

The POGIL Inquirer

In the Spotlight

Clicking into Engaging Science Lessons

Amanda Zullo wins NEA Foundation award to support innovative ideas in the classroom. *Page 6*



From The POGIL Project Director



The Summer of 2013 was a busy and exciting one for The POGIL Project. Our six summer 3-day workshops were well attended and were a great success due to the outstanding efforts of our facilitators and office staff. We continued our international effort with a strong effort at ChemEd 2013 at the University of Waterloo in Ontario, Canada, led by Laura Trout and Paula Butler. Renee Cole traveled to Australia and New Zealand to give POGIL workshops to our friends Down Under, and Clif Kussmaul, Dan Libby, and Kelly Butler traveled to India to give a series of workshops arranged by Sandhya Kode of EnhanceEdu and International Institute of Information Technology – Hyderabad.

Finally, I am very pleased to announce that The POGIL

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Upcoming POGIL Events

Fall 2013

Aug. 28	Cassia Joint School
Sept. 14	1-Day at Portland State University
Oct. 3	Boise State University
Oct. 9	University of Virginia (private)
Oct. 26	NSTA Workshop – Portland, OR
Oct. 26	Washington State University

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

Ask The Mole

Q: Can POGIL be used in laboratory settings?

A: Yes!

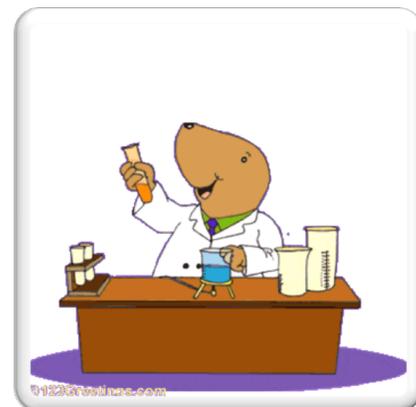
A POGIL laboratory is one in which students, in advance of any classroom work on underlying principles, work in groups to conduct experiments, rather than exercises that verify previously taught principles.

Prior to the beginning of any laboratory work, the instructor poses a focus question (What factors affect the solubility of ions? When an alcohol reacts as a base, what role might substituents play?) and groups propose a set of tentative answers.

To test these hypotheses, students run reactions and collect data, which are pooled and then analyzed with the aid of post-experiment or post-laboratory guided-inquiry questions. This learning cycle approach not only guides students to construct their own understanding of important chemical concepts, but also helps them to develop valuable learning process skills.

(Excerpted from Process-Oriented Guided Inquiry Learning, ACS Symposium Series 994, edited by Richard S. Moog and James. N. Spencer).

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



POGIL Anatomy & Physiology Workshop a Success



Laura Trout and Leigh Foy led a two-day workshop for anatomy and physiology instructors at the University of Minnesota this past June. The focus of the workshop, which included both high school and college instructors, was to begin writing POGIL labs for entry level A&P courses. Ten new lab activities are now in the works which will be revised and tested over the next two years. For more information on the anatomy and physiology POGIL project, contact Murray Jensen at msjensen@umn.edu.



Mare Sullivan Earns Teacher of the Year Award in Science for the State of Washington

The Washington State Science Teachers Association recently announced the winners of the Teacher of the Year Awards in Science for the State of Washington.

Mare Sullivan of Bellevue Christian School was one of those recognized with this award.

Mare has taught for almost 20 years and currently teaches Chemistry. She provides rich instruction and laboratory experiences to her students. Her principal, Sue Taming, shared that, “Mare is a teacher who works hard to reach all of her students, not just the ones for whom chemistry comes easy. She demonstrates to her students her passion for learning and her passion for deeply understanding chemistry by her continual striving to be a life-long learner. Students know that Mrs. Sullivan does not just talk the talk, she walks the walk.”

WSTA is an organization dedicated to advocating and promoting quality advancement of science education. Members of the Washington State science community are encouraged to nominate a deserving teacher of science each year. Nominees must have taught a minimum of three years, and be currently teaching in a part-time or full-time role. Teachers are nominated by their colleagues and awardees are exemplary at:

- Creating a classroom environment that is supportive of science learning.
- Providing effective delivery of instruction leading to student understanding of content and processes.
- Promoting science beyond the classroom to either students, other staff, or the community.
- Providing a positive and enthusiastic attitude for science education.
- Demonstrating leadership in science education as a model for others (teachers, community, other) to follow.

POGIL-PCL Project Continues Progress

The POGIL-PCL project completed its fourth 2-day workshop in July.

