

# The POGIL Inquirer

## From the POGIL Project Director



Greetings from The POGIL Project,

I am writing to apprise you of exciting changes in store for The POGIL Project as we move from a primarily grant-funded organization to an independent,

non-profit entity. We invite your partnership in this new era.

Our phenomenal growth is, in large part, thanks to you. Your commitment and energy, whether as a workshop participant, classroom tester, or facilitator, have helped us to forge a new model for student-centered learning. From our origins in 2003 as a curricular dissemination project in undergraduate chemistry, we've grown to become a national leader in a range of disciplines across the undergraduate and high school levels.

Our future is ripe with possibilities.

Generous funding from the NSF, the U.S. Department of Education, the Hach Scientific Foundation and Toyota USA, have been instrumental in our growth, as has support and housing from Franklin & Marshall College.

In this past year alone, The POGIL Project has:

- Provided professional development experiences to more than 800 people in a variety of academic disciplines via our regional meetings, one-day and shorter workshops.
- Developed POGIL biology and chemistry activities through the High School POGIL Initiative (HSPI) available for purchase from Flinn Scientific in early 2012.
- Initiated the development of new curricular materials in computer science, calculus and pre-

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## Upcoming Workshops

**March 3, 2012**  
Parsippany, NJ  
Holiday Inn & Suites

**April 14, 2012**  
Cincinnati, OH  
Holiday Inn, I-275

**May 29, 2012**  
San Francisco, CA  
ACSM Meeting

**Summer 2012**  
Regional workshops will be announced on the POGIL website in early January

*For more information on upcoming workshops, please visit the POGIL website at [www.pogil.org](http://www.pogil.org).*



**POGIL**<sup>TM</sup>

**Moog, continued from p. 1**

calculus, anatomy and physiology, and chemistry in a climate change context.

- Launched its online newsletter, The POGIL Inquirer (available at [www.pogil.org](http://www.pogil.org)). You can also follow us on Twitter (@pogilproject).
- Been cited in the journal *Nature* as a prime example of effective “cooperative, hands-on learning activities.”
- Seen several of its leadership members garner national recognition:
  - HSPI Partners Melissa Hemling and Bruce Wellman — 2010 Presidential Awards for Excellence in Mathematics and Science Teaching; Bruce was also selected as a USDE Teaching Ambassador Fellow for the current academic year.
  - Diane Bunce — 2012 ACS George C. Pimentel Award in Chemical Education.
  - Loretta Jones — 2012 ACS Award for Achievement in Research for the Teaching and Learning of Chemistry.
  - Vicky Minderhout — 2011 CASE Professor of the Year for Washington State.

Your gift of time and energy has been instrumental in bringing us to this point, poised on the cusp of growing into something even greater as an independent entity. We are in the midst of our transition into a not-for-profit corporation with official tax-exempt 501(c)3 status, which allows us to create a permanent framework to enable The POGIL Project to be sustainable into the future.

Our mission remains clear. We are committed to leading the way in a classroom revolution, encouraging advancements toward more student-centered learning through tools like professional development enrichment and developing classroom materials in support of educators. Our aim is to make POGIL instruction the norm throughout our nation’s educational system.

To get there, we need to establish a firm financial foundation for The POGIL Project. Grant funding and generous donations of time and money have brought us this far, and we will continue to rely on all of these sources. But at the end of March, the significant support of our current direct funding from the National Science Foundation will end.

**Your support now is vital to help us advance the mission of The POGIL Project. I hope that you will consider making a tax-deductible contribution to enable us to continue our work serving the academic community and reforming our country’s educational system.**

Best wishes for a happy holiday season,



## In the Spotlight

Vicky Minderhout  
*Seattle University*



*By Mike Thee*

If you're looking for one of the most highly regarded faculty members in the United States, you don't have to walk very far.

Vicky Minderhout, professor of chemistry, is the 2011 Washington State "Professor of the Year" by the Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education (CASE). Minderhout is the first Seattle University faculty member to receive this honor and one of only 27 faculty chosen nationwide.

"Dr. Vicky Minderhout is an exemplary scholar-educator who embodies the high standard of excellence that has come to characterize Seattle University," said Provost Isiah Crawford. "An educator in the fullest sense of the word, Dr. Minderhout is committed to providing the very best learning experience for her students while taking a leadership role in reshaping our nation's approach to science education. My faculty colleagues and I are immensely proud of her and congratulate her on receiving the recognition she has so rightly earned."

