

The POGIL Inquirer

In The Spotlight:

Kristen Drury

William Floyd High School

Page 3



From The POGIL Project Director



Dear Friends,

Happy September to everyone! I hope you all have had a great start to the academic year and that your classes are going well. The POGIL Project had an event-packed summer and the fall is also shaping up to be a busy one.

Over the summer, we held four highly successful 3-day summer workshops in New York, Chicago, Dallas and Tacoma, as well as a productive Facilitator Training workshop and two Writers Retreats. Also, I am happy to report that we finalized our next five-year Strategic Plan and retooled Mission, Vision and Values statements

at our POGIL National Meeting. Thank you to everyone in our community who participated in this process! I also want to especially thank Chris Bauer for his guidance and leadership in this endeavor.

As we look forward to the coming months, I am energized by the depth and breadth of the projects that our practitioners are undertaking. Our Goal 1 Strategic Plan team is excited to begin a six-session eSeries, following up on a successful launch of this program last spring; our local networks team is drumming up interest for POGIL in new parts of the country, and our one-hour Mini-POGIL Experience team is running introductory sessions in high schools, colleges, and at conferences. We are also planning the 2019 version of NCAPP and hope to see many of you there at the end of next June!

These are just a few of the many projects that will help us transform education and bring POGIL to an ever-wider audience of educators.

Richard S. Moog

Upcoming Workshops

Sept. 25	North Broward Preparatory School, FL
Sept. 25	POGIL e-Series Team Formation
Oct. 5	Quincy Conference, IL
Oct. 24	POGIL eSeries: Assessing Process Skills
Oct. 26	Episcopal School of Jacksonville, FL
Nov. 3	POGIL NW Summit Meeting, WA
Dec. 17	University of Illinois-Urbana

For more info on upcoming POGIL workshops, visit www.pogil.org

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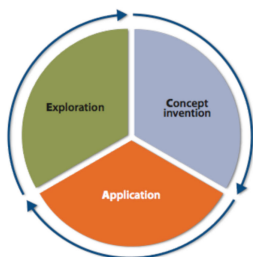


Ask The Mole

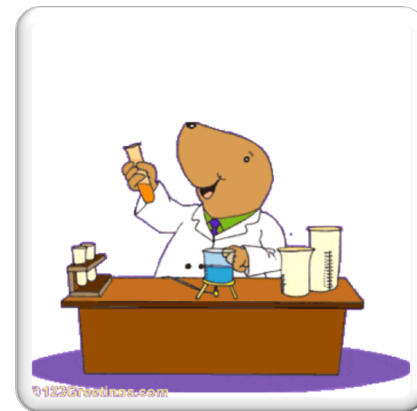
Q: What is the Learning Cycle?

A: The basis for writing a POGIL activity is the *Learning Cycle*. The basic learning cycle model was initially proposed by Karplus and Thier (1967) as a teaching strategy for elementary school science and was based on Piaget's ideas of learning. The learning cycle model provides the structure for activities in a POGIL classroom, is the guided inquiry learning portion (GIL) and usually is completed in one class period. Each activity contains one or more models followed by set of *Critical Thinking Questions* (CTQ).

- First, direct questioning promotes the *exploration* of a model.
- Second, questions guide students to *invent* concepts through their attention to patterns and relationships in the data as terms are introduced.
- Third, questions prompt students to *apply* the concepts to new situations.



Feel free to suggest your own topics. The more ideas we have, the happier the POGIL community will be! If you have any questions regarding inquiry learning, POGIL materials, or any POGIL-related knowledge, email us at marcy.dubroff@pogil.org



POGIL Launches Fall 2018 eSeries

This fall, The POGIL Project will offer three eSeries events. On Sept. 25, a session on Team Formation will be held, with Teresa Bixby (Lewis University) and Sheila Barbach (Gerard Berman Day School) facilitating. Session 2 in October will be led by Juliette Lantz (Drew University) and will be a reprise of her Assessing Process Skills session from last fall. Finally, in November, Shannon Wachowski (Platte Valley High School) and Mare Sullivan (Seattle Pacific University) will lead a session on POGIL and the NGSS. In true POGIL fashion, the online sessions will be interactive and discussion based. Three more sessions will be held in the spring. If you have suggestions about future eSeries offerings, please email Marcy Dubroff at marcy.dubroff@pogil.org.



