CTE NOTEBOOK

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Reinert CTE Mission Statement
The mission of the Paul C. Reinert, S.J. Center for Teaching Excellence is to support Saint Louis University faculty and graduate students. To fulfill this mission the Center:

• Helps faculty and graduate students find their own directions, meaning and pedagogical style in the context of Jesuit traditions of education.

• Develops a community of scholars who encourage and challenge each other through mutual inspiration, mentoring and renewal.

• Supports faculty and graduate students in the development of skills and knowledge of pedagogical approaches using technology and other teaching innovations.

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Problem-based Learning in the Classroom

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Problem based learning (PBL) is thought of as both a curricular approach and a learning process. I will leave to others the discussion of PBL as a curricular approach. My comments will focus on PBL as a learning process.

PBL is a form of active learning requiring students to engage in the learning process through solving real time problems. Advocates of PBL believe students retain knowledge longer through this learning process as compared to the traditional lecture method. Because students are more engaged in and stimulated by the learning process, it is also believed they acquire the skills for self-directed learning.

PBL possesses two distinct characteristics. First, it focuses students on the process of learning. Some describe it as learning the process of solving problems. Rather than providing students with formulaic, predetermined problems and solutions, you teach students the process of how to analyze and solve problems. This is achieved through the use of ill-defined problems from real life or practice. These problems are sometimes referred to as complex or messy. Through the PBL process, we reinforce students' ability to analyze and dissect problem situations. We want students to analyze holistically: frame the problem through identification of issues, discriminate between key and peripheral issues, think divergently, generate ideas about the situation, collect information, and evaluating alternatives. We are attempting to

teach students to think both creatively and critically. The PBL process is complimented by course reading materials so students have some base of reference to course ideas and theories within the arena of the course work.

The second characteristic of PBL is small group work. PBL utilizes small groups for solving the complex or messy problems as a learning experience. The approach believes that small group work more closely approximates the real world of work into which students will enter upon graduation. The learning process is structured to help students understand the work group as both a social and a work environment. Students must learn how to collaborate, how to work interdependently, how to pool talents and resources while forming a group that advances through known stages of development, including conflict and power struggles.

By implication, the role of the faculty person has a dual focus. On the one hand, the faculty instructor is a content expert who guides and facilitates students' learning. On the other hand, we must also be process experts who help students master the group environment.

In my Evaluation of Human Service Programs, a graduate level social work course, I approach the classroom implementation of PBL by combining it with both traditional lecture and case teaching materials. I begin the semester long course with lecture to review foundation material. This insures students have the key concepts necessary for the current course. I then introduce a teaching case on design and implementation of a field-based evaluation. This provides the students with an example of the types of issues they could face in the field. Unlike PBL, the case method provides a structured, guided experience with predetermined concepts and issues to be addressed by the class. These two steps are usually completed within the first month of the 15-week course. At this point, I introduce the real life problem into the classroom. The problem is an evaluation project previously negotiated with a local, nonprofit, human service agency that desires assistance with evaluating a program service. In the past we have worked on projects for The Wyman Center- Kiwanis Camp Wyman/ Camp Coca Cola and Saint Louis For Kids. Students are engaged in the complete experience of formulating and implementing the evaluation project. They are required to meet real deadlines, due dates and deliverables. They have to solve problems encountered in the design and implementation of the project.

My role in the process is to serve as both resource and guide. Sometimes, I am a sounding board for the problems encountered by the students. At other times, I assist students with the problems they face. Along the course's path, I highlight the concepts they should have read about in preparation for the project stage. I emphasize the conceptual point rather than the project specific problem, even as we address the challenge at hand.

I am not implementing a "pure" PBL approach. I want to insure some minimal, foundational learning. If you have worked on a research project, you will recognize PBL as the method that is used in virtually every research situation.

So, is PBL new? Probably not. But, it introduces real world problem solving earlier into the careers of our students.

Problem-Based Learning : Expect the Unexpected
By Roger Lewis, Ph.D., CIH
Public Health

I have always been uncomfortable giving long lectures. The discomfort is due to the fact that I never know if what I'm saying is really sinking in. If some wisdom from the instructor is truly to sink in students must be engaged in problem solving. Confucious said, "I hear and I forget. I see and I remember. I do and I understand." Problem-based learning is doing.

Most students tell me they learn more from problem-based learning than from lectures, discussions, or any number of paper assignments. Many quantitative college courses offer problem sets that both challenge and just as often frustrate students, nevertheless students are problem solving while often struggling to find answers. My notion of problem based learning, however, is a bit different than solving problem sets.

Problem based learning in my view is solving real problems and once set into motion, causes the creative juices to stir in the student leaving an unpredictable and somewhat hazardous journey for the student and the instructor. The safe harbor of the Microsoft power point lecture, where the student knows that after 25 slides the lecture will be over and the "bell" will ring, is left far behind in a sea of events that could be quite unexpected.

