

The POGIL Inquirer

In the Spotlight

POGIL Travels the Globe: Washington State University's
Laura Lavine Brings Introductory POGIL Workshop to South
Korea

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From The POGIL Project Director



Fall is in full swing at The POGIL Project, and with it comes exciting news to share.

First, I want to thank our extraordinary community for its generosity during POGIL Pledge Week! Your gift makes a difference for teachers and students all year long. As part of our community, you are changing teachers' lives, you are preparing students to succeed as critical thinkers and collaborators, and you are changing education for future generations. Thank you for your continued dedication to this work and for all you do to support The POGIL Project.

Also, please join me in congratulating our colleague Amanda Zullo (Saranac Lake HS, NY), who received the prestigious Presidential Award for Excellence in Mathematics and Science Teaching. The award is presented to outstanding K-12 science and mathematics teachers from across the country. When announcing the award, President Obama said: "The recipients of this award are integral to ensuring our students are equipped with critical thinking and problem-solving skills that are vital to our Nation's success."

Be sure to read the update on the progress of The Project's strategic plan. In 2017, we'll be nearing the end of our initial five-year plan, and will assess what we've achieved and explore where we want to go. During this process, we'll be reaching out to our community for insights as we develop and refine our next set of goals.

Thank you for all you do to make this possible.

Richard S. Moog

Upcoming POGIL Events

Nov. 5	POGIL Summit – Puget Sound
Nov. 5	Intro to POGIL – FEAST – Oakland, CA
Nov. 11	POGIL at NSTA – Portland, OR
Nov. 19	Intro to POGIL – Stony Brook University, NY
Jan 14-16	2017 Facilitator Training Workshop – San Antonio, TX
Feb. 17, Apr. 3, May 1	Round Lake Middle Schools, Round Lake, IL
Feb. 18	POGIL Summit- Puget Sound
Mar. 1	Intro to POGIL – Erie 1 BOCES, NY
Apr. 22	POGIL Summit- Puget Sound

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

Ask The Mole

Q: What are process skills and why are they important?

A: Process skills are an important part of any POGIL classroom. The PO in POGIL stands for “process oriented” which refers to the seven key process skills that are developed as students work through POGIL activities. The process skills identified by the POGIL project include: teamwork, communication (oral and written), information processing, critical thinking, problem solving, management, metacognition and assessment. These skills are also called soft skills, workplace skills or professional skills. Most employers cite the need for employees who are capable of communicating with others, solving problems that do not have an obvious solution and are able to think critically. In a typical lecture-based classroom, students gain little experience developing these important workplace skills.

The POGIL classroom however, focuses on the explicit development of these important process skills. POGIL activities are based on the learning cycle, completing activities in groups of 3-4 students assigning clear roles for each student, and helping students develop communication, teamwork and management skills. The exploratory (or directed) questions in the activities help students improve their information processing as they work to interpret the model. They also support problem solving and critical thinking skills. The questions that comprise the concept invention/development part of the activity ask students to engage in problem solving and critical thinking, although the focus varies from activity to activity. These questions also support the development of students’ communication skills, particularly questions that require students to explain concepts in complete sentences. The classroom facilitator also plays a large role in helping elicit the process skills during group interactions. Both in the classroom and on written assignments the instructor should be deliberate about having students work on process rich materials.

—*Courtesy of Suzanne Ruder, Virginia Commonwealth University*

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 mdubroff@pogil.org.



Where in the world is the POGIL water bottle?

The POGIL water bottle made an appearance at the second presidential debate at Washington University in St. Louis. The bottle wants to remind everyone to get out and vote!

We are 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.