In 1997, 17 years after joining SU's faculty, Minderhout radically changed her method of teaching. She stepped away from the podium and assembled her students into small groups. She then challenged them to delve into their course work by actively exchanging ideas, challenging one another and building on each other's thoughts.

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## Diane Bunce Honored as George C. Pimentel Award Winner in Chemical Education

Congratulations to Diane Bunce, winner of the American Chemical Society's 2012 George C. Pimentel Award in Chemical Education for "outstanding contributions to chemical education." Bunce, professor of Chemistry at The Catholic University of America and a former PI on the POGIL main NSF grant, was honored as an exemplary contributor to chemical education. She will attend a daylong symposium held in her honor in San Diego in March 2012. At this symposium, Bunce will deliver a keynote address on mentoring, and scientists will present projects that were directly influenced by Bunce's research.

**Minderhout, *continued from p. 3***

There was some trepidation—even resistance—at first. But in time, her new lecture-free way of teaching (also known as guided inquiry learning) was embraced by Minderhout's students. "This, I believe, is the future of science education, and it's happening right now, right here at our university," the dean said.

Minderhout likens her post-1997 role to more of a coach, and she turns to Redhawk basketball for an analogy. "What if (head men's basketball coach) Cameron (Dollar) just explained things but didn't let his players try it?" she asked. "Students want to hear what their professors have to say, but I also believe they want to be actively involved in the learning process."

At a Nov. 21 campus celebration for Minderhout, President Stephen Sundborg, S.J., called her achievement "an historic occasion at Seattle University" and lauded the chemistry professor for "the courage it must have taken to move to that kind of a coaching way (of teaching). It's an extraordinary change she made. This is just as good as it gets at Seattle University."

Recognizing that other educators might benefit from a guided inquiry approach to learning, Minderhout extensively publishes and presents on the subject nationally. With Associate Professor of Chemistry Jenny Loertscher, Minderhout authored an active learning curriculum for biochemistry classes that is now being used at 50 institutions nationally.

Minderhout's expertise is often tapped by her SU colleagues. She co-chaired the University Core Revision Committee and is now co-chairing the committee implementing the new Core.

"Vicky's contributions to Core Revision process were invaluable," said Nalini Iyer, director of the Office of Research Services and Sponsored Programs, who served with Minderhout as a co-chair of the Core Revision Committee. "Vicky brought to the project a deep understanding of pedagogical issues and curriculum design. Her knowledge of outcomes-based education takes her beyond the disciplinary boundaries of chemistry and even that of science. She can engage with professors from diverse disciplines as history, nursing, management, fine arts, and so on, to examine what does work and what does not work in terms of general education at Seattle University."

Minderhout also collaborates with other educational innovators such as the Institute for Systems Biology's Center for Inquiry Science, a Seattle-based pioneer in reshaping K-12 science education. At the Nov. 21 reception, Dana Riley Black, the center's director, said, "Vicky is a model of how we can effectively rethink science, technology, engineering, and mathematics (STEM) education at the undergraduate level. We believe that the model that Vicky has embraced is the model for STEM educators as well as educational administrators across the country."

Read the front-page [Seattle Times](#) article about Minderhout's award, [view the slideshow](#), or the local news story, "[Making a Difference](#)" story to learn more about how she's changing the way science is taught.

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## HSPI Happenings

For everyone involved in the High School POGIL Initiative (HSPI), 2012 will be filled with excitement. Three projects that have literally been years in the making are about to launch.

First, we are thrilled to announce the publication of the first two activity collections developed through the HSPI. The collections, titled *POGIL Activities for High School Chemistry* and *POGIL Activities for High School Biology*, will be available from Flinn Scientific in their January 2012 catalog. Online ordering for the books is anticipated to begin on January 15. Visit Flinn's website in the new year at [www.flinnsci.com](http://www.flinnsci.com) for details.



The second project going live in January 2012 is our web-based Implementation Guide, that will be found under the Resources tab on the POGIL website. This interactive guide will be filled with ideas contributed by our high school practitioners and includes tips and tricks, downloadable files, videos and more. Take a minute to scroll through some of the resources the HSPI has gathered there — we are confident you'll find something to help you refine your instructional practice and reach your POGIL-related classroom goals.

Our final announcement is that HSPI will be sponsoring monthly Implementation Webinars. The schedule for these events will be posted on the POGIL website, along with descriptions and registration information. Head to the events page (<http://www.pogil.org/events>) to reserve your spot at these live events. Space is limited to 50 participants, but the webinars will be archived and links to those recordings will be available on the POGIL website.

