

The POGIL Inquirer

In The Spotlight
Gail Webster Q&A p. 3



From The POGIL Project Director



Dear friends,

Spring has finally made it to Lancaster, and with it come good wishes and news from The POGIL Project. First, please join me in congratulating Tammy Pirmann of the School District of Springfield Township, PA, and Tricia Shepherd of St. Edward's University, Austin, TX, for receiving The POGIL Project's inaugural Early Achievement Award. Given to one post-secondary and one secondary educator, the award recognizes practitioners who are new to The Project and have distinguished themselves by advancing the goals of The POGIL Project.

We're also excited about the fantastic response to our summer regional workshops—the Northeast Regional Workshop at Simmons College is already full, and the Southeast, Central, Southwest, and Northwest workshops are filling quickly. If you're planning to attend one of the four remaining workshops, please register soon to guarantee your spot.

Be sure to read about the new *Activities for High School Physical Sciences* project, currently in development. And look for another new program in the works: the National Conference for Advanced POGIL Practitioners, scheduled for June 26-28, 2017, at Muhlenberg College in Allentown, PA. You'll be hearing more about this in the coming months.

Finally, we're getting ready for the POGIL National Meeting. We have another capacity crowd this year—a testament to the incredible devotion of the POGIL community and your willingness to work together to advance The Project's strategic plan and transform education through our collective efforts.

Thank you for everything you do on behalf of The POGIL Project. All of this would not be possible without the support we continually receive from you, the educators and thinkers that help sustain The POGIL Project and our programs.

Richard S. Moog

Upcoming POGIL Workshops

- Apr. 23 University of Texas – El Paso
- May 7/14 Teaching with your Mouth Shut – Seattle Pacific
- May 12 James Madison University
- May 16 Georgia Gwinnett College
- May 18 SERESC – New Hampshire
- May 19 Thousand Oaks High School

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

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Ask The Mole

Q: Can I implement POGIL in my laboratory course?

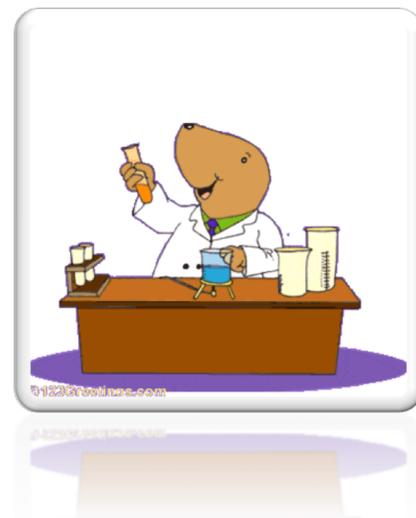
A: The simple answer is, “Yes, of course!”

The learning cycle framework used in POGIL activities can be applied to laboratory work in the same manner as it is in the classroom. In its simplest form, instead of giving the students a goal of completing an experiment or obtaining a result, you would start by asking them a question and provide an experimental framework that could provide data that can be used to answer that question. With guidance, students work together to develop the details of the experiment and decide what data they want to acquire to answer the question. In an advanced laboratory, the students can be asked to refine their experiment and repeat it to answer the question with more detail.

As with classroom activities, the laboratory activity is driven by carefully structured questions. The questions are designed either for pre- experiment work to get students thinking about the work ahead, and also for reflection about the data they have acquired and what it means.

To get a better sense of how POGIL can be used in the laboratory or how you might convert your favorite traditional experiment into a POGIL experiment, a Lab Track has been added to the Southeast and Northeast Regional Workshops this summer.

If you have any questions regarding inquiry learning, POGIL materials, or any POGIL-related knowledge, email us at marcy.dubroff@pogil.org



Where in the World is the POGIL Water Bottle?

From humble origins in Lancaster, PA, (713 College Avenue, right) POGIL has grown and expanded across the United States and around the world.

