

# TRANSFORM

Scholarship • Teaching • Learning

FEBRUARY 2008

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# Sparkling Students

## through Problem-Based Learning

By Mary Brakke and Kevin Smith

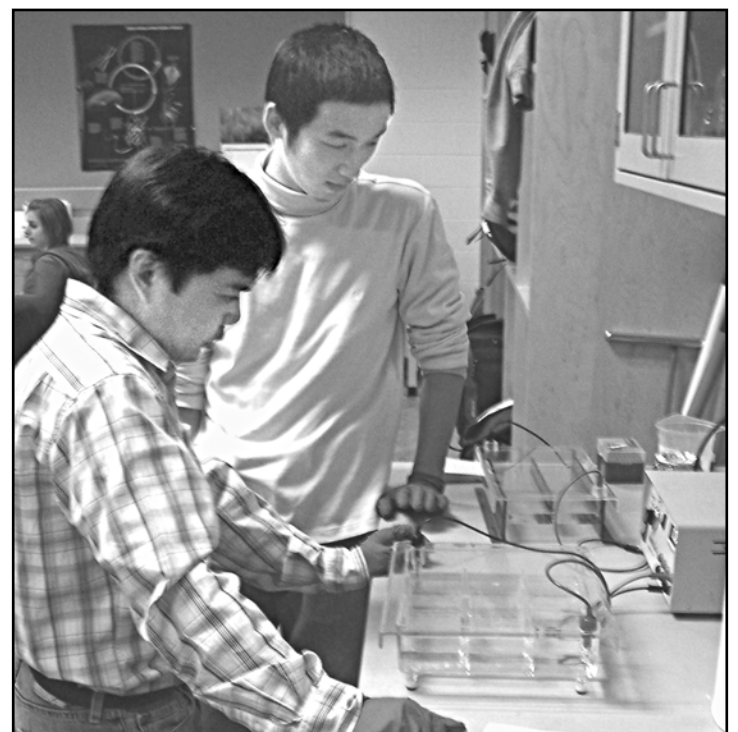
Are genetically modified foods safe? Do you know what's actually in those cheese doodles you're eating? What are we doing in Minnesota that's creating the "dead zone" in the Gulf of Mexico? These are some of the questions we've learned to ask our students in Agronomy 1101. But it wasn't always this way.

When you're teaching a course that fulfills a liberal education requirement, some of the students choose to attend simply to "check off a box." Student engagement can be low. The quality of work can be marginal. Attendance may be problematic. And who really wants to teach that course?

In 2002, we were experiencing all of these problems, and we made the decision to adopt a problem-based learning (PBL) approach for teaching "Biology of Plant Food Systems and the Environment," a course that emphasizes food production, plant biology, and the environment. This large-enrollment class is one of several that fulfills the University of Minnesota's liberal education requirement for a life-science course with a laboratory component. It is taken by students throughout the University, and, as such, student interest in the subject and preference for learning format vary widely. Students represent a cross-section of the University and come to the course with a wide range of background knowledge and interests. Prior to implementing PBL in the course, a traditional lecture format was used to provide an overview of fundamental biological concepts. Learning expectations were narrowly defined and the application of concepts focused almost exclusively on exam performance.

We felt that the underlying problems with student performance were primarily attitudinal and specifically related to a lack of interest and motivation to learn. To address this problem, we decided to enhance the relevance of the material and to increase the amount of active learning within the classroom. Most importantly, we chose to adopt PBL as a means to achieve our learning objectives because the problem-solving framework creates opportunities to emphasize the personal relevance of material and to engage students in an active process that inspires interest and motivates learning.

In this article, we examine how we implemented PBL in Agronomy 1101, the opportunities it provided to engage students in a range of cognitive activities, and the impact that it had on students' motivation to learn. We were particularly interested in finding out whether or not the PBL approach would motivate our students to learn. Would students feel they learned more with the PBL approach than with a traditional lecture approach?



### Problem-Based Learning

Problem-based learning seeks to create an environment in which learners engage material in a manner that is relevant to their lives. It allows students to identify and pursue avenues of personally relevant inquiry, and it provides opportunities for self-directed learning. Emphasis on the acquisition of knowledge and skills that are perceived by students as relevant to personal or professional goals by addressing real-world problems also enhances the learner's perception that the material has value related to personal or professional goals (Savery and Duffy, 1996). For example, in a medical science course PBL problems are designed to engage students in analyzing complex problems related to diagnosis of an illness and recommendation of treatment (Barrows, 1985). The PBL model has also been used to engage students in learning content and discipline-specific skills in business (Milter and Stinson, 1993), education (Bridges and Hallinger, 1992), social work (Boud and Feletti, 1991), and general communication and group work skills (Amador and Gorres, 2004).

Although the problem-solving process looks somewhat different in each class in which it is implemented, learning is characterized by being inquiry-driven, active, collaborative, self-directed, and self-evaluated (Woods, 1996). The diverse cognitive tasks involved in this collaborative, problem-solving process have been linked to multiple, desirable cognitive and attitudinal developments. It has been shown that actively solving a problem results in

*(continued on page 7)*

Center  
for Teaching  
and Learning



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## EDITOR'S NOTE

Last semester, Ken Bain, author of *What the Best College Teachers Do*, spoke at the Carlson School of Management. In her review article, “Learning as an Unnatural Act,” Kate Martin explains Bain’s assertion of what it takes to dislodge naïve misconceptions among learners. What does it take to help a novice in any field to become an “adaptive expert” who thinks nimbly and can easily transfer his or her learning to new domains? Bain asserts that students must be given authentic and challenging problems before instructors take a didactic teaching approach. The learning struggle helps students understand what they don’t fully know.

In the article “Sparkling Students through Problem-Based Learning,” Mary Brakke and Kevin Smith explore the effects of problem-based learning (PBL), a method that embodies much of Bain’s research. What happens when students grapple with unstructured and real world problems? How do they formulate evidence-based responses to questions such as “are genetically modified organisms safe?” In addition to analyzing how students adapt to a PBL model, Brakke and Smith are also interested in formally measuring student motivation and study habits. The article details their struggles with classroom assessment and formal survey instruments.

With this issue, we continue to publish excerpts from the Making Meaning of a Life in Teaching program. In her essay, “My Magnificent Seven: A Memoir of Students Who Have Shaped My Teaching,” Kathleen O’Donovan reflects on what she terms her “reservoirs of revelation.” In this excerpt, she recalls one student, a Cambodian scholar, whose personal struggle reminds us of how much we learn from our students, particularly when we are drawn into their world as learners. We’d like to remind you that now is a good time to think about enrolling in the Making Meaning program for the Fall of 2008.

Ilene Alexander reviews a recent set of workshops on the “Pedagogy of Revolt” given by noted scholar, Cherrie Moraga. Moraga problematizes the conditions of teaching and learning within a large institution. She reminds us to examine the privileged status of education and the radical power of “contrary moments” that emerge while teaching.

In the previous issue, we briefly outlined the history of the Scholarship of Teaching and Learning (SoTL), and we promised to further outline the role of SoTL in the framework of faculty work. Specifically, we need to understand how SoTL relates to the idea of “good teaching” and to that of “scholarly teaching.” Do these three categories make sense when we look at the educational facet of an instructor’s career? To learn more about all of this, read “What is ‘Scholarly Teaching?’”