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

Photo courtesy of Gina Frey, Washington University in St. Louis

POGIL Travels the Globe

Laura Lavine Runs Intro Workshop in South Korea

The 1-day Introductory POGIL Workshop at SolBridge International School of Business, Daejeon, South Korea was hosted by their new Dean, Jerman Rose. Rose is a strong proponent and user of collaborative learning and as a new administrator at SolBridge, committed time during the annual faculty retreat to offer his faculty professional development to encourage student-centered teaching pedagogies. The faculty at SolBridge is 30% South Korean and 70% non-South Korean to better model international diversity to their students. These faculty come from the U.S., New Zealand, Great Britain, India, Kenya, Uzbekistan, Colombia, Taiwan, China, and South Korea. Their core challenge arises from the fact that the faculty are so diverse, the students, who are largely South Korean or Asian, are not comfortable speaking up, working in groups, or offering their opinions in front of their peers. Thus, many of the faculty are hesitant to push their students to work collaboratively. The interesting insight that came during the second half of the workshop, where we worked on process skills, was that many of the faculty already use groups, but in a competitive classroom where groups are pitted against each other and where grades are given on a curve. The faculty rationalize this with the idea that this is what the real world will be like. The discussion that was started, and continues, is that the classroom should be a place where students are offered the opportunity to practice the skills that will allow them to be competitive once they are actually in the real world. A competitive classroom environment is unlikely to be that place if there has been no training beforehand.

Facilitating POGIL workshops in another country requires a bit of extra time to prepare for the cultural differences of professors as well as of the students. Guided inquiry learning is based on



the learning cycle model of constructivist and deductive learning in which students are given the opportunity to explore, invent, and apply new concepts in the classroom. POGIL is unique because it combines a process skill objective with each guided inquiry learning activity and these activities are done by groups of three to four students in the classroom. The instructor does not lecture – in fact, here she is more of a facilitator of learning, in a POGIL classroom. In summary, a POGIL classroom focuses on having students learn by doing in a collaborative environment through facilitation by an expert (the professor) and peer mentoring (group work.)

The morning was spent learning about POGIL by doing POGIL. The participants were engaged in thoughtful guided inquiry learning activities. Then, participants were introduced to key concepts of POGIL, experienced a POGIL classroom, learned what POGIL is based upon, and were given information from peer-reviewed pedagogical studies that support the decrease in withdrawal rates and failing grades in several different POGIL classrooms. Data was also shared that showed that students from POGIL classrooms retain knowledge longer than those in lecture-based classrooms.



The afternoon was spent learning more about how to identify and assess process skills in the classroom and on effective facilitation. We focused on having participants work together in groups in a relatively high-stress, timed situation. This highlighted how difficult it can be to work in teams and how important focusing on training students to work on process skills can generate more positive, productive, and successful outcomes. The very last session focused on the facilitator's role and effective tools for facilitation in a loud, chaotic, active learning environment.

—Laura Lavine, Washington State University

Announcing The POGIL Project's National Conference for Advanced Practitioners – June 26-28, 2017



NCAPP 2017



2017 Facilitator Training in San Antonio, TX

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

NCAPP welcomes POGIL practitioners from both high school and college, and from a wide range of content areas. Although POGIL started in the STEM fields, the strategies for developing new activities of applying POGIL are not specific to any discipline.

This conference is designed for experienced POGIL practitioners to gather together and share ideas, challenges, and struggles regarding the use of POGIL in their classrooms. The format will include various types of participant-centered sessions where practitioners will be able to share their ideas for new POGIL activities, explore challenges related to using the POGIL format, and work with others to design new POGIL activities or methods of implementation.

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

To apply, go to: <https://pogil.org/news/ncapp/apply-to-ncapp>

The annual POGIL Facilitator Training Workshop will be held in beautiful and historic San Antonio, TX, in 2017.

The POGIL Facilitator Training workshop is a 3-day POGIL professional development workshop with a focus on workshop facilitation. The workshop is designed for those who attended the 2013 2014, 2015 or 2016 POGIL Regional workshops or those who have previous POGIL workshop experience and who are interested in becoming a skilled workshop facilitator.

The workshop will provide training in student-centered teaching techniques as well as effective POGIL workshop facilitation. Participants will be prepared and encouraged to run a 1/2 day inquiry-based learning workshop on their home campuses at the conclusion of this 3-day workshop.