In the Spotlight: Kristen Drury

William Floyd High School, Shirley, NY



College-tested approach to teaching science helps Long Island teacher win national award

How do you make stew with a recipe that calls for canned chickpeas when you only have dried chickpeas in the cupboard and can't get to the grocery store? What's the best way to rehydrate the chickpeas and avoid a dry, crunchy dish? That was the problem that confronted about 70 educators - all from colleges, high schools or middle schools throughout the Northeast - during a three-day training at Manhattan College in New York City in July. The teachers were playing the role of students for this 100-minute exercise. In teams, they weighed the chickpeas, soaked them in water, and weighed them again. Then they repeated using salted water.

One participant was Kristen Drury, who was recently named 2018 High School Chemistry Teacher of the Year by the American Association of Chemistry Teachers. A 13-year veteran of the William Floyd School District on Long Island, she scanned the screen of a laptop as her lab partner entered the data they'd just collected. The graph that took shape on the screen illustrated the relationship between water salinity and chickpea hydration. (Salted water is better. There is a point of optimal salinity.) They were using an educational approach called Process Oriented Guided Inquiry Learning (POGIL). Drury says it's an important part of her teaching style, and she is part of a corps of trainers who teach other educators to use the same approach.

In contrast to traditional lecturing, POGIL is a learn-by-doing approach to science. Students work in teams and are assigned roles such as manager, recorder, presenter and reflector. Emphasis is placed on communication and problem-solving skills, as well as presenting findings and "reflecting" - analyzing what could have been done better. It is a form of "inquiry-based learning." Notably, student inquiry is baked into the Next Generation Science Standards, which a majority of states have implemented in one form or another. New York adopted its own version in 2016.

At the POGIL training, the facilitator was Alexander Grushow, professor and chair of the department of chemistry, biochemistry and physics at Rider University in New Jersey. Outfitted for the occasion in a gray T-shirt that said "Keep calm and POGIL on," he circulated among the tables, peeking over shoulders and listening in as his "students" discussed their work. If a question came up, he tended to respond with another question. He was modeling the idea that teachers should help students to think critically rather than simply supply answers.

Currently only about 1,000 high school teachers throughout the U.S., Asia, Australia and South America are implementing POGIL in their classrooms, according to a recent survey conducted by The POGIL Project, a professional development organization. But that could be an undercount, as the organization sells many more POGIL teacher guides each year.

Drury, 34, said she was first exposed to the basic concept of POGIL as an undergraduate at Stony Brook University in 2001, when she took chemistry with professor David Hanson. She also landed an internship with science education professor Linda Padwa, which allowed her to sit in on early informal gatherings of educators who were figuring out how to use POGIL in their recitation courses. But it wasn't until she learned she could get specialized training through the nonprofit POGIL Project a few years ago that she "jumped down the rabbit hole" and developed a passion for using the strategy in her classroom.

"Using the POGIL process for what it is intended to do has definitely changed my classroom structure, it's changed how my students perceive science, it's changed [her comfort level] with the material," she said. Now one of about 80 POGIL facilitators, she travels frequently to train other educators. At the New York City seminar, she shadowed Grushow to learn how to facilitate laboratory modules.

Continued on page 4

Continued from page 3

University chemistry professors began developing the key ideas of POGIL almost 30 years ago because about a quarter of students were failing lecture-heavy introductory courses.

"We had bright students, we had capable students," said Rick Moog, professor of chemistry at Franklin and Marshall College in Lancaster, Pa., and executive director of the POGIL Project. "People just didn't seem to be performing at a level they should have been able to perform," he said.

Moog, Hanson and other professors started experimenting with student-centered, inquiry-based learning as an alternative to lecturing in the 1990s. What emerged, with the support of the National Science Foundation, was the POGIL Project. Today the work of the Lancaster, Pa.--based organization includes hosting trainings for POGIL practitioners, a mentoring network and publishing a variety of teaching materials. While mostly used in STEM classes, POGIL has also been used by music theory, mathematics, French and English teachers. Participants at the July conference in New York City included a public school librarian from Westchester County.

Moog believes POGIL is "a better approach for most students in most situations," but admits it is no panacea. It is impractical for students with autism or dyslexia, for instance. How well it works for a given student depends on that student's learning style, he said.

Research on its use at the college level has demonstrated the value of inquiry-based learning, Moog said. Limited research on its use at the K-12 level also has found positive results, he said. The organization has been seeking financial support to conduct a rigorous high school study, he said.

It is also working to make POGIL accessible to more high school and middle school students by translating materials into Spanish and developing course materials for math, earth science and life sciences like biology.