Finally, we’d be remiss if we didn’t offer a token eulogy for the soon-to-be razed Science Classroom Building. While many disparaged its concrete-block construction and its labyrinthine halls, we at the Center for Teaching and Learning will miss our home of nearly three years. Though the wrecking ball will be pulverizing this loveable bomb shelter, CTL will relocate to Suite 425 of the University Office Plaza at 2221 University Ave. (We like to think of it as stadium seating for the new football complex.) Until that move in the late spring or early summer, you can still find us by the river.

– Paul Baepler

# www.transform.umn.edu

## Cherrie Moraga and Transformative Learning

By Ilene D. Alexander

“One does not pass through the university system unchanged,” Cherrie Moraga asserts early in her essay *Out of Our Revolutionary Minds: Toward a Pedagogy of Revolt*. During a Fall 2007 workshop of the same title, 50 University of Minnesota faculty and instructors joined Moraga in considering impacts of our having been changed – enriched and diminished – by our encounters with university systems as students, as scholars, as teachers and administrators, and in considering strategies for critical pedagogues seeking to help more than hinder our own students’ learning.

Sponsored by the Office for Equity and Diversity, the workshop provided an opportunity to consider a number of conflicts inherent in critical, transformative learning:

- Thinking is not a privilege, but education has become an economic privilege;
- Classrooms require cooperation and learning sometimes requires “informed non-cooperation”;
- The social construction of education frequently requires timelines, material to be covered, and agendas for learning, while individual construction of knowledge may require being awake to competing claims, community concerns, and a beginning mind rather than an authoritative mind.

As critical teachers, Moraga noted during the workshop and in her essay, we are likely to “love teaching and remain in conflict with it” as part of a corporatized system. As reflective critical teachers, she urged audience members to learn from the contrary moments by telling the stories within those images. Asking participants to remember 1) a moment of epiphany alongside one that killed the spirit, 2) a moment of teaching for change coupled with an instance of teaching from complacency, and 3) a disturbing interaction paired with a transformative one, Moraga gave the audience time to create dialogues within these moments. The goal was to have the audience remember “our most defiant thoughts – those profoundly intuitive insights, those flights of the unrestrained imagination – generated through life’s lessons and remembered history.” In re-constructing these moments personally and in sharing them with students and peers, we reinvigorate the “radical revisioning of how, why, and what we learn and who gets to decide.”

2 Ilene D. Alexander is an education specialist at the Center for Teaching and Learning.

# What is ‘Scholarly Teaching’ ?

By Paul Baepler

Every discipline seems to have its own jargon, its own bloviating magniloquence. The teaching world, of course, is no different. Thus we have something called “scholarly teaching” and this is distinct from the ubiquitous “scholarship of teaching and learning” or SoTL. And both of these categories are entirely different from the formal concept of “good teaching.” Make sense? Well, that’s why we need to define our terms.

In general, you can think of the three categories – good teaching, scholarly teaching, and SoTL – existing along a continuum, one perhaps more complex and involved than the next. (Even at this point, though, I have to offer the caveat that good teaching could be more complicated and time consuming than some scholarly teaching or SoTL. It’s also possible that good teaching may not be explicitly informed by scholarship. For the sake of argument, though, remember that I’m painting with broad strokes and not trying to pick a fight.) The literature on what constitutes good teaching is wide and varied. It’s probably safe to say, though, that good teaching results in significant learning as well as other positive student outcomes. This could be realized in many ways and is the subject of most SoTL.

Scholarly teaching, as its name implies, invokes a scholarly approach to teaching. That is, scholarly teachers may not produce actual scholarship on teaching and learning, but they’ll be familiar with it. They might involve themselves in teaching discussions with their colleagues, reflect on their own teaching, and even conduct informal teaching experiments in their classrooms. There’s probably a good amount of informal assessment going on, too. But for whatever reason, these teachers choose not to formalize their practice in the form of written and peer-reviewed scholarship. It’s also the case that conducting scholarly teaching doesn’t guarantee positive student outcomes and thus qualify as “good teaching.”

Now we’re down to the nugget. What is SoTL? Again, we could worry about the semantics, but I suspect most people just want an operational definition. Here are a couple. Illinois State University calls SoTL “the systematic reflection/study on teaching and learning made public.” Lee Shulman, former president of the Carnegie Foundation, calls it “a form of systematic, problem-focused inquiry, subject to analysis and peer review.” What these and most other SoTL definitions have in common are three criteria: SoTL is systematic, public, and peer-reviewed.

On the surface, that seems pretty straightforward ... until you think about other kinds of writing that teachers do. For instance, is a reflective essay SoTL? Would an informal report about a particular teaching technique be considered SoTL if it wasn’t rigorously assessed? If, under the strictest definitions, we don’t call these forms SoTL, what are they? Maryellen Weimer, editor of *The Teaching Professor* newsletter, uses the term “pedagogical scholarship” to cover the full range of professional writing on teaching. She further divides the category into two subcategories: “wisdom of practice scholarship” and “research scholarship.” Informal reports and reflective essays would fit under the “wisdom of practice” heading while SoTL and educational research in general would more likely fit under the “research” rubric. But wait, things become even more confusing! Weimer further subdivides these scholarship types into seven finer-grained categories, and Craig Nelson from the University of Indiana has put forward an altogether different schema.

At this point, you have to ask yourself, does any of this truly matter? To some degree, the distinction between “scholarly teaching” and SoTL, however defined, is only as important as we make it (or as it is rewarded by the institution). Currently, the concept of SoTL has gained a lot of momentum nationally, and these definitions may be a way to both legitimize an emerging field as well as give it some rigor. One of the foundational ideas behind SoTL was to place teaching more closely on a par with traditional research, and a logical way to do that is to create a research agenda out of teaching itself. SoTL, by its strictest definition, begins to accomplish this by formalizing the processes that we use to document, assess, and share teaching investigations. That’s all good news. However, it would be a shame to overlook or undervalue “scholarly teaching” or those other forms of writing about teaching (“wisdom of practice scholarship,” for instance) that don’t fit a strict SoTL definition.

## REFERENCES

Nelson, C. E. (2003). Doing it: Examples of several of the different genres of the scholarship of teaching and learning. *Journal of Excellence in College Teaching*, 14(2/3), 85-94.

Richlin, L. (2001). Scholarly teaching and the scholarship of teaching. *New Directions for Teaching and Learning*, 86, 57-68.

McKinney, K. (2007). *Enhancing learning through the scholarship of teaching and learning: The challenges and joys of juggling*. Boston: Anker.

Weimer, M. E. (2006). *Enhancing scholarly work on teaching and learning: Professional literature that makes a difference*. San Francisco, CA: Jossey-Bass.



# My Magnificent Seven:

## A Memoir of Students Who Have Shaped My Teaching

by Kathleen O’Donovan

**Editor’s Note:** The Center for Teaching and Learning sponsors the Making a Meaning of a Life in Teaching program in which cohorts of faculty gather to reflect upon their teaching careers. The following excerpt is from Kathleen O’Donovan’s, “My Magnificent Seven: A Memoir of Students Who Have Shaped My Teaching.”

Seven. I admire that number. Many important things come in groups of seven – weekdays, chakras, cardinal virtues, deadly sins, wonders of the world, colors of the rainbow, and, according to Shakespeare, stages of man. Professionally, seven holds special meaning for me. Over the stages of my development as a teacher, seven students have influenced both my philosophy about teaching and learning as well as my classroom practice.

