Poster Session

National Conference to Advance POGIL Practice
Monday, June 26, 2023

Poster Session A: 8:00-8:30 PM

1A. Belonging in Gateway POGIL Classes

Olga Glebova, Matthew Horn, Charity Lovitt, and Tracey Murray

Abstract: Although studies have reported on the relationship between belonging and persistence in STEM majors, this has not been specifically explored in POGIL classrooms. There are competing hypotheses that POGIL classrooms may increase belonging because of the collaborative learning environment and that POGIL classrooms may decrease belonging because of increased awareness of differences between populations in the class. This project explored these ideas in POGIL classrooms by collecting both quantitative and qualitative data on students' perceptions of belonging in four different "gateway" POGIL classes (three general chemistry, one computer science). No statistically significant differences were seen in total belonging score before and after one semester of a POGIL class, overall and when looking at different populations. As seen in other studies, a statistically significant difference was observed in final belonging score and persistence to the next class in the sequence (using data from two of the four institutions). Analysis of the qualitative data is ongoing. Initial findings indicate that social interactions have the most positive influence on belonging and student perception of competence have both positive and negative effects on belonging.

2A. Promoting Teamwork in the Classroom

Gifty Blankson, Patrick Cafferty, An-Phong Le, and Andri Smith

Abstract: 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. Over the past year, we have examined the effect of introducing written or oral teamwork prompts into POGIL activities and facilitation in three different undergraduate settings (introductory chemistry, organic chemistry, introductory biology and physiology) at three 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. Preliminary results in these three settings will be discussed along with our plans for future investigation to promote process skills more effectively.

3A. Examination of Effort Belief and Self-Competence in Classrooms using Mastery-Based Grading and Active Learning

Joel Davis, Melissa Reeves, and Heather Wilson-Ashworth

Abstract: Student motivation and success in introductory chemistry courses (general chemistry 1 and 2) can be impacted by student self-competence and effort belief. Self-competence is the need to feel efficacious and capable. Effort belief is the belief that working harder at a task could produce better results. This research explores whether using a mastery-based grading method in active learning classrooms is associated with improved student self-competence and effort belief compared to traditional lecture classrooms using traditional grading methods. Preliminary results show that students with low initial self-competency scores improved significantly (p=0.01) under the MBG-active course, but not in the conventional course. For both classes, the initial effort-belief scores were high and remained so at the end of the course.

4A. Impact of Teaching Evidence-Based Learning Strategies

Gina Florio, Eileen Kowalski, and Joan Roque

Abstract: We are investigating how teaching students about evidence-based learning strategies changes their study habits and their self-efficacy. We are also interested in knowing if different groups of students choose different learning strategies or if they change to different extents. We are conducting a pilot study in a General Chemistry I class this fall, and we plan to expand to more classes, instructors, and institutions in the spring. Our results will include pre- and post-surveys on students' study habits and self-efficacy, in addition to analysis of students' open-ended reflections after mid-term exams.

5A. Building Research Capacity within POGIL Community

Chris Bauer and Suzanne Ruder

Abstract: Sixteen early- and mid-career POGIL practitioners are being mentored by a team of five DBER scholars in learning about design, implementation, and methods of STEM education research. These practitioners, organized in four-person teams, have then engaged in STEM education research projects of their own design during the 2022-2023 academic year. In additional to virtual meetings during the academic year, a weeklong summer 2022 work session was held at St. Thomas University MN in order to provide participants short-courses on theoretical frameworks, qualitative and quantitative methods, and human participant research ethics,

and to allow time for planning their research projects. Funded by NSF DUE-1954427.

6A. Designing a Departmental Program to Improve Belonging and STEM Identity

Teresa Bixby

Abstract: In an effort to build community and improve students' sense of belonging and STEM identity, the Departments of Chemistry and Physics at Lewis University are working together to develop a cohesive program that engineers interactions and intentionally provides shared experiences. Ongoing GA/TA/faculty training to inform and guide interactions with undergraduates presents the research of STEM retention, effective study strategies from learning science, and approaches to overcome institution-specific challenges. Formal and informal community-building events are included through required courses and throughout the academic year. Early exploration of possible career trajectories and networking with diverse national lab and industrial scientists are designed to build STEM identity. Preliminary data from event participation, feedback from students, GAs, and faculty will be presented.