We're asking you to send us a picture of your POGIL water bottle wherever you may be to show the POGIL community the wide-ranging scope of our unique pedagogy (and our really cool bottle). Let's see how many places we can reach.

At right, the POGIL water bottle visits Arches National Park in eastern Utah. Photo courtesy of Tim Herzog.

Send your photo or video of your water bottle to Marcy Dubroff at marcy.dubroff@pogil.org



In the Spotlight: Q&A With Gail Webster



Gail Webster is a professor of Chemistry at Guilford College in Greensboro, NC. Dr. Webster is teaching her course, Chemistry of Food and Cooking, in the Alto Adige province of Northern Italy. The POGIL Inquirer checked in with her to see how the course was going.

Q: Explain Chemistry of Food and Cooking. If I were one of your potential students, why would I want to take this course?



A: Chemistry of Food and Cooking explores basic chemical concepts (atomic structure, periodic properties, bonding, ionic nomenclature, interpreting line structures for molecular compounds, acid-base reactions, stoichiometry and much more) through the study of “food molecules” --water, fats, carbohydrates, and proteins. Chemical reactions are studied using these types of molecules and also through cooking processes. For potential students, I would talk to them about how learning chemistry through a common context, food, makes learning the material more interesting since it is relevant to their everyday activities, like cooking and eating. I would also mention that the course is not a cooking class, but the study of many of the same chemistry topics that one would learn about in a regular general chemistry.

Q: What do you want your students gain from taking this course?

A: It is important for students to understand that no food is chemical free and that we use chemicals and chemistry in all aspects of our lives. I also want students to be able to develop a question involving food or food preparation that may be explored by designing and executing an “experiment” in their own kitchen.

Q: What do you enjoy about teaching this course?

A: Many of the students in the class are juniors and seniors who have delayed taking their lab science requirement. Because I teach mostly first-year students in general chemistry, I’ve enjoyed working with students who are getting ready to graduate and who seem to me to be more outgoing and talkative with each other and me during class. Students in Chemistry of Food and Cooking often tell me they’re “not a science person” and that they dreaded having to take (and pass) a science class to graduate. By the end of the course, some of the most reluctant science students become genuinely interested in chemistry and are truly surprised about how much they’ve learned.



Q: How many years have you been teaching this course? What has changed since you first started teaching it?

A: I think the first time I taught the course was in 2005, so I’ve been teaching it for more than ten years. When I first taught the course, I worked on developing the lab portion of the course. The course was first taught in the evening, and the adult students in the class did many of the labs at home. I was able to



incorporate some experiments that are done in the chemistry lab like extraction of fats, TLC of plant pigments, and synthesis of esters. I think it's important for students taking a chemistry course at the college level to gain experience working in a chemistry lab although we do some labs in a food-safe environment as well so we can taste the products of the reactions. The first few times I taught the course, it was all lecture, with some in-class activities. Each year I would incorporate more student-centered activities, but now the majority of class time is focused on POGIL activities.

Q: Has teaching this course abroad added anything to your understanding of the course as an instructor? If so what?

A: Living and learning in Northern Italy (South Tyrol) has been a great venue for this course. We've been able to visit local cheese making facilities, wineries, a distillery, and a salt mine and incorporate some of the rich history of this region into the course. What I'm always struggling with is what NOT to include. There is so much that can be addressed, from growing food to food preservation to nutrition and more.

Q: At the 2014 Biennial Conference on Chemical Education you led a session titled "Using POGIL activities to teach non-science majors in a Chemistry of Food and Cooking course" how have you incorporated POGIL into this course?

A: POGIL is used for students to learn about each of the major food molecules and other chemical concepts. I use activities for students to learn about atomic structure, the periodic table, ionic compounds, molecular compounds, fats, amino acids, carbohydrates, acid-base chemistry, amino acids, proteins (structure and folding), and stoichiometry. The models are focused on chemical compounds found in foods and chemical reactions used in cooking.

Q: How has the incorporation of POGIL impacted the course?