After completing a B.S. in Spanish and Speech, I taught Spanish for three years at the high school and junior high school level in Minneapolis, Minnesota. During that same interval, I began ”testing the waters” in alternative instructional venues. Two of the most memorable were in adult basic education and preschool foreign language. After completing my M.A. in English as a Second Language and Ph.D. in Foreign Language Education, I had taught students ranging in ages between three and eighty-three. Now, as I reflect on an extensive sample size, there have been seven students whose personal impact on me has been extraordinary – they have transformed me and my perspectives on teaching and learning. Here are my “magnificent seven.”

- Reggie:** A three-year-old African American student in a demonstration preschool Spanish class
- Nancy:** An over-achieving 13-year-old who garnered the role of Goldilocks in a middle school’s first Foreign Language Festival
- Nacho:** A twenty-something gay student teacher from El Paso, Texas
- Sauwo:** An illiterate Liberian grandmother whom I taught to read and write
- Daniel:** A high school senior registered in my beginning Spanish class and study hall
- Mr. Park:** A Korean grandfather participating in an evening Adult ESL class
- Mr. Poon:** A Cambodian scholar enrolled in two ESL classes that I taught

Reflecting on my thirty-plus years in teaching, I have come to think of those seven students as “reservoirs of revelation.” Through their uniqueness, each one has caused a hidden aspect of my teaching soul to be revealed. Because of their personal attributes, special attitudes, and sometimes challenging behaviors, I was brought to the edge of my instructional comfort zone and summarily pushed over. In this memoir, my goal is to relate key memories I have of each student, identify a suitable symbol that represents each one, and describe each student’s unique imprint on my classroom practice. For the purpose of this excerpt, I concentrate on a single student.

Mr. Poon’s smiling face will be etched forever in my mind. A broad, toothy grin greeted me twice daily during a spring quarter in the early eighties.



Mr. Poon was registered in two ESL classes that I taught: Basic Pronunciation and Intermediate Grammar. Though chronologically older than his mostly Latin American and Middle Eastern peers, Mr. Poon’s classmates thought he was much younger than his actual age. Perhaps his slight stature (around 5’ 2”) and high voice contributed to that misconception.

The Latinos expressed special regard for him – especially for his name. They consistently called him “Mr. Espoon.” That mangled moniker always made him and the entire class laugh. In casual conversations, he was also called the “Map Man.” As a visiting scholar in geography, Mr. Poon gifted our classroom with a large wall map of the world. I appreciated his generosity because the map became a convenient resource for talking about time, topography, sports, climate, cuisine, and cultural traditions. When I entered the classroom, I often found Poon standing near the map. In that space, his inner teacher came to the fore. I watched him invite students to locate their hometowns and cities with colored punch pins and then to share a special insight about that “sacred space.”

After several one-to-one consultations with me, Mr. Poon asked if I would like to hear something about his life back home. Of course I said “yes,” and I felt deeply honored by the fact that he chose to share something of his personal life with me.

He began by asking me to look at the wall map with him. As he referenced strange sounding places, Poon started to share stories of his family, his schooling, and his teaching experiences prior to the uprising of the Khmer Rouge. I followed his narrative closely and demonstrated my interest by asking him intermittent questions, such as: “What did your father do for work? Does your married sister have children? Do you have nieces and nephews?” As he spoke, I took note of how Poon’s life as the responsible elder son and accomplished scholar had been riddled with loss – the visible and invisible kinds of losses that accompany political, social, economic, and personal upheaval. While feeling captivated by his story-telling skills, I recalled experiencing a sense of uneasiness. At times, it felt as if I were eavesdropping on an intimate tale or a final confession.

During that brief exchange, I witnessed Poon’s body and voice become that of an orphaned child, a disillusioned teacher, a grieving widower, and a dashed dreamer. He stopped his conversation, leaving me holding much of his pain. My student had taken me to key stops on his life path of sorrows, and I felt his sadness blend with my own.

At the end of his story, Poon told me of his intention to return to Cambodia at the end of his academic work at the University. That meant that he would be going back to Cambodia in approximately one year. I tried to listen respectfully to his rationale for returning to his homeland, but Poon’s stories raised questions for me that I wanted and needed to ask.

Q: How can you be so happy when you have suffered so much?  
A: That’s all history. I can’t change history – only how I think and feel about it.

Q: You’re always smiling, Mr. Poon. What does that grin really mean?  
A: I am here. I am safe. I am healthy. I am hopeful.

Q: But why do you want to go back to Cambodia at this time? Isn’t it dangerous?  
A: Of course it’s dangerous there. But it’s my home. They’re my people, and they are suffering. I will return.

Poon and I shared many ideas and insights during subsequent meetings. Those unfolded over the summer and into the following year. I took him out for a farewell dinner at a restaurant in Dinkytown. There, he gave me two beautiful teacups and saucers. When the time came to part, teacher from teacher and friend from friend, neither of us was able to say the word, “goodbye.” Instead, we let a long hug speak for us. Poon left Minnesota that

(continued on page 7)

# Faculty Scholarship on Teaching and Learning

## Articles published by UM Faculty and Staff

**Simmons, S. R. (2007). “Amazing grace”: A memoir of mentoring. *Journal of Natural Resources and Life Sciences Education*, 36, 1-5.**

This article presents a memoir of Simmon’s experiences with his mentor, biochemistry professor Larry Butler, during his undergraduate studies at Purdue University in the 1960s. The purpose of the memoir is to improve understanding of the practices of effective mentors by reflecting upon the author’s experiences while executing his “senior thesis” under Dr. Butler’s direction. His mentor’s impact continued even beyond the author’s graduation from college, and his recollections of Professor Butler’s actions during that time have especially shaped his convictions about mentoring. The author’s own approaches to advising students as a professor have been greatly influenced by his involvement as a student with Dr. Butler.

**Doorn, D. & O’Brien M. (2007). Assessing the gains from concept mapping in introductory statistics. *International Journal for the Scholarship of Teaching and Learning*, 1(2).**

In an effort to improve active learning in introductory statistics, the authors introduce the use of concept mapping techniques as part of the course. While previous papers have touted the use of this and other interactive teaching methods in statistics education, Doorn and O’Brien add to this literature by providing additional assessment of its efficacy. This comes through an experimental design that involves a single instructor teaching two sections of the same statistics course over the same semester. Both cover the same material in the same way with the exception

that concept mapping is used in one section, but not the other. Assessment of learning outcomes is done through the use of pre-tests and post-tests of understanding of statistical concepts. The authors also track changes in student’s study habits over the semester through additional surveys. Doorn and O’Brien find only weak evidence that concept mapping is effective in aiding student learning of statistics.

**Smith, T. J. (2007). The ergonomics of learning: Educational design and learning performance! *Ergonomics*, 50(10), 1530-1546.**

This paper deals with the fundamental purpose of education – student learning – and with the question of how the ergonomic design of the learning environment influences learning performance. The basic scientific question confronting learning ergonomics is which design characteristics in the learning environment have the greatest influence on variability in learning performance. Practically, the basic challenge is to apply this scientific understanding to ergonomic interventions directed at design improvements of learning environments to benefit learning. This paper expands upon these themes by addressing the origins and scope of learning ergonomics, differing perspectives on the nature of learning, evidence for context specificity in learning, and conclusions and research implications.