About four experiments have been alpha tested and reviewed; once the authors finalize any edits suggested in the reviews, these experiments will be available for beta testing. Everyone will get an email from Alex Grushow regarding the specifics of this process. Following beta testing, the leadership team plans to submit these experiments to the national POGIL office.

In addition, there are a number of experiments that should be available for alpha. The project will publish updates in its newsletter on the POGIL website later this fall.

The POGIL Project Welcomes Scott Denlinger



The POGIL Project is happy to welcome Scott Denlinger to its staff as its new multimedia specialist.

He is responsible for managing the development and revision of paper-based instructional materials as well as overseeing the implementation of relevant technologies used to further the mission of the POGIL Project. He serves as a liaison to both undergraduate and high school level personnel and collaborates with publication designers to create effective instructional materials for use at workshops. He also investigates, recommends, and implements appropriate technologies that can be used for instructional and promotional purposes.

Scott received an M.S. degree in Information Studies at Drexel University, in Philadelphia, PA, and a B.A. degree in German at Goshen College in Goshen, IN. Scott enjoys cooking, and watching and playing soccer.

High School Happenings

The latest Flinn Scientific book, AP Biology, was released this past fall, and has sold almost 1,000 copies since then.

2013 sales figures were still strong for the Chemistry and Biology books, with more than 1,800 texts already sold!

Third POGIL Facilitator Training Workshop Planned for January 2014



Applications are now being accepted for the third POGIL facilitator training workshop, which will take place Jan. 18-20, 2014, in Myrtle Beach, S.C. The facilitator training workshop is designed to give each participant a deeper understanding of the goals of POGIL workshop sessions as well as an opportunity to practice their workshop facilitation skills while also learning about a number of POGIL sessions. In particular, participants will experience aspects of Introduction to POGIL, Classroom Facilitation, Writing and SoTL workshops. All participants will facilitate parts of these workshops and receive valuable feedback on their facilitation skills. A key workshop goal is to increase the number of workshop facilitators across the nation. The workshop is also designed to provide consistent training of all POGIL workshop facilitators, and to train people to present POGIL workshops at their home schools and regions. The workshop will be led by Suzanne Ruder (Virginia Commonwealth University), Andrew Bressette (Berry College), and Tim Herzog (Weber State University). Applicants must fill out the registration form located at www.pogil.org by clicking the "Apply for this event" button located on the left side of the page. They must then complete an additional application form that will be emailed upon receipt of the original registration request. The application must be completed and returned to mdubroff@pogil.org or 717-358-4640 (fax) no later than October 15. Space is limited to 20 attendees. The POGIL Project will inform applicants of their status no later than October 31. Limited scholarships are available.

St. Vincent's Caryl Fish Honored with Boniface Wimmer Faculty Award



Dr. Caryl Fish, associate professor of chemistry in the Saint Vincent College Herbert W. Boyer School of Natural Sciences, Mathematics and Computing, was honored with the presentation of the Boniface Wimmer Faculty Award at the Saint Vincent College spring Honors Convocation on April 24 in Saint Vincent Basilica. Named for the founder of Saint Vincent and the pioneer of Benedictine monasticism in the United States, the Boniface Wimmer Award recognizes a senior faculty member for sustained teaching excellence. Fish earned a bachelor of science degree in chemistry and environmental studies with distinction from Manchester College, a master of business administration degree from the University of Dayton and a Ph.D. in environmental chemistry from the State University of New York. She is the director of the environmental science

Photo: Dr. Caryl Fish, associate professor of chemistry, accepts the Boniface Wimmer Faculty Award from Br. Norman W. Hipps, O.S.B., president of Saint Vincent College.

“This academic year is Dr. Fish’s 22nd year as a faculty member,” commented Dr. John Smetanka, vice president for academic affairs and academic dean. “Throughout this time Dr. Fish has been an integral person in a number of environmental projects including the remediation of mine drainage in the local watershed and the establishment of the environmental science major at the college. The efforts to mitigate the orange mine drainage in the Loyalhanna Creek is perhaps one of the most visible success stories for passive treatment wetlands. It has also yielded numerous research opportunities for faculty, students and high school teachers under Dr. Fish’s direction. Dr. Fish has been the principal investigator for ten environmental and educational grants including most recently a grant from Dominion Energy to develop and incorporate energy-related modules into a variety of natural science courses.” “A leader among the faculty, Dr. Fish has chaired the educational policies committee for several years, moving this year to serve as the chair of the core curriculum subcommittee working on general education assessment in preparation for our periodic review. In everything she does Dr. Fish is an effective partner, a thoughtful planner and a professional scientist and educator held in high esteem by her colleagues,” Dr. Smetanka continued.