A: The depth of chemistry that is presented to students through these activities has made the course more rigorous. Students are also very involved in class. They ask more questions and they seem to have more fun in class...and I do too! Since there is no real textbook on the market for a course like this, the POGIL activities fill an important gap in the materials available for the course.

Q: It appears schools across the country have a chemistry and food course similar to yours. What about the topic appeals to educators?

A: I think anything that makes chemistry interesting, relevant and fun appeals to educators and students alike. Having students leave a class with a positive attitude toward chemistry is very rewarding.

Q: Using the concepts of your course, what meal is the most fun to cook?

A: I can tell you a dinner menu that our class developed and cooked here during our study of proteins. We made a frittata, so we denatured proteins using both physical force (beating eggs) and then with heat. The frittata called for ricotta cheese, which we made from local milk. The milk solids were precipitated using an acid (lemon).





The students prepared a salad, and made a dressing from olive oil (fat), lemon juice (aqueous) and mustard (emulsifying agent). At dinner, each of the students involved in the process explained the science involved in the particular dish that they helped prepare.

Q: What is your favorite unit or activity to teach?

A: I like teaching acid-base chemistry! We make a cabbage juice indicator in class and in their groups, students work through a POGIL activity using the data they've collected by observing what happens when the indicator is added to various foods. It's fun to use something from the grocery store (or farm) to learn about acids, bases and acid-base reactions.

Captions:

- P. 3 top: Making the frittata
- P. 3 bottom: Grappa distillery at Castel Juval, South Tyrol, Italy
- P. 4 top: Making pasta in Rome
- P. 4 bottom: The POGIL classroom
- P. 5 top: The completed dinner
- P. 5 middle: The class enjoys some of the local scenery
- P. 5 bottom: The POGIL water bottle hard at work in the vineyard at Brunnerburg in Dorf Tirol.



Rick Moog Honored at ACS Meeting



Rick Moog, Director of The POGIL Project, was recently honored at the annual American Chemical Society meeting in San Diego, CA, where he was presented with the George C. Pimentel Award in Chemical Education. The award was given in recognition of Moog's work in "developing and encouraging the use of innovative, student-centered teaching approaches and fostering true collaboration among professionals that benefits the entire chemical education community." Here, he is pictured with, from left, Donna Nelson, President of the ACS, Cathy Middlecamp, Chair of the Division of Chemical Education, and Lisa Lockwood, Cengage Learning.

New SII Improvement Plan to Debut at PNM/Regional Workshops

Workshop SIIs over the years have been somewhat underwhelming and disappointing to the workshop facilitators and POGIL administrators. Why? Not because they weren't flattering (because they **always** are) but they just don't provide quite enough information. After all, we would like them to provide guidance as to **why** our strengths are strengths and **how** to make improvements on what needs to be improved. We also want to hear how POGIL may affect teaching through insightful thoughts. But what we often get are quickly written, short statements that we believe are done without much thought. Why? Not because the participants aren't capable of great feedback and reflection, but because they do them at the end of three, long, mind-boggling days of **intense** work and frankly, they are beat! Shame on us! So.... it was time to come up with something that might help the participants understand what exactly we are looking for, encourage them to break up the task, and then do just a little homework before falling into bed at night.

The 10-12-minute "How to Write an SII PowerPoint" is designed to be presented during the first plenary session of a workshop. The participants will be sitting in groups but will not yet have their assigned team roles. They will work through comparing good and weak Strengths, Improvements, and Insights. They will be instructed to explain why/how one is more useful over the other. The last slide encourages them to jot down notes during each session of the day, for later use. They can then work on their SII statements at the end of each day as their "homework assignment." On that last day, when they are exhausted and just want to head home, they can put some final touches on their evaluation and be out the door. Seems to make much more sense and hopefully we will get very useful feedback. Also, the participants will walk away with reflection that will carry them into using the POGIL method in a very effective and useful way.