**Crosby, B. C. & Bryson. J. M. (2008). Teaching leadership and policy change in a public affairs school. *Journal of Public Affairs Education*, 13(2), 169 - 186.**

**Andersen, D. F. , Bryson, J. M., Richardson, G. P., Ackermann, F., Eden, C., & Finn, C. B. (2006). Integrating modes of systems thinking into strategic planning education and practice. *Journal of Public Affairs Education*, 12(3), 265-293.**

February

Introduction to SciFinder Scholar

Monday, February 4, 4 – 5:30 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidxx88>  
Sponsor: University Libraries

Writing Assignments and Activities that Work

Wednesday, February 6, 12 – 1:30 p.m., location TBA in Minneapolis  
To register: online at <http://writing.umn.edu/register.htm> or by calling 612-626-7579

In this panel discussion, we'll share and discuss a variety of low- and high-stakes writing assignments, including in-class writing activities, that deepen learning and improve student writing.  
Sponsor: Center for Writing

TEL Seminar: "The Secret of My (Simulated) Success"

Wednesday, February 6, 12 – 1:30 p.m., 101 Walter Library  
To register: Just show up in person, or to attend online as a virtual participant register at <http://dmc.umn.edu/tel-seminar-breeze.shtml>  
For more information, see <http://dmc.umn.edu/issues.shtml> or call 612-625-5055 or 612-625-8030

Instructors discuss the successes (and potential failures) of different kinds of learning simulations, from providing game-like immersive environments to replicating real-life laboratory and professional work.  
Sponsors: The Technology-Enhanced Learning (TEL) Seminar series is sponsored by the Office of Information Technology (OIT) and organized by Academic and Distributed Computing Services (ADCS) and the Digital Media Center (DMC). Sessions are cosponsored by the Office of the Senior Vice President for Academic Affairs and Provost (SVPP) and panelists' units.

RefWorks Basics

Thursday, February 7, 1 – 2:15 p.m., 81 Magrath Library  
Thursday, February 14, 10 – 11 a.m., S30C Wilson Library  
Wednesday, February 27, 2:30 – 3:30 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX75>

Learn the basics of RefWorks, the Web-based citation manager that is available at the U of M. Adding references to RefWorks, exporting them to Word, and selecting a style will be covered.  
Sponsor: University Libraries

Responding to Student Writing

Tuesday, February 12, 2:30 – 4:30 p.m., location TBA in Minneapolis  
To register: <http://writing.umn.edu/register.htm> or by calling 612-626-7579  
In this interactive workshop, we'll discuss (and practice) ways to read student drafts, articulate meaningful comments, and manage the paper load.  
Sponsor: Center for Writing

Research Made Easy: Discover the Web of Science

Tuesday, February 12, 11 a.m. – 12 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX240>

This workshop covers search strategies, article retrieval, journal ranking, and exporting citations to RefWorks. Subject examples will focus on the sciences, but arts, humanities, and social sciences are also covered by this index.  
Sponsor: University Libraries

Educational Technologists Forum (ETF)

Wednesday, February 13, 3 – 4:30 p.m., 402 Walter Library  
No registration necessary. For more information, see <http://dmc.umn.edu/etf> or call 612-625-5055 or 612-625-8030.

The ETF is for educational technologists at the University. In this session, representatives from University Libraries will talk about tools available that support teaching and learning.  
Sponsors: DMC, OIT, and the College of Education and Human Development (CEHD).

Grant Funding – Search Tools and Resources

Thursday, February 14, 2:30 – 3:45 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX18>

Learn how to use IRIS, SPIN, and Community of Science and the Foundation Directory to search for grant opportunities. Setting up e-mail updates on specific subjects will also be covered.  
Sponsor: University Libraries

Keeping Current in the Sciences

Thursday, February 21, 2 – 3 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX149>

This class is an overview of the alerting services in the science and engineering fields. We will help you define your interests in a search profile and set up an alert in the appropriate database.  
Sponsor: University Libraries

Grading Student Writing

Friday, February 22, 12 – 1:30 p.m., location TBA in Saint Paul  
To register: online at <http://writing.umn.edu/register.htm> or by calling 612-626-7579

In this panel discussion, we'll discuss time-efficient systems for grading student writing (holistic grading, rubrics, portfolios) and share strategies for this important, but challenging, teaching activity.  
Sponsor: Center for Writing

February (Continued)

Responding to Non-Native-Speaking Graduate Writers

Wednesday, February 27, 2:30 – 4:30 p.m., location TBA in Minneapolis  
To register: online at <http://writing.umn.edu/register.htm> or by calling 612-626-7579

In this interactive workshop, we will practice strategies for reading and responding effectively to the writing done by non-native-speaking graduate students.  
Sponsor: Center for Writing

Journal Impact Factors, Who is Citing Whom, and How Often?

Wednesday, February 27, 3 – 4 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX202>

Learn more about impact factors and sources for finding out who has cited an individual journal article and how many times a given article has been cited.  
Sponsor: University Libraries

Acta Sanctorum: A Hands-on Introduction

Thursday, February 28, 10 – 11 a.m., S30C Wilson Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX244>  
Sponsor: University Libraries

March

Getting Started: Publishing Your Science Research Article

Monday, March 3, 2 – 3 p.m., 310 Walter Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX246>

This workshop, intended for graduate students and newer faculty in the sciences, will help you identify appropriate journals to which to submit your article and discuss how to manage your rights when signing a contract with a publisher. Join your colleagues to share your ideas and discuss the issues you face as an emerging academic author.  
Sponsor: University Libraries

RefWorks Basics

Tuesday, March 4, 3 – 4:15 p.m., 81 Magrath Library  
Thursday, March 13, 10 – 11 a.m., S30C Wilson Library  
Thursday, March 26, 3 – 4:15 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX75>

Learn the basics of RefWorks, the Web-based citation manager that is available at the U of M. Adding references to RefWorks, exporting them to Word, and selecting a style will be covered.  
Sponsor: University Libraries

TEL Seminar: "Presenting Scenarios and Telling Stories with Online Video"

Wednesday, March 5, 12 – 1:30 p.m., 101 Walter Library  
To register: Just show up in person, or to attend online as a virtual participant register at <http://dmc.umn.edu/tel-seminar-breeze.shtml>  
For more information, see <http://dmc.umn.edu/issues.shtml> or call 612-625-5055 or 612-625-8030.

Learn how online video can humanize learning content, illustrate concepts, and motivate students.  
Sponsors: The TEL Seminar series is sponsored by the OIT and organized by ADCS and the DMC. Sessions are cosponsored by the SVPP office and panelists' units.

"It's All About Efficiency:" Lunch and Conversation for TAs who Teach with Writing

Wednesday, March 5, 12 – 1:30 p.m., location TBA  
To register: online at <http://writing.umn.edu/register.htm> or by calling 612-626-7579

In this roundtable discussion for teaching assistants, three experienced TAs will facilitate a discussion about balancing the roles of graduate student and teacher.  
Sponsor: Center for Writing

Create Your Poster in PowerPoint

Thursday, March 6, 12:30 – 1:15 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX148>

Getting ready to do a poster at an upcoming conference? Learn pointers about using PowerPoint to create the poster as one giant slide and send it to a large-scale printer.  
Sponsor: University Libraries

Search Workshop: Habits of Effective Searchers

Tuesday, March 11, 2 – 3 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX19>

Learn tips to help you focus your searches in the journal indexes and on the Web; spend less time and retrieve better results.  
Sponsor: University Libraries

How Do I Know I Found Everything?

Tuesday, March 11, 3:15 – 4:15 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX216>

Working on a new research project, thesis, or dissertation? Need to be comprehensive in your literature search? Learn techniques to improve your searches.  
Sponsor: University Libraries



## March (Continued)

### Grant Funding – Search Tools and Resources

Wednesday, March 12, 2:30 – 3:45 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX18>

Learn how to use IRIS, SPIN, and Community of Science and the Foundation Directory to search for grant opportunities. Setting up e-mail updates on specific subjects will also be covered.