Space is limited. Apply by Nov. 1 at <https://pogil.org/news/facilitator-training-workshop-application>

Together, we're transforming....



POGIL Pledge Week - October 17-21, 2016

Many, many thanks for a great POGIL Pledge Week!

Because of you we reached our goal. Our water bottle is full with 130 donations and our hearts are overflowing! You will help make a difference for hundreds of teachers and thousands of students in the coming year! Thank you so much—we couldn't do it without you.

And...you also made our day with the notes you sent with your gifts, so we wanted to share the love! Here's what you had to say about The POGIL Project:

- Keep up the great work! I love POGIL :)
- Love your work!
- You all rock! I've retired...but still am a big fan!
- Keep up the great work. There has never been a more important time to have a scientifically literate electorate. POGIL is the way to get there. Thanks for all that the entire POGIL community does.
- This is the second year that I have been using POGIL in my high school chemistry classroom, and along with modeling instruction, it is one of the best tools that I have seen to help students learn to think. I have shared it with my colleagues in the high school science department as well as at the middle school. We want more!!!
- I love using POGIL in my high school Chem class...I have been spreading the word about POGIL to all I meet!
- My daughter tells me great things about POGIL. I'm glad to lend a little support!
- Thank you for all the POGIL activities...my students enjoy Biology and Chemistry activities!
- Go POGIL!

It's all because of you! Thank you!



Thank you for all you do to support The POGIL Project and the work of education reform. Together, we're transforming education. As we always say, "education is not a solitary task, and neither is changing it!" Thank you from the bottom of our hearts.

Are you on LinkedIn? Now we are too!

Also, if you are on Facebook, please "like" our page and consider sharing our LinkedIn post on your personal page! Our goal is to further our engagement on these two social media platforms. Also follow us on Twitter! Thanks in advance for all that you do to help promote the mission and work of The POGIL™ Project.



Kudos!

Amanda Zullo Awarded Presidential Award for Excellence

On September 8, 2016, Amanda Zullo was named a recipient of the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST).

"The recipients of this award are integral to ensuring our students are equipped with critical thinking and problem-solving skills that are vital to our Nation's success," President Obama said in a statement on August 22. "As the United States continues to lead the way in the innovation that is shaping our future, these excellent teachers are preparing students from all corners of the country with the science, technology, engineering, and mathematics skills that help keep us on the cutting-edge."



Recipients of the PAEMST receive \$10,000 from the NSF to be used at their discretion. Zullo is a chemistry teacher at Saranac Lake High School in rural upstate New York. The PAEMST is the second award in education Zullo has received this year. This June she was one of 10 educators awarded the Empire State Excellence in Teaching Award from the New York State Governor's Office.

Zullo was a key contributor to the *POGIL Activities for High School Chemistry* book currently published by Flinn Scientific.

Outside of teaching, Zullo is an accomplished athlete and has completed Ironman Lake Placid, placed first in the 30-34 age group during the Nordic Ski National Championship in 2015, and participated in the 2014 Medtronic Twin Cities Marathon as one of 25 Medtronic Global Heroes.

- Mitchell Winter, '19

POGIL Published Works

The Effect of POGIL on Academic Performance and Academic Confidence

S. De Gale, L.N. Boisselle

POGIL (Process Oriented Guided Inquiry Learning) is a collaborative learning technique that employs guided inquiry within a cyclic system of exploration, concept invention, and application. This action research explores students' academic performance on a unit of organic chemistry work taught using POGIL, in addition to the effect of POGIL on their academic confidence. The academic performance was measured using a summative assessment at the end of the study whilst academic confidence was measured using a pre- and post- test questionnaire. A qualitative comparison to the previous term's academic scores suggested a varied academic performance, whilst tests of significance indicated an improved level of academic confidence among the students involved. It is hoped that this study will serve as a platform for the use of more student-centered pedagogies in chemistry at the institution at which it was enacted, and education at large.