7A. A Specifications Grading Scheme for a Lecture/Lab Chemistry course

Alex Grushow

Abstract: In this presentation I will describe a variant of Specifications Grading that was used in the past academic year. Briefly, the scheme provides students with a set number of Content Learning Objectives. The students have opportunities to score a 1-4 on each of these objectives. These scores are then used to determine the final grade. This method eliminates the use of points and partial credit for quizzes, exams and other assessments.

8A. Examining the Impact of Active Learning Instructional Methods (POGIL) in College Algebra Classrooms

Victoria Causer and Kayla Heffernan

Abstract: The purpose of this study was to examine the impact and interactions of student-centered instructional techniques on College Algebra student engagement and achievement. Throughout the course of one semester, we used POGIL in a section of Algebra. Instructor implementation of inquiry-based collaborative methods aimed for students to actively engage in their learning and be more likely to show positive math learning outcomes –

including higher achievements with the use of productive struggle and collaboration and more positive attitudes towards mathematics.

9A. The Grammar of a Poem

Dalia Hoffman

Abstract: The poster will demonstrate how employing grammatical rules will lead the reader to understand a poem's central idea, and in so doing, it will demystify this written form.

10A. Using POGIL for New Faculty Orientation

Robin Lasey

Abstract: Newly hired faculty often have little teaching experience or preparation. At Arkansas Tech University, we provided new faculty with a week-long orientation before the fall semester and periodic meetings during the academic year. A few POGIL activities designed for this new faculty development will be presented. The topics include: Backward Course Design, Student-Centered Instruction, Getting Started with Classroom Technology, and Introduction to HyFlex.

11A. Decreasing the energy of activation? Adapting an existing activity to the POGIL learning cycle

Eladio Abreu and Kate O'Toole

Abstract: Here, we will chronicle the efforts, considerations, and strategies required to overhaul an activity originally developed as part of an HHMI Summer Institute, to fit the accepted POGIL framework. Initially, this seemed like a more efficient way to generate classroom materials for publication. However, going through the process to overhaul an activity to fit the POGIL framework may be more challenging than starting from scratch. Although basic models are generally transferable, re-writing questions to fit content and process skills objectives required more effort than the authors initially considered. Ultimately, this endeavor was worthwhile because the original worksheet became more inclusive and can now be used in a more engaging way.

12A. Kendall Hunt Custom Publishing

Danielle Schlichtmann

Abstract: Discuss custom publishing with Kendall Hunt's Senior Acquisitions Representative.

13A. The POGIL Project Strategic Plan Working Groups

Marcy Dubroff

Abstract: In 2013, The POGIL Project's Board of Directors approved a 5-year Strategic Plan designed to guide the activities of The Project. The plan set priorities for Project leadership, staff, members of the POGIL community, and those who are or will become interested in the work of The Project. In 2018, with the input of the greater POGIL community, the Steering Committee oversaw a review and refresh of that initial plan and fine-tuned the plan's goals to carry The Project through the next five years. The Project is currently engaging in a third strategic planning process that will be complete in 2023. Learn about the current plan's active working groups and how you can be part of the next iteration of these groups.

Poster Session B: 8:30-9:00 PM

1B. Expanding POGIL's into Web and IT fields

Lora Klein and Carol Stander

Abstract: After observing the positive effects POGIL activities have had on students in computer science classes, we have been writing and implementing POGIL-like activies in both Web and IT classes. Our poster will present some of the things we have learned while expanding POGIL activities into new fields of study.

2B. Collaborative POGIL Activity Development in an Online Writing Group

Eladio Abreu, Patrick Cafferty, Laura Catano, Skye Comstra, and Kate O'Toole

Abstract: The Biology POGIL Writing Group is a faculty-initiated, collaborative group who meets every two weeks using Zoom to give and receive feedback on their writing in progress. Past participants have included faculty and graduate students from several post-secondary institutions, and this group is

open to anyone interested in writing biology activities. Here we present the structure of the writing group and how we break our writing down into smaller tasks to meet the goal for each participant to write one POGIL activity per academic semester. At NCCAP, we also hope to invite others to join our writing group, present our writing progress to date, and find potential classroom testers for our work on the POGIL Activity Clearinghouse (PAC).

3B. Using Technology in a POGIL lab

Ruthanne Paradise

Abstract: There are many ways to incorporate technology into a POGIL lab. The range from submitting reports to sharing data asynchronously to having students isolate home due to being sick but still well enough to engage with peers remotely. In this poster I share some of the approaches that I have used with pros/cons and possible other ways to facilitate remote/asynchronous engagement that I have been considering.