Sponsor: University Libraries

## April

### TEL Seminar: “Authentic Learning with Online Video”

Thursday, April 3, 12 – 1:30 p.m., 105 Cargill Bldg. (St. Paul)  
To register: Just show up in person, or to attend online as a virtual participant register at <http://dmc.umn.edu/tel-seminar-breeze.shtml>  
For more information, see <http://dmc.umn.edu/issues.shtml> or call 612-625-5055 or 612-625-8030

Learn how online video can be used to demonstrate concepts and skills and support self-assessment to prepare students for professional contexts.

Sponsors: The TEL Seminar series is sponsored by the OIT and organized by ADCS and the DMC. Sessions are cosponsored by the SVPP office and panelists’ units.

### Educational Technologists Forum (ETF)

Wednesday, April 9, 3 – 4:30 p.m., 402 Walter Library (East Bank), 65 McNeal Hall (St. Paul), or Second Life at <http://slurl.com/secondlife/Teaching%203/240/232/25> (simultaneous session)  
No registration necessary.

For more information, see <http://dmc.umn.edu/etf> or call 612-625-5055 or 612-625-8030

The ETF is for educational technologists at the University. In this session, Scott Barnard and others from the DMC and OIT will demonstrate how instructors at the University are using Second Life.

Sponsors: DMC, OIT, and CEHD.

### RefWorks Basics

Thursday, April 17, 10 – 11 a.m., S30C Wilson Library  
Thursday, April 24, 1 – 2:15 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX75>

Learn the basics of RefWorks, the Web-based citation manager that is available at the U of M. Adding references to RefWorks, exporting them to Word, and selecting a style will be covered.

Sponsor: University Libraries

### Create Your Poster in PowerPoint

Tuesday, April 22, 3:30 – 4:15 p.m., 81 Magrath Library  
To register: <http://www.lib.umn.edu/registration/#eventidXX148>

Getting ready to do a poster at an upcoming conference? Learn pointers about using PowerPoint to create the poster as one giant slide and send it to a large-scale printer.

Sponsor: University Libraries

## April (Continued)

### TEL Seminar: “Insights from the DMC Faculty Fellowship Program: Significant Learning Across Disciplines”

Wednesday, April 23, 12 – 1:30 p.m., 101 Walter Library  
To register: Just show up in person, or to attend online as a virtual participant register at <http://dmc.umn.edu/tel-seminar-breeze.shtml>  
For more information, see <http://dmc.umn.edu/issues.shtml> or call 612-625-5055 or 612-625-8030

Five faculty fellows from diverse disciplines have been meeting biweekly to experience and reflect on an instructional design process as they develop and implement a technology-enhanced learning activity or environment. They will share their experiences, insights, and projects.

Sponsors: The TEL Seminar series is sponsored by the OIT and organized by ADCS and the DMC. Sessions are cosponsored by the SVPP office and panelists’ units.

### Distinguished Teaching Awards Ceremony

Monday, April 28, 3:30 – 5:30 p.m., Reception follows in Memorial Hall, McNamara Alumni Center  
To register: <http://www.alumni.umn.edu/distinguishedteaching.html>

Members of the University community are invited to a ceremony and reception to honor the recipients of the Morse-Alumni Award for Undergraduate Education and the University’s Graduate-Professional Teaching Award. This occasion recognizes the significance of excellent teaching by inducting the faculty members into the Academy of Distinguished Teachers.

Sponsors: Senate Committee on Educational Policy, the Office of the Senior Vice President for Academic Affairs and Provost, and the University of Minnesota Alumni Association.

## May

### Demystifying the Promotion and Tenure Process: A Workshop for Probationary Faculty

Monday, May 19, 1 – 2:30 p.m., Room TBA  
Tuesday, May 22, 9 – 10:30 a.m., Room TBA  
Open and free to faculty who want to learn more about the promotion and tenure process.  
For more information, contact Karen Zentner Bacig at [kbacig@umn.edu](mailto:kbacig@umn.edu).

## August

### New Faculty Orientation

Tuesday, Wednesday, and Thursday – August 19, 20, and 21  
9 a.m. – 5 p.m. daily. Location varies.  
To register: Contact Karen Zentner Bacig at [newfaculty@umn.edu](mailto:newfaculty@umn.edu)

New Faculty Orientation provides an important introduction to University resources and policies, new faculty colleagues and University leaders, and other University faculty. The orientation includes sessions on teaching and learning.

Sponsor: Office of the Vice Provost for Faculty and Academic Affairs

### Teaching Enrichment Series

Monday, Wednesday, and Thursday – August 25, 27, and 28  
9 a.m. – 12:30 p.m. daily. Location varies.  
To register:

<http://www1.umn.edu/ohr/teachlearn/faculty/enrichment/index.html>

Faculty, instructional staff, and teaching assistants may participate in workshops and presentations focusing on instructional design, student learning, and special topics in teaching.

Sponsor: Center for Teaching and Learning





# Learning as an Unnatural Act

By Kate Martin

In November 2007, Ken Bain, Vice Provost for Instruction and Director of The Research Academy for University Learning at Montclair State University, presented the seminar, “How to Foster Adaptive Experts” at the Carlson School of Management. Bain is also the author of *What the Best College Teachers Do* (2004).

In the early 1980s, two physics professors at Arizona State University conducted a study to find how well 600 students in an introductory course learned Newton’s laws of motion. Not surprisingly, on the pre-test the majority of students conceived of motion intuitively, much the same as Aristotle and 14th century scientists had. When students were given the same test months after the course ended, there was virtually no change in their understanding of motion. Even the “A” students who were successful at memorizing formulas and solving problems had held fast to the original ideas of motion they had brought to the course.

Ken Bain followed this familiar example of non-learning with the assertion that, by expecting students to change their existing mental models, instructors are asking them to engage in an “unnatural act.” Learners construct their reality from existing mental models, a process that begins in infancy via direct experience and observation. Bain contends that to create deep and lasting conceptual shifts (i.e., deep learning), instructors should design learning environments that include elements he uncovered in his 15 years of research for *What the Best College Teachers Do*.

In the book, Bain reports on his study of 63 instructors from a variety of fields who were selected based on their enormous success at promoting deep learning in their students. The single-most common element found among these successful college teachers was an inductive approach to teaching. The most effective instructors presented specific real-world experiences and posed authentic problems. Students were engaged in speculation and problem-solving before they knew much at all about the subject matter. Their speculations were challenged by the instructor along the way. Through this inductive approach, instructors both created a need to know and stimulated a desire to know. Learners grappled with the subject matter. Instructors then provided just-in-time assistance through lectures or in-class problem solving.

Design these elements into your learning environment and, according to Bain, you are more likely to produce in your students the kind of deep learning, flexible thinking, and metacognition that foster adaptive expertise.

Routine and adaptive expertise (Hatano and Inagaki, 1986) describe two fundamentally different types, not levels, of expertise. Bain describes routine experts as those who “know all of the routines of a discipline, profession, game, or whatever, and in fact, they may know them so well that they might even be considered world class in their expertise.” John Bransford, professor of Education and Psychology at the University of Washington in Seattle and director of the Center for Learning in Informal and Formal Environments, has written that routine experts have learned and can apply a set of very complex and sophisticated routines. Though they may be lifelong learners, routine experts simply become more efficient with what they are already familiar. Bain distinguishes adaptive experts as those who “know all the routines, but they also have the attitude and aptitude to recognize and even relish both the opportunity and necessity for invention. They enjoy exploring the unknown and thinking in different kinds of ways. They appreciate their own knowledge, but they also realize how little they know in comparison to all there is to know. They constantly question their own assumptions, and feel comfortable doing so, and they avoid strong emotional attachment to any set of beliefs.”