Drury said POGIL is a "major tool" in her toolbox, but certainly not the only one. A proponent of blended learning, she creates her own videos to use in flipped classrooms and tracks students' learning using an app called EDpuzzle. She sprinkles POGIL activities into her AP, Honors and Regents chemistry classes and labs if it's a good fit with that day's curriculum.

Her "front-loaded" teaching style has improved her students' retention, she said. When the test comes, "they start realizing that they remember (the information) better," she said, which means less time spent reviewing.

Some students weren't thrilled when Drury began implementing POGIL in earnest two years ago, recalled student Bianca Convery, who took 10th grade Regents chemistry and 11th grade AP chemistry with Drury. Some of Convery's classmates were "infuriated" by the prospect that they had to go digging for answers themselves.

One way Drury got student buy-in was explaining that the qualities that employers look for - ability to communicate, think critically and solve problems - were being practiced in the classroom.

Convery, who will be a senior at William Floyd High School this fall, told *On Board* that she appreciated how the POGIL activities allowed students to learn from each other as well as from the teacher. And she observed marked progress among her classmates who were not naturally inclined toward science.

"It's the opposite of spoon-fed learning," she said.

—Mareesa Nicosia

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Summer Workshop Coordination Team Selected

In order to adjust to recent changes in The POGIL Project's summer workshop schedule (reduction of meetings from six to four) and to ensure that qualified facilitators will continue to lead the summer workshops, The Project instituted a change to the summer coordinator selection process.

In previous years, summer coordinators were chosen at the POGIL National Meeting during a brief affinity group session. Most of the time, the coordinators were people who were at the POGIL National Meeting with the main role of serving as the point persons for their region's workshop.

Instead, this year, and going forward, we will have a summer workshop coordination team consisting of a cohort/committee of eight POGIL practitioners and not limited to just those who are in attendance at the PNM. The team will be responsible for setting the agenda for the following summer's meetings, facilitating at the summer workshops, and to provide and synthesize feedback on the summer sessions in conjunction with the POGIL Project Session Editors.

Membership on the team is by application to The POGIL Project and each member selected will serve two years. The team reports to the Steering Committee member in charge of summer workshops and four positions will open up every year.

After a selection process, led by members of the POGIL National Office, the Director of The POGIL Project, the Chair of the Steering Committee and the Steering Committee member in charge of workshops, we are pleased to announce the 2019 Summer Workshop Coordinator Team.

Joe Brown, United States Coast Guard Academy
Megan Daschbach, Washington University in St. Louis
Joyce Easter, Virginia Wesleyan University
Tim Herzog, Weber State University
Dan Libby, Moravian College (retired)
Mare Sullivan, Seattle Pacific University
Craig Teague, Cornell College
Shannon Wachowski, Platte Valley HS

For more information on the Summer Workshop Coordination Team, please contact Ellen Harpel, ellen.harpel@pogil.org.

Facilitator Training Workshop a Success

The 7th Facilitator Training Workshop took place July 24-26, 2018 at the University of St. Thomas in St. Paul, Minnesota. The workshop was facilitated by Suzanne Ruder and Andy Bressette with Brandon Fetterly as a facilitator in training. Sixteen participants from both the secondary and post-secondary level were enrolled with a goal of learning how to become a POGIL workshop facilitator. All participants were given a chance to facilitate part of a POGIL workshop while the rest of the group completed part of a workshop session. Additionally, they explored training activities like "Understanding Fishbowls" and the "Mission Vision Values" statement of The Project. Participants noted that both their knowledge of The POGIL Project as a whole and their facilitation skills were strengthened after completing the workshop.

Writers' Retreats in Two Cities

The POGIL Project also held two Writers' Retreats this summer — one in St. Louis and one in Seattle. These retreats were designed to provide an opportunity for individuals or small teams to spend focused time on writing, developing, and improving POGIL activities under the mentoring of experienced POGIL authors coaches (Mare Sullivan and Michael Garoutte in WA and Shawn Simonson and Kristi Deaver Uselding in MO.) The retreats sparked several new activities and The Project will hold another Writers' Retreat next summer to continue the momentum.

Refreshing The POGIL Project's Strategic Plan and Mission, Vision and Values Statements



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. Additionally, we also revamped our Mission, Vision and Values statements to more closely align with the Plan. Thanks to everyone who contributed to this community process!

