skills in STEM classrooms by using a scalable digital platform based on novel feedback-based skill rubrics from the Enhancing Learning by Improving Process Skills project (ELIPSS.com). The project team has designed and will begin piloting a digital platform (SkillBuilder) to streamline assessment and actionable feedback delivery to students, using a multidisciplinary team of STEM instructors from a range of class sizes and institutional settings to ensure the application's utility and adoptability.

To date, the alpha version of SkillBuilder has been designed by a team of computer science students through an iterative process with the PIs and the cross-disciplinary STEM faculty team. Through interviews and survey responses, the primary collaboration team members provided feedback on the app design itself, as well as identified ways they want to use SkillBuilder in their teaching. From these discussions, a set of use cases for process (professional) skill assessment has been formulated. This use case approach has been found to be important for faculty in developing assessment implementation strategies, and for the PIs in designing professional development workshops.

6. **The Role of POGIL in an AI Environment**

Chris Oehrlein – Oklahoma City Community College (OK)

How does guided inquiry fit into an AI-influenced teaching and assessing environment? What is the role of POGIL activities in a curriculum that acknowledges and encourages the use of AI? Is POGIL the answer to reforming curricula currently centered around fact and procedure memorization into programs that value exploration and process skills development? Can AI help us build better models for our activities, OR enable student groups create their own models (which they already do with some statistical apps in courses using a lot of data-analysis)? How do we then maintain the integrity of a learning cycle with student-designed



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models? How do our activities need to evolve if the assessment of course learning objectives is affected by AI? Can AI enhance our PAC review procedures and Collaborative Feedback training? Are these even the correct questions to be asking? Let's boldly embrace and explore what AI has to offer POGIL Practitioners and our students?

7. **Using Feedback to Promote Teamwork in the Classroom**

Andri Smith – Quinnipiac University (CT)

Patrick Cafferty – Emory University (GA)

Process skills such as teamwork have traditionally been promoted through facilitation within POGIL pedagogy. More recently, POGIL activity authors have been encouraged to include explicit prompts within their activities to foster specific process skills. However, the evidence for the effectiveness of these prompts is limited. Here, we present an update on our work to examine the effect of providing feedback on the process skill of teamwork in different undergraduate settings (chemistry and physiology) at two different institutions. The ELIPSS analytic teamwork rubric was used to assess observed changes in students' behavior during team activities, and students were surveyed about their attitudes toward teamwork at the beginning, midpoint, and end of the academic term.