“Dr. Fish was an early adopter of inquiry-based and active learning pedagogies in the class and laboratory,” he added. “She has presented her educational innovations at national conferences and along with several of the chemistry faculty, is a member of the POGIL (Process Oriented Guided Inquiry Learning) group. Saint Vincent College is truly blessed to have faculty like Dr. Fish who devote themselves to teaching, service and improving the environment.”

From the Director

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Project has entered into an agreement with John Wiley & Sons to publish and distribute POGIL-endorsed materials for the post-secondary market. The first two collections under this agreement are now available through Wiley’s Custom Select platform: Calculus 1 by Andrei Straumanis, Catherine Beneteau, Zdenka Guadarrama, Jill Guerra, and Laurie Lenz, and Quantum Chemistry by Alex Grushow and Tricia Shepherd. In addition to providing the entire collection of materials for a Calc 1 and PChem class, these collections are easily customizable. Additional content will be available soon through this site. We are very excited about all of these developments and look forward to sharing more news with you about the continuing growth and successes of The POGIL Project.

Richard S. Moog

In the Spotlight: Amanda Zullo

Clicking into Engaging Science



Every year, the NEA Foundation awards more than 150 grants to support public school educators' innovative ideas. On average, each grant impacts the learning of 200 students. Amanda Zullo of Saranac Lake High School in Saranac Lake, NY was the recipient of a Student Achievement Grant.

When Amanda Zullo began teaching a multi-grade high school chemistry class, she knew she needed to change the way her class worked to meet the needs of a wider range of students. With no prerequisites, the Regents chemistry course placed in the same classroom “the valedictorian and the kids who are hoping to meet the graduation requirements,” she says. “It challenged me to try different ways of teaching to reach the broadest group of students possible.”

Zullo shifted to an inquiry-based model of classroom instruction, one in which students work together in groups to solve open-ended problems. To ensure students were on task, she walked from group to group to check for understanding. But she knew that spot checks “based on gut” weren’t enough to ensure that all students were learning.

In searching for a solution, Zullo discovered a counterintuitive corollary about technology and teaching: finding a tool to quickly gauge student understanding paved the way for more open-ended, deeper learning.

Through the NEA Foundation Student Achievement Grant, Zullo obtained a classroom set of “clickers,” a system of handheld devices that students use to respond to questions posed during class. The system compiles the results and pinpoints which students are struggling to understand key concepts, allowing Zullo to focus on helping exactly who needs it.

“You could tell if the kids were on target as they were doing these projects,” she says. “It immediately took the fear factor out of spending a day teaching kids something they may or may not learn from. With this, I can just find out on the spot and adjust on the fly to make sure everyone’s on target with the learning goals at hand.”

Zullo worked with other science and math teachers to learn how to use the system, which has also helped spark classroom discussion.

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“A teacher could borrow the laptop from the library, pick up the clickers and bring them to their classroom and use them,” Zullo says. “It became very seamless.” Collaboration on the technology also opened the door for collaboration in the classroom, as Zullo began co-teaching lessons with an Algebra teacher. “As we found this was effective, we were encouraged to try more and broader things,” she says.

The technology has also helped focus tutoring in the school’s after school library program, which is overseen by educational support staff. “You can export reports from the system and see what kids got right and wrong,” Zullo says. “That way, the students come into the library after school and get help with what they need. It’s helped realign that support with the classroom expectations.”

All told, 300 students and 15 teachers have used the clickers since they were introduced in March 2012. Zullo saw the number of critical thinking statements included in student lab reports increase by 45 percent; this is a significant increase and is what new standards such as the Common Core State Standards aspire to achieve.

The clicker has facilitated formative assessment of student understanding, higher-order and cross-disciplinary instruction, and more aligned afterschool supports—all of these are known by research to contribute to higher-student achievement. Zullo adds, however, that an equally important shift occurred—she became a more “reflective” teacher. That is, with the reports generated by the clickers, she had access to a new source of data and information that she could use to reflect on and tweak her practice. In her own words, “In the end, the reflection on what’s happening in your classroom is really valuable.”

Calculus 1 and Quantum Books Now Available

Customers interested in adopting content from these two resources above can now do so through our partnership with Wiley Publishing (www.wiley.com). To view the complete collections of activities in *Calculus I: A Guided Inquiry* as a flipbook, visit <http://www.flipsnack.com/579969EC5A8/fhksz8li>

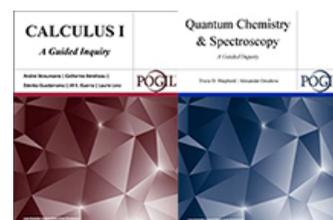
To view the complete collections of activities in *Quantum Chemistry & Spectroscopy: A Guided Inquiry* as a flipbook, visit <http://www.flipsnack.com/579969EC5A8/fhmlwknu>

To create, preview and adopt your own custom book, you can go to: <http://customselect.wiley.com/collection/pogil>.