Mission

The mission of The POGIL Project is to improve teaching and learning by fostering an inclusive, transformative community of reflective educators who design, implement, assess, and study learner-centered environments.

Vision

We envision an educational system that prepares every learner to enrich the world by thinking critically, solving problems, working effectively with others, and experiencing the joy of discovery.

Foundation and Values

The way in which we intend to transform education evolves from a set of foundational ideas established by research and a set of community values developed through practice. Together these elements define how we approach teaching and learning.

The foundational ideas for POGIL are that:

- Learners construct their own knowledge.
- Learners negotiate meaning actively through student-student discourse in self-managed teams within an instructor-facilitated environment.
- Effective learning in a team emerges from attending to cooperative learning principles and process skills development.
- Reflection and assessment enhance individual learning, team function, and teaching practice.

The shared practices valued by The POGIL Project community include:

- Using inquiry-based learning materials that are structured following the explore/invent/apply learning-cycle model.
- Intentionally developing content knowledge and process skills simultaneously in the learning environment.
- Interacting and collaborating within and across educational levels and disciplines.
- Incorporating insights from educational research that have implications for classroom practice.
- Creating inclusive learning environments for students and instructors.
- Being personally invested in encouraging and supporting the professional development of colleagues.

Strategic Plan (2018-23)

1. Grow and support the POGIL practitioner community by actively and intentionally reaching out to **new populations of STEM educators at all levels** (elementary through graduate school) by means of professional development events.
2. **Increase the availability of high-quality POGIL activities**, which incorporate a strong guided-inquiry structure and explicit development of process skills, embedded within a well-considered facilitation plan.
3. Increase the **diversity and inclusivity** of the POGIL community.
4. Gather and analyze **data to provide comprehensive assessment** of student learning and of POGIL learning environments.
5. Develop and implement plans for the **sustainability and growth** of The Project.
- 6.

For more information on the Strategic Plan, visit <https://pogil.org/about-the-pogil-project/pogil-strategic-plan>

POGIL Published Works

Assessment of a Constructivist-Motivated Mentoring Program to Enhance the Teaching Skills of Atmospheric Science Graduate Students

Howard Drossman, Jim Benedict, Erica McGrath-Spangler, Luke Van Roekel, and Kelly Wells

This article describes a collaborative mentoring program in which graduate students (fellows) from a university atmospheric science research department team-taught environmental science classes with professors in a liberal arts college. The mentorship allowed fellows to develop and test the effectiveness of curriculum based on the Process Oriented Guided Inquiry Learning (POGIL) approach.

Qualitative analysis of narratives from four fellows who completed the mentoring program in an upper-level undergraduate atmospheric science class was used to develop three hypotheses about approaches to mentoring and teach: (1) a constructivist-motivated approach to mentoring effectively allows graduate fellows to learn about constructivist-motivated pedagogy, (2) graduate fellows learn to formulate hypotheses related to the scholarship of teaching and learning by reflecting on their development and use of pedagogical innovations, and (3) the development and use of POGIL assignments and associated classroom pedagogy promotes graduate students' understanding of cognitive and social constructivist principles.

Journal of College Science Teaching, 41 (2), 72-81.

Implementing the process oriented guided-inquiry learning (POGIL) pedagogy of group scenario exercises in fundamentals and Medical Surgical II nursing courses

Susan Zori, Maureen Carroll Roller, Erik Lyons

Research with Process Oriented Guided Inquiry Learning (POGIL), an interactive learning pedagogy, has shown improvement in grades and student satisfaction in science and nursing courses. POGIL is an active teaching strategy which utilizes small groups of students to analyze case studies. The student teams participate in groups of four to problem solve topics based on the material taught. POGIL can be additional to lecture and didactic teaching methods to help with the synthesis and analysis of content taught. The object of this study was to compare final course and national standardized exam grades between POGIL and comparison groups in both Fundamentals and Medical-Surgical II nursing courses. In classes that used POGIL, there were higher scores on a standardized national exam scores but not final course grades for students in the Fundamentals course.

Using POGIL in Medical Surgical Nursing II courses revealed no difference in final course grades or on national standardized exam scores. The use of POGIL for beginning nursing students may be more helpful as these students are in the process of determining which learning strategies are most helpful as they progress through the nursing curriculum. *Journal of Nursing Education and Practice*, 18(12).1-8. DOI: 10.5430/jnep.v8n12p1

The impact of instituting Process Oriented Guided Inquiry Learning (POGIL) in a fundamental nursing course

Maureen C. Roller, Susan Zori

POGIL, using small groups of students, who assume the roles of leader, manager, recorder, and reflector to complete problem based activities in science courses, has demonstrated significant improvement in students' grades and course satisfaction in science courses and a nursing Fundamentals course. Using POGIL with nursing students in fundamentals nursing courses could help to improve final grades and course satisfaction while promoting active learning, critical thinking, and teamwork.

