

## WHAT WORKS - A PKAL INTERVIEW

# INTERVIEW WITH A 2005 DISTINGUISHED TEACHER SCHOLAR

Jeanne L. Narum, Director, Project Kaleidoscope, interviewing Dr. Paul Bierman

*If a visitor were to come into your classroom/lab - the environment in which you work with students - what impression would s/he leave with?*

Energy, fun and hard work! It is my love of science and fascination with the Earth that drives me to do what I do every day and that's what I try to convey to my students at all sort of levels. Sure science and learning are hard work but isn't everything that's worthwhile?

In my classroom, there's lots of talking and moving around, even when I am teaching 230 students in an introduction to Earth Hazards class. The TAs and I walk the aisles. We ask for students to shout questions out to the group. We try our hardest to get people to think, to speak to each other, to question what they think they know.

We get people down front doing silly things like using giant slingshots to impale birthday cakes with apples—the best we can do to simulate asteroids striking Earth. The analogy's not perfect but I can tell you they never forget the demonstration and they walk away laughing, knowing that things fall from the sky, and realizing that their professor is a person who likes to have fun too. My former chair used to remark that I taught 200 students like I was teaching 20. He was right on target.

Spending time with my graduate students is not the same, of course, as teaching hundreds of undergraduates, but the same ethic of working hard and having fun prevail.

My students and I work in the field all over North America and indeed all over the world collecting samples; one of the best parts of being a geologist is the time we all get to spend in wonderful places.

What other job would pay you spend 2 weeks in July camping and hiking in the rain above the arctic circle and then carry on your back 100 pounds of rock samples up and down for 25 kilometers? Or spend a week in the Mojave in May without a cloud in the sky and the thermometer over 100 degrees by 10 a.m. every morning?

Words can't really describe the feeling we get sitting on rock outcrops and knowing that the sample we are taking will tell us how long the rock's been there or when it last eroded.

It's just plain fun figuring out how the Earth works. I particularly love the mixture of low-tech field data collection with high-tech lab work. One week, my students and I are knee-deep in muddy soil pits; the next week we are counting atoms at Livermore National Laboratory.

### AWARD SUMMARY

The NSF Director's Award for Distinguished Teaching Scholars (DTS) recognizes and rewards individuals who have contributed significantly to the scholarship of their discipline and to the education of students in STEM, and exemplify the ability to integrate their research and educational activities.

<http://www.nsf.gov/funding/>



Bierman with UVM graduate students Luke Reusser and Matt Jungers.



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***What brought you to an interest in "advancing the frontiers of education" and to connecting your research to that work?***

Lots of different experiences got me intellectually and philosophically to where I am today. My parents made sure that I had the best education all the way through my life.

Time spent with wonderful and dedicated teachers at both my high school (Gilman School in Baltimore) and at Williams College shape who I am today as a teacher. I learned from all of these people, especially my undergraduate mentor David Dethier, the importance of authenticity, learning by doing. He tossed me straight into being a professional geologist and it was great, if a bit harrowing at the time.

I'll never forget my first GSA talk at a sectional meeting. If I'd had a clue that Reds Wolman, one of the best hydrologists in the country, were sitting in the back row, I'm not sure I would have made it onto that stage.

My interest in education led me back to graduate school after a 2-year hiatus following my BA degree. I'd been working at the Boston Museum of Science in the evenings teaching workshops to kids in the *Camp-In* program. It's an amazing thing, hundreds of kids descend on the museum at closing time and spend the night on the floor in sleeping bags.

I'll never forget the night I spent over as supervisor. I was walking the museum in the dark at 2 a.m. with the task of making sure everyone was in bed, asleep. I came around a corner

and there was a group of kids no more than 10 years old doing some hands-on interactive science exhibit by flashlight. I just sat there and watched them. That's the kind of experience that sent me back to school to be a professor and it motivates and guides my teaching to this day.

***Were there risks in doing this? What made you persevere?***

I guess I never saw this integration of research and teaching as particularly risky. It was the only model I really knew having had mentors who were both researchers and exceptional teachers. I guess there was some risk in taking a job at UVM [the University of Vermont] where both research and teaching are emphasized, but I just charged on and never looked back.

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It turns out UVM was a wonderful place to connect what some people still seem to view as disparate endeavors. There were wonderful teachers here from whom I learned a lot and senior research faculty who mentored me early on the importance and ways of education.

I owe a lot to Rolfe Stanley, a structural geologist and another Williams graduate who showed me by example how to teach by doing research.

His field geology class, which didn't have a lecture and had the students in the field twice-a-week for six-hour afternoons, was an inspiration – and he started teaching that course at UVM before I was even in high school!

Clearly, I walked into a department where risk-taking and learning by doing were the norm.