Thanks to everyone who has been involved in bringing these projects to life.



### Happy Belated Mole Day!

In honor of National Mole Day, celebrated on October 23, a new section has been added to *The POGIL Inquirer* — *Ask the Mole!* If you have any questions regarding inquiry learning, POGIL materials, or any POGIL-related knowledge, email us at [mdubroff@pogil.org](mailto:mdubroff@pogil.org).

# Adapting a Methodology From Mathematics Education Research to Chemistry Education Research: Documenting Collective Activity

Renee Cole, Nicole Becker, Marcy Towns, George Sweeney, Megan Wawro and Chris Rasmussen

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*For the full text of the article, please visit*

<http://www.chem.purdue.edu/towns/Towns%20Publications/Cole%20et%20al%202011.pdf>

In this report, we adapt and extend a methodology for documenting the collective production of meaning in a classroom community. The methodological approach we develop is the result of a synergy between undergraduate chemistry and mathematics education researchers. This synergy built on the experience of the mathematics education researchers in using Toulmin's (1969) model to study classroom discourse and the complementary experience of the chemistry education researchers in studying student learning in innovative classrooms. The result was the adaption of a methodological approach developed by the mathematics education researchers to document collective progress in inquiry oriented classrooms. Our efforts to analyze students' ways of reasoning by examining classroom interaction are compatible with the relatively recent emphasis of mathematics and science education research that focuses on the collective activity by which communities of learners jointly build ideas (Hershkowitz, Hadas, Dreyfus & Schwarz, 2007; Rasmussen, Zandieh & Wawro, 2009; Saxe, Gearhart, Shaughnessy, Earnest, Cremer, Sitabkhan et al., 2009).

The collective activity of a chemistry or mathematics class refers to the normative ways of reasoning that develop as students work together to solve problems, explain their thinking, represent their ideas, etc. These normative ways of reasoning, also known as a classroom mathematical practice (Cobb, Stephan, McClain & Gravemeijer, 2001) or, in our case, a classroom chemistry practice, can be used to describe the mathematical or scientific activity of the classroom and may or may not be appropriate descriptions of the characteristics of each individual student in the class. This last point is critical to the notion of collective activity. It offers a perspective of the social context of the classroom that affords students opportunities for conceptual growth. The notion of collective activity also resonates with how instructors typically think about their students when they are teaching. For example, in a class of 40 students, instructors often make decisions based on their sense of the class as a whole, while recognizing that there are individual differences (Cobb & Yackel, 1996; Phillips, 2003). As such, the theoretical notion of a classroom practice (whether it be a classroom mathematical practice or a classroom chemistry practice) is one that has strong pragmatic connections.

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One promising method for analyzing classroom practices, which was originally developed in mathematics courses, uses a three-phase approach grounded in Toulmin's (1969) argumentation scheme (Rasmussen & Stephan, 2008). This method for documenting the collective production of meaning provides an empirical basis for examining the quality of classroom discourse, for reflecting on instructional design, and for comparing learning opportunities across classrooms. Adapting and extending this method to inquiry-oriented chemistry classrooms provides a unique opportunity to modify the method as needed to fit a new content domain and to investigate how students develop understanding of ideas and symbolism in physical chemistry.

In this paper, we identified a new criterion that can be used to determine the specific ways of reasoning that constitute a classroom chemistry practice. This new criterion is not limited to chemistry classes but can be used, in conjunction with the two previously identified criteria, to determine the classroom practices in any classroom that actively engages students in the learning process. The specific criterion we discovered involved the repeated use of data or warrants to justify assertions.

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## POGIL in the News

- U.S. Secretary of Education Arne Duncan has selected HSPI Partner Bruce Wellman, of Olathe Northwest High School (Kansas), as a 2011–12 Teaching Ambassador Fellow. The fellowship gives outstanding teachers an opportunity to learn about national education policies, and to share their knowledge in professional networks. Wellman was chosen as one of the 16 Fellows from 750 applicants. <http://www.seattleu.edu/news/>
- Dr. Isaac Wood, Senior Associate Dean for Medical Education and Student Affairs and Professor of Psychiatry and Pediatrics at Virginia Commonwealth University, has received a grant to implement a faculty learning community, using POGIL, with representatives from medicine, dentistry, library sciences, nursing, and the simulation center.
- Get all the latest news about POGIL by following us on Twitter! Sign up to get our @POGIL tweets at twitter.com.



### 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 your news to Marcy Dubroff at [mdubroff@pogil.org](mailto:mdubroff@pogil.org)

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