This quantitative descriptive study used a comparative design, with one group of students who experienced POGIL while analyzing case scenarios in class and a control group who did not experience POGIL. A t-test was used to compare final grades, ATI scores, and satisfaction survey results. The results of this study revealed that Fundamental nursing students who experienced POGIL had significantly higher final grades and course satisfaction compared with students who did not experience POGIL. The active learning and teamwork experienced during POGIL, may be beneficial to students as they transition to practicing nurses. Additional research using POGIL with a variety of nursing courses could be beneficial in educating undergraduate nursing students. *Nurse Education Today*, 50 (2017) 72-76. DOI:10.1016/j.nedt.2016.12.003

Scaffolding STEM Classrooms to Integrate Key Workplace Skills: Development of Resources for Active Learning Environments

Suzanne Ruder, Courtney Stanford, Anand Gandhi

Active learning classrooms provide an ideal opportunity to develop key workplace skills such as teamwork, information processing, critical thinking, and problem solving. Although many active learning pedagogies implicitly support student development of these skills, the role of the instructor in explicitly prompting and assessing these skills in the classroom is important. Integrating workplace skills in large-enrollment classrooms can be challenging, even with the support of teaching assistants (TAs). Using formative feedback from both students and TAs, the instructor developed resources and modified classroom facilitation to encourage development of workplace skills in an active learning Process Oriented Guided Inquiry Learning (POGIL) organic chemistry course. The resources developed include TA training activities, workplace skill rubrics, and course materials. Training activities help TAs understand course content and structure of course materials, facilitate POGIL classrooms, and become familiar with different workplace skills. Rubrics provide instructors a means of identifying and assessing student interactions for evidence of workplace skills. Guided-inquiry course materials highlight the importance of workplace skill objectives in addition to traditional content objectives. *Journal of College Science Teaching*, 47 (5), 2018, 29-35.

Kudos

DIANE BUNCE, Professor Emerita of Chemistry Education, Catholic University, who earned the *ACS Award for Achievement in Research for the Teaching and Learning of Chemistry*, sponsored by the ACS Exams Institute.

KRISTEN DRURY, AP and Regents Chemistry Teacher, William Floyd High School in Mastic Beach, NY, honored as the *High School Chemistry Teacher of the Year* by the American Association of Chemistry Teachers (AACT).

LAURA GALLIGAN, Johnson & Wales University, Providence, RI, was recently promoted to Associate Dean in the College of Arts & Sciences.

CARMEN GAUTHIER, Professor of Chemistry and Department Chair, Florida Southern College, named an *ACS Chemical Society Fellow*.

BARBARA R. HILLERY, Dean, School of Arts and Sciences, State University of New York, Old Westbury, named an *ACS Chemical Society Fellow*.

MEGAN HOFFMAN, Professor of Biology and Chair of the Biology Department, Berea College, honored with the school's *Seabury Award for Excellence in Teaching*, the college's highest award for faculty.

SIOBHAN JULIAN, AP and Regents Chemistry Teacher, Webster Central School District, Webster, NY, was awarded the 2018 *Science Teachers Association of New York State (STANYS) Excellence in Teaching Award*.

CLIF KUSSMAUL, Associate Professor of Computer Science, Muhlenberg College, honored with the 2018 National Center for Women & Information Technology Excellence Award, to recognize authors of the best materials submitted to the EngageCSEdu collection in the past year.

ANDREA MARTIN, Associate Professor and Chair of the Chemistry Department, Widener University, honored with the *College of Arts and Sciences Faculty Award for Excellence in Teaching*.

CATHERINE MIDDLECAMP, Professor of Environmental Studies, University of Wisconsin-Madison, who was named the winner of the *George C. Pimentel Award in Chemical Education*, sponsored by Cengage Learning and the ACS Division of Chemical Education.

TRACEY ARNOLD MURRAY, Associate Professor and Chair, Chemistry and Biochemistry, Capital University, received the institution's *Praestantia Award for Outstanding Teaching*, the college's highest honor for faculty.