De Gale, S. & Boisselle, L. (2015). The Effect of POGIL on Academic Performance and Academic Confidence. *Science Education International, Volume 26 (Issue 1)*, 56-79.

STEM Reform Outcomes Through Communities of Transformation

Sean Gehrke, Adrianna Kezar

Kezar and Gehrke utilized an exploratory mixed-methods study design to examine four "communities of transformation" over a period of two and a half years. They spent the first year learning about the organizations through project meetings with an advisory board, comprising leaders from all four organizations, site visits to the communities' main offices, attendance at events held by all of the organizations, and interviews with more than 100 leaders and staff from the founding institutions and key personnel in all of the communities. The information gathered from this process guided the second year of their work, during which they surveyed all members of the four organizations in order to better understand the extent of their involvement, the activities in which they engage, their perceptions of the importance of various design principles and communication and engagement strategies, and their perceptions about the benefits of community involvement. The survey was sent to nearly 18,000 members of these communities in spring 2014, with an initial response rate of 3,792 (22 percent). The 2,503 individuals who completed the entire survey were distributed among 997 institutions in the US (ranging from 1 to 28 observations per institution) and the four STEM-reform communities (ranging from 235 to 1,102 observations per community).

This sample represents a wide swath of faculty committed to STEM reform, with approximately half of the participants from public institutions and a fairly even distribution across Carnegie types (22 percent doctorate-granting, 34 percent master's, 29 percent baccalaureate, and 14 percent associates institutions). Gehrke, S. & Kezar, A. (2016). STEM Reform Outcomes Through Communities of Transformation. *Change, January/February 2016*, 30-38.

CS Principles with POGIL Activities as a Learning Community

Helen Hu, Brian Avery

In spring 2015, Westminster College offered a learning community titled "Where Genetic Coding Meets Software Coding." All the students in the learning community were required to register for the same computer science and biology classes, which were each taught by the authors. Both classes had no pre-requisites and were targeted at introducing non-majors to the respective discipline. Students learned significant portions of the course content by working in groups on Process Oriented Guided Inquiry Learning (POGIL) activities, many of which were developed by the authors for the new learning community. Several assignments drew connections between the two disciplines. The activities were relatively effective in incorporating voice and higher order thinking to better teach for diversity, but the authors are still working to better incorporate differentiation, access, social justice, and equity into their activities. A comparison of survey answers from the start and end of the course show more negative attitudes toward computers, yet a promising and marked increase in interest to take additional CS courses.

Hu, H. & Avery, B. (2015). CS Principles with POGIL Activities as a Learning Community. *Journal of Computing Sciences in Colleges, Volume 31 (Issue 2)*, 79-86.

Inquiry-Based Training Improves Teaching Effectiveness of Biology Teaching Assistants

P. William Hughes, Michelle R. Ellefson

Graduate teaching assistants (GTAs) are used extensively as undergraduate science lab instructors at universities, yet they often have minimal instructional training and little is known about effective training methods. This blind randomized control trial study assessed the impact of two training regimens on GTA teaching effectiveness. GTAs teaching undergraduate biology labs (n = 52) completed five hours of training in either inquiry-based learning pedagogy or general instructional "best practices". GTA teaching effectiveness was evaluated using: (1) a nine-factor student evaluation of educational quality; (2) a six-factor questionnaire for student learning, and (3) course grades. Ratings from both GTAs and undergraduates indicated that indicated that the inquiry-based learning pedagogy training has a positive effect on GTA teaching effectiveness.