We will try the new and improved SII plan out at the PNM.

—Beff Mancini, Steering Committee

Chestnut Hill's Kelly Butler Spends Year in India

In July, 2015, Kelly Butler, Professor of Chemistry at Chestnut Hill College, was named a Fulbright –Nehru Scholar. Working out of the VNR Vignana Jyothi Institute of Engineering and Technology in Hyderabad, India, Butler has been collaborating with professors there to assess the efficacy of using POGIL in statistics and



engineering chemistry. The results show a statistically significant difference between the POGIL and non-POGIL sections, with the former getting the better post-test scores. Also, during her time in India, Butler has assembled a dedicated group of organic chemists to write POGIL activities at the Homi Bhabha Centre for Science Education in Mumbai. She has also facilitated POGIL workshops across the country. In the photo above, Butler is giving a talk at the Innovations in Teaching, Learning and Evaluation Conference in Higher Education conference in Pune in January 2016.

2016 POGIL Regional Coordinators

North Central (IA, IL, IN, MI, MN, SD, ND, NE, OH, WI)
Kristin Plessel, University of Wisconsin-Rock County
(kristin.plessel@uwc.edu)

Northeast Region
(CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT, WV)
Steve Gravelle, St. Vincent College
(sgravelle@stvincent.edu)

Northwest (AK, ID, MT, OR, WA)
Laura Lavine, Washington State University
(lavine@wsu.edu)

Southwest (AZ, CA, CO, HI, NM, NV, UT, WY)
Matt Horn, Utah Valley University
(hornma@uvu.edu)

South Central (AR, KS, LA, MO, OK, TX)
Gina Frey, Washington U. in St. Louis
(gfrey@wustl.edu/)

Southeast (AL, FL, GA, KY, NC, MS, SC, TN, VA)
Rob Whitnell, Guilford College
(rwhitnel@guilford.edu)

Please contact any of the Coordinators if you have any questions about events or workshops in your region.

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.

Visit our website and submit an event request at <https://pogil.org/contact/enter-request> or email Marcy Dubroff at marcy.dubroff@pogil.org.

Spaces Filling Quickly for Summer Workshops

If you are a high school or college/university teacher and want to enhance your professional development, these workshops are for you! At each workshop location, you will learn about POGIL's philosophy and methodology. You will also learn about different facilitation techniques and have opportunities to write and review activities, as well as attend informative poster and plenary sessions.

Whether you are new to guided inquiry learning, an advanced POGIL practitioner, or somewhere in between, these workshops will provide a wealth of opportunities to gain new insights, grow professionally, and take home tangible skills.

Introductory Track: No prior experience or workshop attendance required. Experience POGIL methodology and learn to facilitate POGIL activities.

Intermediate Track: Previous attendance of at least 3-hour POGIL workshop required. Improve facilitation skills and be introduced to POGIL activity structure.

Advanced Track: Previous attendance at a 3-day POGIL Regional Workshop required. Improve facilitation skills. Write and receive feedback on POGIL activities and/or develop a Scholarship of Teaching and Learning project.

New in 2016 – Lab Track: Designed for those who are interested in learning how to implement guided inquiry into STEM laboratory courses. Conduct actual experiments from the student's perspective. Discuss the unique benefits and challenges of using guided inquiry for teaching lab classes. Begin writing guided inquiry experiments.

Registration Information

The workshop fee is \$399, which includes registration, materials, three lunches, and two dinners. On-campus housing for two nights is available for an additional \$150 and includes two accompanying breakfasts. Go to pogil.org to register for any of these workshops.