Once you are on the Wiley CustomSelect site in the POGIL Special Collection, you can narrow your results by using the filters on the lower left hand side of the page under the heading 'Refine your results'. Once you are ready to start building your custom book you will need to log into the site. To do so, click the orange 'LOG IN / SIGN UP' button on the right hand side of the page.

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POGIL National Meeting Focuses on Strategic Plan

More than 50 POGIL stalwarts converged on Washington University in St. Louis in June for the 11th annual POGIL National Meeting. This year's event was particularly exciting, as it was organized around the goals of The POGIL Project's Strategic Plan. Attendees had multiple opportunities to contribute to activities that support The POGIL Project as it strives to meet these strategic goals. To view the strategic plan, visit <http://www.pogil.org/about/pogil-strategic-plan>. (*Thanks to Michael Garoutte for photographs*)



2013-14 POGIL Regional Networks/ Coordinators

Great Lakes Region (North Central)
(IA, IL, IN, MI, MN, ND, NE, OH, SD, WI)
Tracey Murray, Capital University
(tmurray2@capital.edu)

Northeast Region
(CT, DC, DE, MA, MD, NH, NJ, NY, ME, PA, RI, VT, WV)
Laura Galligan, Johnson & Wales/Kris Lantzky-Eaton, St. John Fisher College
(lgalligan@jsu.edu/klantzky@sjfc.edu)

Northwest Region
(AK, ID, MT, OR, WA)
Lori Stanton, Bellevue Christian School
(lstanton@bellevuechristian.org)

South Central Region
(AR, KS, LA, MO, OK, TX)
Marty Perry, Ouachita Baptist University
(perrym@obu.edu)

Southeast Region
(AL, FL, GA, KY, MS, NC, SC, TN, VA)
Patrick Brown, East Tennessee State University
(brownp@etsu.edu)

Southwest Region
(AZ, CA, CO, HI, NM, NV, UT, WY)
Tim Herzog, Weber State University
(timothyherzog@weber.edu)

Summer 2014 Regional Workshops are in the planning stage. Please contact any of the Regional Coordinators if you have any questions about events or workshops in your region.

The POGIL Project Seeks Nominations for its Steering Committee

The POGIL Steering Committee is currently seeking applications for new members. You are invited to submit an application or encourage someone you know to apply. Applicants should be experienced enough with The POGIL Project to be well informed about the direction of The Project as outlined in the Strategic Plan and be proficient POGIL practitioners in the classroom.

The Steering Committee guides the work of the Project by assuring the strategic plan is carried out. There are eight members on the committee, each with defined responsibilities related to one of the goals on the strategic plan. The members serve a three-year term, with two to three members rotating off each year, and new members rotating on at the POGIL National Meeting (PNM).

New Steering Committee members are selected based on the needs of The Project at the time and the skills and knowledge that applicants can offer. These needs change from year to year so applicants should not be discouraged from applying multiple times. Although a range of experiences within the project is an advantage, it is not a requirement.

Applications will be evaluated by the current Steering Committee members according to the most pressing needs of The Project. The Project Director will choose new members based on recommendations by the current Steering Committee members. Application forms are **due September 15, 2013**. New Steering Committee members will be notified of their appointment by December 1, 2013.

All Steering Committee members will be asked to:

- Perform tasks that further the strategic plan as assigned. Typically this includes managing and guiding projects that are ongoing in the community.
- Attend two meetings in person each year: a weekend meeting in the fall in Philadelphia, and the PNM in June with additional days before and after the meeting for Steering Committee work.
- Participate in monthly conference calls with other Steering Committee members, staff members and the Project Director for updates and to discuss issues that arise throughout the year.
- Assist in the planning and implementation of Regional meetings and the PNM.

Minimum requirements:

- Applicant has attended an Advanced Workshop, or the equivalent.
- Applicant has used POGIL activities in the classroom on a regular basis for at least two years. (Note: It is not a requirement that an applicant be in the classroom currently. Retirees or persons who have moved to administrative positions are also eligible.)
- Applicant has attended at least one PNM in the past three years.

Past Steering Committee members are eligible to apply, as long as their previous term ended June 2012 or earlier.

If you are interested in receiving an application, please contact Marcy Dubroff at marcy.dubroff@pogil.org before September 10, 2013.