BRUCE WELLMAN, Chemistry, Engineering and Robotics Teacher, Olathe Northwest High School, Olathe, KS, was selected as an *inaugural member of the STEM Education Advisory Panel*, overseen by the National Science Foundation (NSF) in consultation with the United States Department of Education, NASA, and the

We are excited to announce The POGIL Project's second National Conference for Advanced POGIL Practitioners (NCAPP): *Building Bridges, Breaking Barriers*, to be held June 24-26, 2019 at Washington University in St. Louis, MO.

NCAPP 2019 will create an environment where advanced practitioners can connect with peers to gain insight into effective teaching and facilitation, share and find new activities and approaches for the classroom and the laboratory, and establish collaborations over shared interests. We are also excited to announce our plenary speaker lineup, which includes **Michael Bruno**, Ph.D., instructor of chemistry at North Carolina School for Science and Mathematics; Katayoun Chamany, Ph.D., Mohn Family Professor of Natural Sciences and Mathematics, The New School; **Sylvia Hurtado**, Ph.D., former Director of Higher Education Research Institute at UCLA; and **Susan Shadle**, Ph.D., founding Director of the Center for Teaching and Learning and Distinguished Professor of Chemistry and Biochemistry at Boise State University.

Visit the POGIL website for more information and application information.

NCAPP 2019

**BUILDING
BRIDGES
BREAKING
BARRIERS**



POGIL PEACH Winners Selected

The POGIL Early Achievement Award, or PEACH, recognizes significant and enthusiastic contributions of secondary and post-secondary practitioners early in their involvement with The POGIL Project.

KRISTIN PLESSEL

University of Wisconsin-Whitewater at Rock County

MICHAEL BRUNO

North Carolina School of Science and Mathematics, Durham, NC



Announcing the 2018 POGIL Water Bottle Summer Photo Contest Winner!

Thanks to the 25 people who submitted more than 30 photos to our first POGIL Water Bottle Contest. The winner of the Grand Prize and a POGIL T-shirt is Madeline Brooks of Boulder, CO with her stunning photo of the bottle on the shores of Lake Michigan. Honorable Mentions go to Stephanie Erickson, Alex Grushow, Sally Hunnicutt, Dan King, Clif Kussmaul, Kristin Plessel, Shawn Simonson, Malia Turner, Ryan Ulrich, Kristi Deaver Uselding, and Mary van Opstal.

To see all of the winners, visit the POGIL website. Photographers selected for Honorable Mentions will receive a copy of a calendar featuring the winning photos.



VISIT THE POGIL STORE

Need to get a water bottle to stay hydrated? Visit the POGIL online store at

<http://store.apexadv.com/pogil/>

And while you're at it, pick up a Keep Calm and POGIL On T-shirt as well!



POGIL PUBLICATION UPDATE

Recently Endorsed

Middle School Earth & Space Science Activities and Middle School Life Science Activities, two new collections by **Lori Stanton, Amy Steele, Kim Gilreath, and Mare Sullivan**, on schedule to be published by Flinn Scientific in 2019.

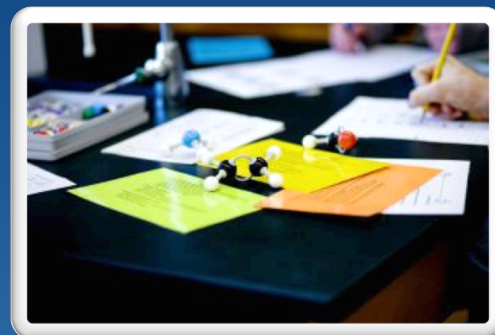
New Books from POGIL Community Members

Engaging Students in Physical Chemistry, co-edited by **Craig Teague** of Cornell College and **David Gardner** of Lander University, published by the American Chemical Society Symposium Series.

Looking to Book a Workshop?

- If you would like to bring a POGIL workshop to your area, please get in touch with us! We are interested in teaching more instructors about POGIL at both the high school and post-secondary levels and want to help them make their classrooms and laboratories more student-centered.

Please visit our website and submit a request a workshop form or email Marcy Dubroff at marcy.dubroff@pogil.org.



Send us your news!

We'd love to feature your news, your grant, or your video on the POGIL website and in the POGIL newsletter. Send news to Marcy Dubroff at marcy.dubroff@pogil.org

Get all the latest POGIL news by following us on Twitter or Facebook! Sign up to get our @POGIL tweets at [twitter.com](https://twitter.com/POGIL).

POGIL

The POGIL Inquirer

The POGIL Project

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