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Hughes, P. & Ellefson, M. (2013). Inquiry-based training improves teaching effectiveness of biology teaching assistants. *PLOS ONE*. Retrieved from <https://journal.plos.org/plosone/article?id=10.1371/journal.pone.0078540>

The Effects of Process Oriented Guided Inquiry Learning Environment on Students' Self-Regulated Learning Skills

Senol Sen, Ayhan Yilmaz, Omer Geban

Teaching and learning trend has shifted gradually from a teacher-centered approach to a student-centered learning approaches, such as Process Oriented Guided Inquiry Learning (POGIL). POGIL is an instructional approach combining guided inquiry and cooperative learning in which students are involved in the learning process. The purpose of this study was to investigate the effect of POGIL method compared to traditionally designed chemistry instruction (teacher-centered approach) method on 11th grade students' Self-Regulated Learning Skills. The study was conducted during 2014 – 2015 spring semester. Participants were 115 students from one high school in Turkey. Non-equivalent control group design was used. Two experimental groups and two control groups were randomly selected. Experimental groups were instructed with POGIL, while control groups received traditionally designed chemistry instruction. Achievement Goal Questionnaire (AGQ) and Motivated Strategies for Learning Questionnaire (MSLQ) were administered to both groups as pre-test and post-test to determine students' self-regulated learning skills. Multivariate Analysis of Variance (MANOVA) was used to investigate the effect of POGIL on the dependant variables. Results revealed that POGIL improved students' mastery approach, task value, control of learning beliefs, self-efficacy for learning and performance, critical thinking, help seeking peer learning, metacognitive self-regulation, effort regulation, time/study environmental management. The results showed that POGIL was superior to the traditionally designed chemistry instruction on students' self-regulated learning skills. Thus, POGIL is helpful for development of students' self-regulated learning skills.

Şen, Ş., Yilmaz, A., & Geban, Ö. (2015). The Effects of Process Oriented Guided Inquiry Learning Environment on Students' Self-Regulated Learning Skills. *Problems of Education in the 21st Century, Volume 66*, 54-65.

Effective Teaching: To Be an Effective Educator, Get Active

Chris Tachibana

Scientists from leading universities, the National Academy of Sciences, and the White House are calling for faculty to move from traditional lecture-based teaching to active learning strategies. Active learning gets students involved in finding, interpreting, and explaining course material. It's an evidence-based method with rewards for students and instructors. This article explores how - and why - faculty should incorporate active learning into their courses.

Tachibana, C. (2015). Effective teaching: to be an effective educator, get active. *Science*, September 18, 2015. Retrieved from <http://www.sciencemag.org/careers/features/2015/09/effective-teaching-be-effective-educator-get-active>

POGIL Regional Coordinators

North Central Region—NC (IA, IL, IN, MI, MN, SD, ND, NE, OH, WI)

Urik Halliday, Friedrich W. Von Steuben Metropolitan Science Center (2017)

Craig Teague, Cornell College (2018)

Northeast Region—NE (CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT, WV)

Steve Gravelle, St. Vincent College (2016)

Joe Brown, U.S. Coast Guard (2017)

Northwest Region—NW (AK, ID, MT, OR, WA)

Bonnie Wehausen, Idaho Falls High School and Laura Lavine, Washington State University (2017)

Southwest Region—SW (AZ, CA, CO, HI, NM, NV, UT, WY)

Heather Wilson-Ashworth, Utah Valley University (2017)

South Central Region—SC (AR, KS, LA, MO, OK, TX)

Michael Garoutte, Missouri Southern State University (2017)

Tricia Shepherd, St. Edward's University (2018)

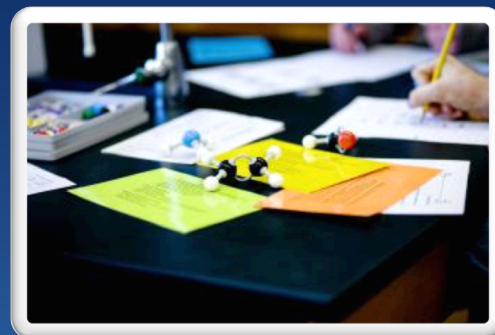
Southeast Region—SE (AL, FL, GA, KY, NC, MS, SC, TN, VA)

Megan Hoffman, Berea College (2017)

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 an event request at <https://pogil.org/contact/enter-request> or email Marcy Dubroff at mdubroff@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 mdubroff@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

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