POGIL Published Works

Reasoning using particulate nature of matter: An example of a sociochemical norm in a university-level physical chemistry class

Nicole Becker, Chris Rasmussen, George Sweeney, Megan Wawro Marcy Towns and Renee Cole
Chem. Educ. Res. Pract., 2013, **14**, 81-94

ABSTRACT: In college level chemistry courses, reasoning using molecular and particulate descriptions of matter becomes central to understanding physical and chemical properties. In this study, we used a qualitative approach to analyzing classroom discourse derived from Toulmin's model of argumentation in order to describe the ways in which students develop particulate-level justifications for claims about thermodynamic properties. Our analysis extends the construct of sociomathematical norms to a chemistry context in order to describe disciplinary criteria for reasoning and justification, which we refer to as sociochemical norms. By examining how whole class and small group discussions shape norms related to reasoning, we provide suggestions for teaching practices in inquiry-oriented settings.

How Does Atomic Structure Affect Electron Clouds? A Guided-Inquiry NMR Laboratory for General Chemistry

Michael A. Everest and Jeffrey M. Vargason
Journal of Chemical Education 2013 90 (7), 926-929

ABSTRACT: In a guided-inquiry laboratory experience, students encounter data that give them the opportunity to discover a concept on their own. Nuclear magnetic resonance (NMR) spectra and inquiry-based pedagogy are used to guide general-chemistry students to the concept of electronegativity and periodic trends. The chemical shift of hydrogen vicinal to a test atom is used as a proxy for the "thickness" of the electron cloud around that atom, and the test atom is changed across the periodic table (C, N, O, and F) and down the periodic table (F, Cl, Br, and I). By examining the spectra, students learn that the more protons in the nucleus of an atom, the thinner the cloud on an adjacent atom when comparing atoms in the same row of the periodic table, but this trend does not hold when going down the periodic table. Although the students acquire spectra during the lab period, students at institutions without access to an NMR spectrometer could explore prerecorded spectra in a classroom or dry-lab activity.

Implementing Process-Oriented, Guided-Inquiry Learning for the First Time: Adaptations and Short-Term Impacts on Students' Attitude and Performance

Anthony Chase, Deblina Pakhira, and Marilyne Stains
Journal of Chemical Education 2013 90 (4), 409-416

ABSTRACT: Innovative, research-based instructional practices are critical to transforming the conventional undergraduate instructional landscape into a student-centered learning environment. Research on dissemination of innovation indicates that instructors often adapt rather than adopt these practices. These adaptations can lead to the loss of critical elements of the practice, which may affect its effectiveness. Process-oriented, guided-inquiry learning (POGIL) is a research-based instructional practice that has been widely disseminated for the past two decades. However, few studies have investigated practitioners' adaptations of POGIL and the impact of these adaptations on expected outcomes measured during recommended implementations of POGIL. In this study, we explore the impact of the implementation of POGIL in discussion sections of a general chemistry and an organic chemistry course on students' grades, retention, attitude toward chemistry, self-efficacy in chemistry, and attitude toward the learning environment provided in these courses. A quasi-experimental design was implemented and data were collected through valid and reliable surveys. Results indicate little to no impact on most measures, although positive trends favoring POGIL students were observed. Discussion of how this particular adaptation of POGIL could explain these results is presented, along with implications for research and practice.

Implementing Process Oriented Guided Inquiry Learning (POGIL) in Undergraduate Biomechanics: Lesson Learned by a Novice

Shawn R. Simonson, Susan Shadle
Journal of STEM Education: Innovations and Research 2013 Vol. 14, No. 1

ABSTRACT: Process Oriented Guided Inquiry (POGIL) uses cooperative learning activities to teach content and to actively engage students in inquiry, analytical thinking, and teamwork. It has been used extensively in Chemistry education, but its use is not well documented in other areas. This is a summary of the initial implementation of POGIL in a university Biomechanics course and includes the benefits, challenges, and recommendations for teachers interested in using this effective instructional strategy.

Make a gift to The POGIL Project

• If you haven't yet made a contribution to The POGIL Project, please consider a gift. The POGIL Project stands at crossroads — functioning for the first time without direct funding from the NSF, we are in a unique position to positively impact our nation's educators and students at an unprecedented level, expanding into new communities, institutions and subject matters. Your commitment and generosity has allowed The POGIL Project to impact countless lives for the better. With your continued support, you can help us achieve and surpass our potential!

Contact Aaron Spangler, aaron.spangler@pogil.org, for more information on how to make a gift.



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

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The POGIL Inquirer

The POGIL Project

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