Workshops with Introductory and Intermediate tracks:

Southwest Region: Santa Clara University (Santa Clara, CA), June 28-30

Southeast Region: Davidson College (Davidson, NC), July 12-14 - ***Lab track also available**

Workshops with Introductory, Intermediate and Advanced tracks:

Northeast Region: Simmons College (Boston, MA), June 27-29 - ***Lab track also available (this workshop is full)**

Central Region: Washington University in St. Louis (St. Louis, MO), July 18-20

Northwest Region: University of Puget Sound (Tacoma, WA), July 18-20

Spots are available on a first-come, first-served basis. For more information, visit our website or contact Julie Boldizar (julie.boldizar@pogil.org) or Ellen Harpel (ellen.harpel@pogil.org)

POGIL Published Works

Flipped Classroom Modules for Large Enrollment General Chemistry Courses: A Low Barrier Approach to Increase Active Learning and Improve Student Grades

Eichler, Jack F.; Peeples, Junelyn Peeples *Chemistry Education Research and Practice* (2015)

ABSTRACT: In the face of mounting evidence revealing active learning approaches result in improved student learning outcomes compared to traditional passive lecturing, there is a growing need to change the way instructors teach large introductory science courses. However, a large proportion of STEM faculty continues to use traditional instructor-centered lectures in their classrooms. In an effort to create a low barrier approach for the implementation of active learning pedagogies in introductory science courses, flipped classroom modules for large enrollment general chemistry course sequence have been created. Herein is described how student response systems (clickers) and problem-based case studies have been used to increase student engagement, and how flipped classroom modules have integrated these case studies as collaborative group problem solving activities in 250–500 seat lecture halls. Preliminary evaluation efforts found the flipped classroom modules provided convenient access to learning materials that increased the use of active learning in lecture and resulted in a significant improvement in the course grade point average (GPA) compared to a non-flipped class. These results suggest this approach to implementing a flipped classroom can act as a model for integrating active learning into large enrollment introductory chemistry courses that yields successful outcomes.

Special Session: Helping Students to Develop Communication, Teamwork, and Other Process Skills with POGIL

Kussmaul, Clifton; Hu, Helen H.; Pirmann, Tammy *Proceedings of the 47th ACM Technical Symposium on Computing Science Education (SIGCSE '16)*

ABSTRACT: Employer surveys and other sources indicate that CS students need process skills such as communication, teamwork, critical thinking, and problem solving. Further, the AP CS Principles practices include communicating and collaborating. POGIL (Process Oriented Guided Inquiry Learning) can be used to teach these process skills in high school or college courses. Instead of sitting in lecture or working together with minimal guidance, student teams work through POGIL activities to discover concepts on their own, while the instructor circulates and facilitates learning of key concepts and the development of process skills. Structured roles help students learn to communicate and work in teams more effectively. In this special session, attendees will experience a POGIL activity, learn how process skills are developed and reinforced by POGIL (through a POGIL meta-activity), and see the range of activities available at <http://cspogil.org>. We will share POGIL activities and discuss how POGIL can transform CS classes at all levels, from high school to graduate-level classes, from small schools to large universities.

POGIL Published Works

Continued from page 9

Process Oriented Guided Inquiry Learning (POGIL) in Discrete Mathematics

Abdul-Kahar, Rosmila; Gaik, Tay Kim; Hashim, Rathiah; Idris, Muhammad Nurhaffiz; Abdullah, Normazni 7th *International Conference on University Learning and Teaching Proceedings (InCULT 2014)*

ABSTRACT: POGIL has been initiated primarily in chemistry education for over the last 15 years ago. In this structure, students built understanding based on their prior knowledge, experiences, skills and attitude which consequently follow a learning cycle of exploration, concept formation and invention. Based on multiple previous studies, it has been examined and proves the effectiveness of POGIL in improving students' study performance. This paper cater about general background of POGIL and activity in project scheduling that has been conducted. In conclusion, educators can increase the strength of student learning in their classes by implementing POGIL

Evaluating the Effectiveness of POGIL-PCL Workshops

Stegall, Stacy L.; Grushow, Alexander; Whitnell, Robert; Hunnicutt, Sally S. *Royal Society of Chemistry 2016*

ABSTRACT: The POGIL-PCL (Process-Oriented Guided Inquiry Learning in the Physical Chemistry Laboratory) project has developed a series of workshops to introduce faculty to POGIL-PCL and to facilitate the development of new experiments. More than 60 faculty members from various institutions have attended these workshops. Workshop participants were surveyed in order to evaluate the effectiveness of the workshop and better understand why faculty choose to adopt POGIL-PCL. Of the participants who completed the survey, 77% had used POGIL-PCL experiments. The results of the survey show that personal influence is a major factor in all stages of the adoption process.