4B. Creating context-based POGIL activities: An undergraduate research experience

Daniel King

Abstract: While POGIL activities have been demonstrated to be effective, one potential improvement is to increase the number of activities that incorporate everyday context, since relatively few current activities use context to engage students in the content. We have created an undergraduate research experience around writing context-based POGIL activities. This has been used with summer research students and with students completing a senior research project. In this poster, the structure and components of the research experience will be described, along with examples of the activities that were created by the students.

5B. POGIL Environmental and Earth Science

Caryl Fish

Abstract: A team of authors, reviewers and classroom testers have been working over the last few years to develop a collection of POGIL activities for College Introductory courses in Environmental Science and Earth Science. We hope to submit these for endorsement next spring. This poster will introduce the scope of those activities with a preview of some activities.

6B. Explorable Explanations and Guided Inquiry

Rob Whitnell

Abstract: Explorable explanations are tools that provide both a guided, data-supported pathway to a desired result or interesting concept and interactive manipulation of the numerical parameters in ways that further build confidence in the conclusions. These explanations are valuable in implementing guided inquiry exercises, as seen in the approach taken by Bret Victor, which is intended to seamlessly merge prose, graphics, and interactivity so that the user manipulates the text itself in ways that provide immediate visual results. I show here examples of this form of explorable explanations as applied to two guided-inquiry exercises: 1) background theories and concepts for molecular dynamics simulations; 2) conversion of a fully print-based guided-inquiry exercise to an explorable explanation. These examples use the Observable platform (https://observablehq.com/), and this work will include comparisons to other software platforms that can provide these kind of interactive tools, such as Jupyter notebooks.

7B. The IntroCS POGIL Project

Helen Hu

Abstract: This poster presents the most recent findings from the IntroCS POGIL Project. One IntroCS POGIL professor showed that students who completed POGIL activities in teams earned higher quiz scores and developed better classroom cultures than students who completed POGIL activities individually. An analysis of the student grades of 25 IntroCS POGIL faculty found a modest increase of A grades and a modest decrease of DFW grades after POGIL adoption. However, the grades of Black, Hispanic, and Indigenous students decreased slightly, especially in the first term faculty taught with POGIL.

8B. Can we make stew with these beans: The POGIL-PCL recipe for building a community supporting teaching and learning in the physical chemistry laboratory

Sally Hunnicutt

Abstract: POGIL-PCL (POGIL for the Physical Chemistry Laboratory) represents a community of over 200 instructors involved in the development and implementation of experiments for this course. POGIL-PCL also comprises experiments developed using POGIL principles that emphasize modeling of chemical phenomena, student design and refinement of experimental

protocols, and data pooling to assist in uncovering physical chemistry principles. The experiments are developed at in-person and online workshops that support our community of instructors by providing the experience of doing an experiment including teamwork, experiment design, and data analysis.

9B. Teach Students How to Learn

Megan Hoffman

Abstract: Metacognition is a central process skill in the POGIL approach. Being aware of your thinking is one step on the way to learning and is a key element in improving learning skills. To this end, I have started using Saundra Yancy McGuire's book, "Teach Yourself How to Learn," in my college-level introductory biology course. My teaching assistants read the book, and our students carry out a multi-part assignment to help them develop successful learning strategies. In addition to improving academic performance, knowing that learning is a skill - rather than an innate talent - can help students overcome fixed mindsets and feel a greater sense of belonging in the classroom.

10B. Transforming a General Education Math Course Using POGIL

Brian Johnson and Kate Johnson

Abstract: We highlight some of the activities written for a general education math course that focuses on developing problem-solving and critical thinking skills through studying concepts in geometry, set theory, logic, probability, and statistics. We have developed twenty-nine activities that have been used regularly over the last ten years, including by other faculty at FGCU and elsewhere. The response from students has been positive and the success rate in the class has improved dramatically. Student feedback will also be shared.

11B. Scaffolding & Tools for Instructors in Guided Inquiry Learning (STIGIL) Guided Inquiry Learning with Technology (GILT)

Rick Moog, Tim Herzog, and Charity Lovitt

Abstract: GILT is a web-based platform to support team-based learning activities. It includes dynamic models, several question types, and summary reports. GILT has been piloted in three courses by six instructors and 750 students, using 20 different POGIL activities. We are one year into an NSF IUSE project to study how instructors interact with GILT and how to better support instructors and students. We are participating in the VITAL Prize

Challenge to develop technology tools to support underserved middle and HS students. We are interested in finding college, HS and middle school instructors interested in using GILT in their own classes and providing feedback.