Traditionally, Bain argues, higher education employs a “single road” approach to developing adaptive expertise. In effect, we instruct and assess learners in such a way that they become routine experts, expecting that at some distant point down the road they will acquire adaptive expertise. Ph.D. programs, for example, require mastery of the set routines of the discipline. Then, after qualifying exams, candidates must suddenly develop the original thinking of adaptive experts in order to complete and publish the dissertation.

Bain proposes a learning model of two roads that diverge early in one’s education designed to develop both kinds of expertise simultaneously. If learning is indeed an unnatural act, and if the characteristics of adaptive experts develop gradually throughout one’s education, what are the implications for instructors? Bain encourages teaching and assessing students in ways that promote deep learning, as well as critical and creative thinking. He challenges us to think of our courses as an invitation to learn. Regardless of the teaching method, Bain suggests designing learning experiences in which “students will buy into the question, actively engage in the pursuit of the answer, draw and defend conclusions, and see what the next question is.”



## Academy of Distinguished Teachers News

### Academy of Distinguished Teachers Online Resources

The Academy of Distinguished Teachers’ (ADT) mission is to recognize and celebrate teaching excellence, to foster the continued improvement of teaching and learning at the University of Minnesota, and to strengthen the resources necessary to do so. In the spirit of fostering continued improvement of teaching and learning and strengthening teaching and learning resources, the ADT Web site is devoted to providing teaching and learning resources as well as to reflecting the activities of the membership. To view the ADT Web site, visit <http://www.adt.umn.edu>.

Resources found on the ADT Web site include two white papers, written early in the life of the ADT. These white papers address two issues: *Fostering Communities of Teaching in Departments and Programs of the University* and *The Role of Teaching in Hiring, Promotion and Tenure at the University of Minnesota*. Both white papers are available as PDF documents at <http://www.adt.umn.edu/resources/index.html>.

The ADT also has a number of members who have volunteered to serve as resource faculty to other University of Minnesota faculty and staff. ADT resource faculty are available to talk with others about a wide range of teaching and learning issues, such as engaging students in large classes, using case studies, creating grading rubrics, addressing diversity issues, and using WebVista, to name a few. A list of resource faculty can be accessed by visiting <http://www.adt.umn.edu/resources/faculty.html>.

Beyond the Academy members themselves, the ADT Web site offers links to a host of teaching and learning resources that address topics from assessment to graduate students and teaching to peer collaboration to teaching first-year students. If you are seeking resources for your teaching and your students’ learning or you would like to learn more about the Academy of Distinguished Teachers, visit <http://www.adt.umn.edu>. We are always seeking new resources to add to the Web site. Feel free to send recommendations for additional links to [adt@umn.edu](mailto:adt@umn.edu).

### ADT Teaching and Learning Conference – April 2009

Planning will begin later this spring for the April 2009 Academy of Distinguished Teachers Teaching and Learning conference. Look for a call for proposals sometime in Fall 2008 – it’s never too early to begin thinking about a presentation! Watch the Fall 2008 issue of *Transform* and the ADT Web site (<http://www.adt.umn.edu>) for details beginning in September or October 2008.

– Karen Zentner Bacig

## REFERENCE

Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In *Child Development and Education in Japan*, H. Stevenson, H. Azuma, and K. Hakuta (Eds.), New York: W.H. Freeman.

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## upcoming conferences

### 2008 National CASTL Institute: Developing Scholars of Teaching and Learning

Omaha, Nebraska  
June 4-7, 2008  
<http://www2.creighton.edu/castl2008>

This prestigious Carnegie-sponsored institute concentrates on developing approaches to SoTL. This year’s theme is “Professional Dispositions and Values,” but proposals on all SoTL topics will be considered.

### Society for Teaching and Learning in Higher Education

Windsor, Canada  
June 18-21, 2008  
<http://www.ualberta.ca/~uts/STLHE/en>

The 28th annual STLHE conference theme is “A World of Learning.” The meeting will focus on the “assumptions, practices, challenges, and possibilities of internationalization, broadened world views, and the impact of globalization trends in post-secondary settings.” Proposals due January 31, 2008. For early information, see <http://web2.uwindsor.ca/stlhe/>

### Improving University Teaching (IUT) International Conference

Glasgow, Scotland  
July 29-August 1, 2008  
<http://www.iutconference.org/index.htm>

The theme for the 33rd meeting is “Transforming Higher Education Teaching and Learning in the 21st Century.” The keynote will be delivered by Ray Land and the Mid-Conference Plenary by Bill McKeachie.

### International Society for the Scholarship of Teaching and Learning

Edmonton, Canada  
October 16-19, 2008  
<http://www.indiana.edu/~issotl08>

This is the fifth annual ISSOTL conference. This is a great meeting to attend even if you’re just starting to grapple with the Scholarship of Teaching and Learning. As of this writing, proposal deadlines have not yet been set.

[www.transform.umn.edu](http://www.transform.umn.edu)



weekend. We corresponded for several months, maybe six or seven. I remember writing him a long letter describing my dream of beginning a doctoral program in foreign language education. He never replied. I wrote him three more letters after that one. None was answered or returned. After a while, I stopped both writing and waiting.

How did Mr. Poon affect my teaching practice? That answer lies in the visual representation I chose for him – the symbol for yin/yang. In his strength, vulnerability was present, and in his vulnerability, strength was present. Without ever asking or knowing, I chose Poon to be my mentor. He taught me about the importance of ambiguity and the prevalence of paradox in the classroom and in life. An example of the latter is that he was as much my teacher as I was his. Throughout the years, I have sensed Poon’s influence on my classroom practice. I am grateful to him for modeling how to move courageously towards the unknown, for demonstrating how to welcome change and its byproducts – loss and transition, and for acknowledging not only the connectivity among all things, but also the people, places, and things that represent our physical, emotional, and spiritual roots.



The influences that shape teachers’ lives and that move teachers’ actions are . . . likely to be found in a complex web of formative memories and experiences. (Stephen Brookfield, p.49)

For me, creating this memoir about my life in teaching has proven Stephen Brookfield’s statement true. My efforts to make meaning through autobiographical connections with a handful of students has provided me with a rich vein of experiences and memories. I have tried to mine those using the tools of discernment, reflection, love, and courage. In truth, I discovered that the task not only generated new knowledge, but it also tapped into unresolved grief, unexpected blockages, and enduring anxieties. Initially, one of the hardest things for me to do was to

identify those students and experiences that transformed my self-perception as a teacher and my classroom practices. I discovered that the task of honing down the list was more visceral than intellectual. In fact, in a couple of cases, I wanted NOT to include a specific student because it would have been easier for me to do so. I knew that writing about our connection would provoke anxiety, sadness, and regret. Somehow, I realized that I had to include that particular student, and I did.

Forcing myself to reflect critically about memorable students from the past (as well as potential readers in the future) has provided rationale for me to believe that teachers are like architects; that is, they design space, select materials, create innovative outcomes, and engender patterns of interaction that may well change not only the landscape of their students’ outside world, but also the inner terrain of their bodies, minds, and hearts.

REFERENCE

Brookfield, S. D. (1995). *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass.