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

Pirmann and Shepherd Named Inaugural Winners of POGIL Early Achievement Award

The POGIL Project has named two educators winners of its inaugural Early Achievement Award – **Tammy Pirmann of the School District of Springfield Township, PA**, and **Tricia Shepherd, St. Edward's University, Austin, TX**.

The award, given to one post-secondary and one secondary school winner, honors practitioners who are new to The Project and who have distinguished themselves by advancing its goals and who have an exceptional level of enthusiasm for active learning. Other criteria include leadership in The Project, active participation in disseminating the POGIL pedagogy, and other service, such as workshop facilitation, authorship of activities, and participation in grant proposals.

Shepherd and Pirmann will be honored at The POGIL Project's upcoming National Meeting in St. Louis in June 2016, and will each be presented with a plaque and a cash award.

"I am excited to honor these two outstanding educators as the inaugural recipients of the POGIL Early Achievement Award," said Project Director Rick Moog. "Both Tammy and Tricia have had a strong impact on the POGIL community and have contributed greatly to the growth and success of The Project."

Pirmann is the district coordinator for Computer Science and Business at the School District of Springfield Township, Montgomery County, PA, as well as a high school computer science teacher. Thanks to Pirmann and many others, Springfield has a computer science graduation requirement. She teaches Computer Science at several levels, a Robotics course, Electronic Game Design and Development, Web Application Development, Computer Science Principles, and AP Computer Science. All of her classes focus on the immediate and 'real world' application of computing concepts. She believes in the importance of teaching practical career skills in addition to the computer science content. She is an NCWIT Aspirations in Computing Educator Award winner for her work in increasing the diversity of her elective computer science courses. She is currently on sabbatical and attending Gwynedd Mercy University, working toward a Doctorate in Educational Leadership. She is also actively involved in The Project's Google Computer Science grant, which is working with a core group of high school computer science teachers to provide in-depth professional development and community support for teaching Computer Science Principles.



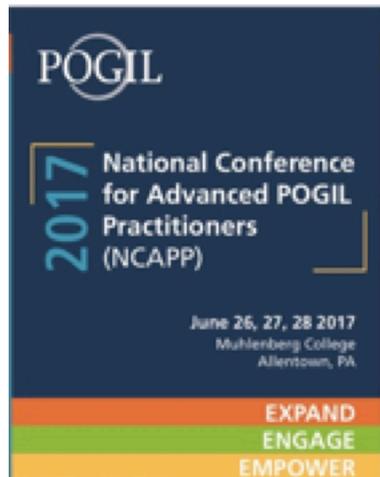
"I am honored to receive this award," said Pirmann. "In computer science education, pedagogy is often an afterthought. I met Cliff Kussmaul of Muhlenberg College many years ago and I was impressed with the research he shared with me regarding POGIL and student retention over time. I knew I had to try POGIL because I wanted those results for my students. The retention research was validated with my high school computer science students and I just couldn't keep it to myself!"