***What connections have been of most value in pursuing these efforts, within your campus community as well as in the broader professional communities to which you belong?***

As I mentioned before, my mentors have been critical connections, especially in the beginning. Over the last few years, I've come to rely more heavily on colleagues outside the University of Vermont, specifically folks associated with SERC, the Science Education Research Center at Carleton College. They have run some amazing workshops that have truly opened my eyes to all sorts of things educational. More specifically, I have learned from them how to focus my research energy and techniques on problems in learning.

I've had excellent support at the University of Vermont from the staff and leadership of the Center for Teaching and Learning, a great bunch and a wonderful resource to have on campus.

My connections to the landscape and to an even broader professional community of natural scientists and educators has also been built over the last decade by my work with the Governors Institutes of Vermont,



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a residential summer science program for highly-motivated high school students. Working as faculty in this program has brought me closer to the student experience and broadened my scientific horizons as I am usually the only geologist among botanists, ecologists and bug folks.

The energy these kids bring to field science is truly amazing and always gets me fired up to go back in the classroom again. The learning community is amazing and we present the students with a challenge to start the week. They need to develop public interpretive materials for their field site. This need drives their learning.

***What kind of institutional culture needs to be in place to nurture careers of faculty actively seeking to integrate their research and education?***

That's a hard one. I think the culture needs to span all the way from one's peers to the President's office.

I am doing what I do now as a tenured, promoted professor so I can afford to take risks in the sense of working up the education learning curve and publishing fewer papers for a year or two.

Some of my faculty colleagues don't always understand why I put so much time into my classes or the high school program and now into educational material development but they certainly don't criticize me.

I've been lucky to have three chairs in a row, all of who have supported education and the integration of learning and research.

You know the odd thing of it is that my research productivity really hasn't changed since I started putting more energy into education. I still have a great group of graduate students and the papers are still coming out.

If anything, discovering a new research passion (how people learn) has increased my overall energy even as the hours left for sleep seem fewer. But maybe that's more related to having two young children.

***What is the project you are undertaking as part of your DTS award? How can others be involved?***

The DTS award is going to give us the resources to continue and dramatically improve a project that has become a real fascination for me over the last couple years. There are lots of ways for people to get involved and I'll return to that at the end of this section, but first let me give you some background.

The DTS award will continue NSF's support of the Landscape Change Program. Check out <http://www.uvm.edu/perkins/landscape/>. This is a project that Christine Massey and I started more than five years ago with NSF support for a pilot project from the AFGE program in Geosciences.

The idea is pretty simple. Use historic landscape images to teach people about how Earth's surface works and how human landscape interactions shape both our lives and the landscapes we live on.

What started as a collection of several hundred historic images and modern re-shots has now mushroomed into more than 11,000

images online. Working intensively with students, we've created an archive that's searchable and contains images from almost all 260 Vermont towns.

We started doing science with these images and all this labor - mostly those of the three undergraduate interns NSF supported last summer through the REU supplement program - catalyzed a major paper in *GSA Today* (published April 2005).

The Landscape program is my model for integrating research and learning. Students collect and describe imagery working with digital technology in dusty archives, quite the contrast. They analyze the data and many times they interact with the public. This is research, learning and public service all bundled into one.

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The DTS award will help us really deepen the program and broaden its impact.

During the first two years, we'll be working to improve what we have, so we are well equipped to catalyze a national workshop in summer 2007. The workshop will bring to Vermont other scientists and educators who seek to set up similar image archives.

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Our goal for the workshop is to model best practices and help everyone jump start their own work by showing what has worked and what has not. Our goal for the DTS award overall is to help catalyze a series of image archives around the country that would allow scientists, historians, planners and everyone interested in landscapes to document change over time in their communities.

There's lots we will be doing – most of it student- or teacher-centered. Computer science students will design new functions for the archive web pages as part of a service-learning initiative supported by the DTS award.

There will be a close association with Carleton College's SERC, which will be spearheading the evaluative part of the project. We'll be developing approaches to work with Native Americans in order to capture another way of seeing landscapes.

There will be workshops for K-12 educators and, of course, teams of students working to add images to the archive and to do research based on the archived images. There will be educational materials development and dissemination.

How can people get involved? There are many ways. If you are interested in images, log on to the site and see what we have. If you know about Vermont or about some of the technology in our images, write comments on individual images and we'll add that information to the database.

If you have old images of Vermont, submit them online and they'll become part of the archive. If you'd like to help catalyze a similar archive in your state, email us a [glcp@uvm.edu](mailto:glcp@uvm.edu) and we'll make sure that you get an invitation to the 2007 summer workshop.

If you like the thought of teaching with images, check out Learning Landscapes, our educational material resource that should be online by the fall. It will be available at:

<http://www.uvm.edu/~lcplearn/>. ■

#### SEE ALSO:

- ◆ Landscape Change Program:  
<http://www.uvm.edu/perkins/landscape>
- ◆ Teaching with images:  
<http://www.uvm.edu/~lcplearn>
- ◆ PKAL DTS Scholars:  
[http://www.pkal.org/template1cfm?c\\_id=279](http://www.pkal.org/template1cfm?c_id=279)