Kathleen O'Donovan is an education specialist at the Center for Teaching and Learning. She is co-founder of the Making a Meaning of a Life in Teaching program. The full essay can be found at: [www.umn.edu/ohr/img/assets/18007/odonovan3.pdf](http://www.umn.edu/ohr/img/assets/18007/odonovan3.pdf).

better conceptual understanding, retention of content, and improved problem-solving skills (Resnick and Klopfer, 1989; Coles, 1991; Dochy et al, 2003; Beers and Bowden, 2005). Working to resolve authentic, complex problems also contributes to the development of thinking processes and skills needed to solve problems encountered in particular professions (Carter, 1988). Self-directed learning and self-assessment activities within the context of PBL also lead to greater awareness of, and motivation for, learning. In addition, collaborative work contributes to the ability to appreciate diverse perspectives and multiple solutions to problems (Slavin, 1991).

Converting to Problem-Based Learning

In the spring semester of 2002, we converted the lecture portion of Agro 1101 to a PBL format, using three to four major problems in each semester. Much of what we think of as PBL takes place in small groups of three to four students. We established these during the second or third week of the semester, and unless conflicts among group members arose, students worked with the same group throughout the semester. Students met in their small groups to discuss problems, complete tasks related to the problem, and participate in activities designed to promote discussion of concepts pertaining to the problem presented during lecture. Thirty percent of students’ total course grade was derived from individual and group activities associated with the problems. Another thirty percent was derived from mid-term and final exams, and forty percent was derived from work associated with the laboratory component of the course.

- According to Weiss (2003), PBL problems that promote higher-order thinking should:
- 1) be appropriate for students’ knowledge base yet require knowledge extension,
  - 2) be ill-structured,
  - 3) involve collaboration among students,
  - 4) involve application of knowledge in ways students would be expected to use it in the future, and
  - 5) reinforce attitudes and habits of lifelong learning.

Because the course revolves around biological concepts, we designed problems around controversial issues related to food production and health, and the environmental impacts of agricultural practices.

“Are genetically modified organisms (GMOs) safe?” is a typical example of a question we might pose to students. We might present the problem to them in the following way: “Currently about 80% of the soybeans and 60% of the corn produced in the U.S. are genetically engineered. What does ‘genetically modified organism’ mean? Are these crops different from others? Do they pose risks to human health or the environment? If so, what measures should be taken? What unique benefits do these crops offer?”

Over the three- to four-week period, student groups are asked to research a genetically engineered crop, identify the risks and benefits to human and environmental health, and make recommendations for research that will lead to further information on an associated risk. Typically we follow a five-step learning process.

- 1. **Engagement:** Students are introduced to the issue through an activity that highlights its contemporary, and often controversial, nature. Short video clips (10-15 min.) shown in class or brief articles that students read in class have been effective.
- 2. **Identifying the problem and understanding the task:** Working in small groups or as a class, students discuss the issue and articulate the central problem revealed by the engagement activity. Students consider the issue-related problem they are asked to resolve and generate questions and ideas based on their background knowledge. Students identify personally relevant questions that will provide information needed to address the problem. Before meeting in class again, students conduct research on personally relevant questions.
- 3. **Understanding the problem and generating a solution:** Working in small groups, students share the results of their research and use this information to refine their ideas concerning a possible solution. Conceptual information is provided in class through mini-lectures and other activities such as deconstruction and discussion of a related scientific article, simulation of a biological process, concept mapping, or a guest speaker. During class, students are given time to meet in groups, discuss ideas about solutions, and work on the assigned task.
- 4. **Presenting the solution:** All groups are asked to prepare a presentation and discussion of their proposed solution. Due to time constraints, less than half of the groups actually present, but everyone can participate in the discussion. Class discussion of the proposed solutions provides opportunities to further elucidate concepts and to clarify any misconceptions that are revealed.
- 5. **Debriefing the problem:** During this time, the class takes a retrospective look at the problem-solving process, identifies the concepts learned, answers remaining questions, and reviews and evaluates the problem and the group learning process.

Student Responses

To assess students’ response to using PBL in our course, we conducted an online survey at the end of each unit of the course from 2003-2005. (For survey methodology, see *The Dilemma of Measuring Motivation and Study Habits* (p. 8).) One of the primary reasons for implementing a PBL approach to biology for non-science majors was to increase student motivation to learn. Averaged across the course topics for the years 2003-2005, 72% of the students agreed that the PBL approach helped to motivate their learning. Since this course enrolls a wide spectrum of students from the University, we were interested in seeing if motivation by PBL differed among several demographic groups. When we compared the responses of freshmen versus non-freshmen, we found no significant differences, with the exception of one topic in 2004. In this case, non-freshmen scored higher indicating they were less likely than freshmen to be motivated by the PBL approach. Since the topics in this course deal with food and agriculture issues, we compared responses from students enrolled in the College of Agricultural Food and Natural Resources Sciences (CFANS) to those of students enrolled in other colleges at the University. There was a consistent trend, and significant differences in three of the seven instances, suggesting that CFANS students were more motivated by PBL than non-CFANS students.

Since PBL requires more active learning than a traditional lecture-based course, we asked students to identify all of the ways they prefer to learn (from a list of eleven classroom activities). Student responses varied, with some students preferring lectures and others non-lecture activities. Students’ perceptions of the effectiveness of PBL in motivating their learning did not differ significantly between those who indicated a preference for lectures and those who indicated a preference for activities other than lecture, with one exception. To assess the relevance of course material to students’ lives, we asked students whether they agreed that the PBL topic “affected them personally.” The responses ranged from 65% to 93% in agreement.

In 2005, we added a question to the survey that asked students to indicate the degree to which specific activities helped them to learn. The possible responses were very helpful, moderately helpful, slightly helpful, or not at all helpful. The percent that indicated that the following activities (ranked in descending order) were very or moderately helpful are as follows: video clips (81.0%), laboratory activities (78.7%), independent research (76.6%), in-class selection simulation active-learning activity (68.1%), discussing class presentations (63.8%), mini-lectures (55.3%), discussion in small groups (53.2%), writing the paper (51.1%), and peer review of group outlines (36.2%).

To assess students perception of the course prior to and after implementation of PBL, we examined data from one of the questions from the University of Minnesota’s required Student Evaluation of Teaching forms. Because implementing PBL or active learning approaches in general is perceived to require the trade-off of reducing content, we looked at the question: “How much would you say you learned in this course?” The response to the question was a 1-7 rating scale from Very poor/Almost nothing to Exceptional/An exceptional amount. The difference was significant (P<0.05) between the score for sections offered prior to PBL (3.74, n = 5 ) versus after implementation of PBL (4.44, n = 3). At the very least, this suggests that the focus on PBL did not result in students perceiving the PBL method came at the expense of reduced content delivery by the instructor.

(continued on page 8)

Conclusions

Advocates of liberal education understand the benefit of a distributed education that engages students in a range of intellectual activities. We should recognize, though, that the lasting impact of liberal education requirements will depend, in large part, on the goals that students set for themselves; the benefit to themselves at some distant moment in time is a vague reality, and the benefit to society, sad to say, may seem irrelevant. It is incumbent, then, upon educators to design environments in which the benefits of learning to students and to society are clear and convincing, and then to create experiences in which those benefits can truly be realized. Because motivation is a strong determinant of what students learn, it is important to consider how interest and motivation can be enhanced. Our experience suggests that for a majority of students in a course that fulfilled a biology requirement for non-science majors, problem-based learning was effective in motivating learning. This effect on motivation was similar for freshman versus non-freshman and for students who indicated a preference for learning in a lecture-format versus those who indicated some other learning format preference. A majority of all students reported that the problems used were personally relevant to their lives and suggested that this is an important aspect of the PBL format which contributed to a motivation to learn.