Shepherd is Professor and Department Chair of Chemistry at St. Edward's University. She received a B.S. and M.S. in Chemistry from the University of Idaho and a Ph.D. in theoretical physical chemistry from Georgia Institute of Technology. In 2014, she moved to St. Edward's University after being a Professor of Chemistry at Westminster College in Salt Lake City Utah for 12 years. She teaches courses in general chemistry, physical chemistry and scientific computing using a guided-inquiry approach that emphasizes active, collaborative, student-centered learning. For the past 12 years she has been implementing and writing Process Oriented Guided Inquiry Learning (POGIL) activities and is the author of *Quantum Chemistry & Spectroscopy: A Guided Inquiry* (a set of endorsed POGIL activities). She leads workshops offered nationwide on both facilitating POGIL in the classroom and incorporating theoretical and computational chemistry into the undergraduate chemistry curriculum. Her research efforts with undergraduates involve the use of coarse-grained molecular dynamics simulations to study aqueous systems at the nanoscale. She is a member of MERCURY (**M**olecular **E**ducation and **R**esearch **C**onsortium in **U**ndergraduate computational chemist**RY**) and advocates for the use of technology in meaningful ways to enhance student learning.



"I'm truly honored by this recognition and thankful for all my older wiser POGIL friends who have encouraged me to present, write, and lead others through a process based guided inquiry trajectory I enjoy facilitating for students in every class I teach," said Shepherd.

Advanced Practitioners Conference Slated for Summer 2017



We are delighted to announce The POGIL Project's first National Conference for Advanced POGIL Practitioners (NCAPP): Expand, Engage, Empower, to be held June 26-28, 2017 at Muhlenberg College in Allentown, PA.

The idea for this exciting new event grew from interest within our thriving community of experienced POGIL educators who have been applying their POGIL knowledge and skills in new and innovative ways over the past several years. NCAPP strives to be a place where POGIL facilitators can come together to share new ideas, gain targeted feedback, engage in in-depth discussions, interact with a diverse community of teachers, and gain a deeper mastery of the POGIL approach.

The conference will welcome POGIL practitioners from both high school and college environments, and from a wide range of content areas.

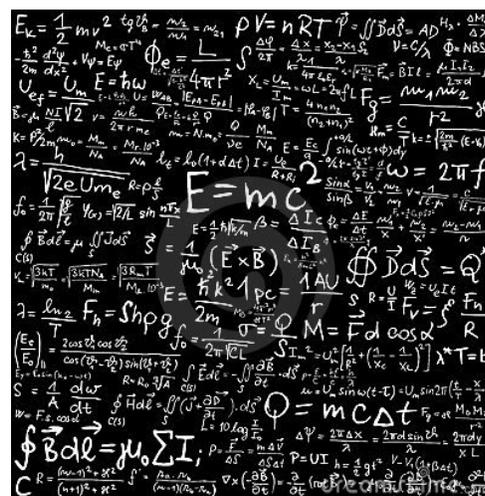
NCAPP encourages applications from POGIL practitioners who have previously completed 3-day POGIL workshops or who have substantial experience implementing POGIL in their classrooms. All conference participants will be expected to contribute to the planned program.

The application/registration process will open in Fall 2016 with opportunities to indicate proposed area(s) of participation. The conference program committee will review all applications. Applicants will be notified of their acceptance as soon as possible after the deadline and up until the attendance maximum is reached.

You can find more information posted on The POGIL Project website later this summer at www.pogil.org

We hope you'll join us for NCAPP in 2017. Together, we will improve, enhance, and transform education for every student, everywhere.

POGIL Activities for High School Physical Sciences



The POGIL Project is developing a collection of POGIL activities for high school physics appropriate for physical science courses and/or introductory physics at the high school level.

To initiate this process, participants will attend a three-day workshop from June 27 - June 29, 2016 at Washington University in St. Louis, MO.

The goals of this workshop are:

- to develop a list of the concepts and corresponding learning outcomes for activities (a "Table of Contents")
- to propose possible models for the activities in #1
- to train participants to provide effective feedback on activities under development, in addition to developing insight into authoring activities
- to enhance participants' ability to effectively implement POGIL activities in their classrooms.

To achieve these outcomes, the workshop will involve a variety of activities, including brainstorming sessions, small group work, and plenary workshops on activity structure and feedback, and on effective classroom facilitation.