The PBL format also provides for diverse experiences and hence is more likely to engage all students, at one point or another, during the course of the semester. Students regarded a number of the activities involved in the PBL process – viewing video clips during engagement in the problem, researching personally relevant information individually, and sharing information in small groups – as especially helpful to their learning. While these activities are not precluded from courses that do not involve the PBL format, they are an integral part of PBL, particularly when implemented in a process that builds toward a purpose and has personal meaning.

Our experience using a PBL format enabled us to realize our learning objectives and provide a framework for engaging students. This structure encouraged students to ask critical questions, locate and evaluate information, state an informed opinion, and work collaboratively to synthesize diverse opinions. Although it is a challenge to effectively implement a PBL structure in a large course, the benefits of connecting students with real world problems and forcing them to think through these scenarios in a structured manner go a long way to creating scientifically literate graduates and truly engaged learners.

Acknowledgements

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REFERENCES

Amador, J. A. & Gorres, J. H. (2004). A problem-based learning approach to teaching introductory soil science. *Journal of Natural Resources and Life Sciences Education*, 33, 21-27.

Barrows, H. (1985). *How to design a problem-based curriculum for the preclinical years*. New York: Springer.

Beers, G. W. & Bowden, S. (2005). The effect of teaching method on long-term knowledge retention. *Journal of Nursing Education*, 44, 511-513.

Boud, D. & Feletti, G. (1991). *The challenge of problem based learning*. New York: St. Martin’s Press.

Bridges, E. & Hallinger, P. (1992). *Problem based learning for administrators*. ERIC Clearinghouse on Educational Management, University of Oregon.

Carter, M. (1988). Problem solving reconsidered: A pluralistic theory of problems. *College English*, 50, 551-565.

Coles, C. (1991 ). Is problem-based learning the only way? In D. Boud & G. Feletti (Eds.), *The challenge of problem based learning*. New York: St. Martin’s Press.

Dochy, F., Segers, M., Van den Bossche, P. & Gijbels, D. (2003). Effects of problem-based learning: A meta-analysis. *Learning and Instruction*, 13, 533-568.

Milter, R. G. & Stinson, J. E. (1993). Educating leaders for the new competitive environment. In G. Gijsselaers, S. Tempelaar, & S. Keizer (Eds.), *Educational innovation in economics and business administration: The case of problem-based learning*. London: Kluwer Academic Publishers.

Resnick, L. B. & Klopfer, L. E. (1989). Toward the thinking curriculum. In L.B. Resnick & L.E. Klopfer (Eds.), *Toward the thinking curriculum: Current cognitive research*. Yearbook (Association for Supervision and Curriculum Development).

Savery J. R. & Duffy, T. M. (1996). Problem based learning: An instructional model and its constructivist framework. In G. Brent Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design*. Englewood Cliffs, NJ: Educational Technology Publications (online at <http://www3.uakron.edu/edfound/people/savery/papers/sav-duff.html>).

Slavin, R. (1991). Synthesis of research of cooperative learning. *Educational Leadership*, 48(5), 71-82.

Weiss, R. E. (2003). Designing problems to promote higher-order thinking. *New Directions for Teaching and Learning*, 95, 25-31.

Woods, D. R. (1996). Problem-based learning for large classes in chemical engineering. In L. Wilderson & W. H. Gijsselaers (Eds.), *Bringing problem-based learning to higher education: Theory and practice*. *New Directions for Teaching and Learning*, Number 68. San Francisco, CA: Jossey-Bass.

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The Dilemma of Measuring Motivation and Study Habits

After deciding to use PBL in our class, we created a questionnaire to determine if it improved student interest in course material and students’ motivation to learn (study). We asked students to complete the questionnaire at the conclusion of each of the three or four problems. Students were asked to rate their interest in the issue, the personal relevance of the issue, and the effectiveness of the PBL approach in motivating them to learn. We also asked them to rank the effectiveness of class activities (e.g., videos, group work) in helping them to learn. Student demographic data were obtained from enrollment information. While these questionnaires provided us with useful information on students’ attitude toward PBL, we wondered whether they accurately assessed student motivation. Is there a better, more formal way to capture student motivation and studying habits? It was a good question, particularly because we sought to gain an understanding of, and experience with, classroom research methods.

We found references to two surveys designed to assess motivation, the Intrinsic Motivation Inventory or IMI and the Approaches to Studying Inventory or ASI. The IMI was designed to assess the effect of interventions on student interest/intrinsic motivation and other aspects of self-regulation. It poses questions that relate to 1) interest/enjoyment (the self-report measure of intrinsic motivation), 2) perceived competence, 3) effort, 4) value/usefulness, and 5) perceived pressure and choice. The second survey, the ASI, characterizes the way in which students engage in learning. The abbreviated form we used describes students’ approaches to studying as either meaning-oriented (intent to understand and connect learning to other knowledge) or reproducing-oriented (intent to memorize to pass exams).

In fall 2006, we asked if student motivation was affected by the PBL approach in comparison to an issue-focused, active learning approach that did not entail PBL. In addition, we asked if group work in conjunction with the PBL approach had any effect on student interest and motivation. We included the 25-item IMI in the questionnaire that students completed at the conclusion of each problem. We also included the 32-item ASI in surveys taken by students at the beginning of the semester as well as after the final problem. Thus, we surveyed students four times during the course of the semester and questionnaires varied from about 40 to 70 questions in length.

We found that student responses showed no significant differences for any of the six subscales of the IMI after each problem. In other words, according to the IMI, students’ intrinsic motivation to learn biology was not changed by the use of PBL, with or without group work. In retrospect, this is probably not surprising. Most students take Agro 1101 to fulfill a liberal education requirement. Thus, while our earlier survey results indicated that most students viewed PBL as effective at motivating their learning, using the IMI, we could not detect a change in attitude in response to PBL over the course of a semester. This suggests that a single course will not change the attitudes of most students toward the subject and that we may need to focus on other motivational factors. It also points to the need to measure student motivation over a longer period of time.

Additionally, we found that mean ASI scores were higher for meaning-orientation than reproducing-orientation both at the beginning and end of the semester, suggesting that students were, in fact, slightly more focused on studying in order to understand than simply to obtain a passing grade. The fact that mean scores did not differ over the course of a semester may indicate that teaching approaches during a single semester have limited impact on this dimension of student learning. We decided to retain the ASI as a measurement of students’ disposition toward study in a nonmajors course and to explore its use as a corollary variable to help explain differences in students’ attitudes toward classroom activities (e.g., lecture, group work, reading, labs).

The results we obtained with the IMI and ASI caused us to rethink the questions we were asking about the effect of PBL on student learning. Although PBL may not cause students in a nonmajors course to want to study the subject (as is implied by intrinsic motivation), it may make it more interesting and thus perhaps easier to study. PBL may provide other benefits to learning, such as retention, that we have not attempted to measure in our course. And, while we think that students might be more deeply engaged in learning material that seems interesting and relevant, the reality may be that students’ attitudes toward studying may be a trait that is not easily changed by the content or the manner of teaching in a single course. We also learned that students, like the rest of us, grow weary of excessive surveying, as evidenced by failure to complete surveys or questionable responses. The quality of students’ responses is probably best when surveys are short and used judiciously. Thus, our self-designed questionnaires provided us with the most direct and useful information for evaluating our teaching.

– Mary Brakke and Kevin Smith

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