I had recently come back from one of several visits to rural Honduras, where SLU colleagues and myself had recently installed several portable water filter devices that we had developed in our laboratory. It had taken the faculty and staff many months to arrive at a workable solution for these devices that we

hoped would help reduce exposures to fecal coliform bacteria and hence reduce diarrhea among the people we were helping. What if my students in my course on control of infectious and biological agents were given the same task we were, to develop a device for removing fecal coliform bacteria and protozoans? Could they do it? As it turned out, some could and some could not. My students were not graduate engineers and although a few students turned in a working portable water filter that met the assignment criteria some students came to me with bits of tinfoil and a little sand and said, " I can't do this". I understood then that I had asked the students, most without hands-on skills; too much by asking them to make some tangible and testable device, so I modified the assignment and added components to it that they were learning in other courses in their public health curriculum.

I arrived at a final assignment that would not require students to make a working water filter but instead to design the filter, write a document that describes the barriers to put it to practical use, and write a study that would evaluate its effectiveness for reducing diarrhea. The students take courses in both behavioral science and epidemiology at our school and they would be putting their skills that they learned in those classes, in addition to what they were learning about the design in my class, into solving the problem. In fact, the students were actually now doing work that reflected our own experience in Honduras.

I also teach or have taught several classes in occupational health. These classes offer students the opportunity to investigate and solve mysteries on a variety of human exposure scenarios but what seems very exciting to students can also be frustrating as "real world" problems become evident to students. I sometimes ask students to solve actual indoor health quality issues at workplaces but these can't always be scheduled for the benefit of the student syllabus and some students grumble about doing on-site work at odd hours. I also have had students work as a consulting team, identifying, measuring, and report writing on the controls needed to contain hazardous chemicals or noise in a small business. Unfortunately, many small businesses are conflicted about the value of student occupational health investigators and have been known to stop the investigation when expensive controls measures or significant hazards are identified. Large companies present different problems than small companies and cooperation is rarely rescinded. I teach a laboratory class where my students evaluate the environment of large companies and the greatest

problems they usually find there are workers that don't show up or sampling equipment that falls out of calibration. This often requires the student to reschedule their visits to a company.

I now have a warning on my syllabus for my course in occupational and environmental laboratory, "Unexpected circumstances during sampling or lab work is more the norm than the exception in the real world of environmental and occupational health, therefore, students must expect that last minute changes, additions, or deletions to sampling and lab work is part of the territory. Every attempt will be made to run the lab class according to the syllabus, however, changes may be needed from time to time". Problem based learning exercises can be a rewarding experience both to the student and instructor. My warning to students to be flexible and adapt to changing conditions in the workplace is also apt for my advice to fellow instructors; be flexible based on the student's reaction to the assignment and be empathetic to the students needs for some semblance of predictability even when forewarned to expect the unexpected.

CONFERENCES

Teaching Renewal Conference, February 23-25, 2006 at the University of Missour-Columbia (http://teachandlearn.missouri.edu/events/trc/**)**

The Teaching Renewal Conference (TRC) focuses on sharing ideas and research on assessing and overcoming the many challenges faculty face as they try to make learning happen in their courses.

PBL RESOURCES

- PBL at University of Delaware (http://www.udel.edu/pbl/)

  A resource of the University of Delaware's Institute for Transforming Undergraduate Education, this site includes syllabi and examples of incorporation of PBL into a range of disciplines.

- PBL Clearinghouse (https://chico.nss.udel.edu/Pbl/)

  PBL Clearinghouse a collection of peer-reviewed problems and articles to assist faculty in using problem-based learning. The service is free to academics but requires online registration.

- Problem-Based Learning Initiate (Howard Barrows) (http://www.pbli.org/core.htm)

  An excellent introduction to PBL, including resources produced by Howard Barrows and colleagues.

- Problem-Based Learning Initiative (http://www.samford.edu/pbl/index.html)

  An initiative of Samford University, this site serves as a clearinghouse of information about PBL in undergraduate and professional education.

- PBL site of Maastricht University (http://www.unimaas.nl/pbl/)

  This site contains discussion lists and other resources of interest to faculty members in higher education.

Follow-up to the "Conversations" Issue
"JESUIT CONVERSATIONS IN POLITICAL SCIENCE"
By Timothy J. Lomperis, Ph.D.

At a brown bag seminar in October, sponsored by the Center for Teaching Excellence, Professor Ron Modras spoke of the Jesuit pedagogy of emphasizing a conversational approach to classroom learning. As a political scientist, I thought I might share my use of this conversational approach in two of my courses. In both cases, I take the individual learning that comes from writing a major paper, and try to draw further insights from these individual efforts through discussions that can collectively come from conversations in small groups. This "old" pedagogy of conversations represents at least one way we can escape from the heavy dependence on the classroom lecture through which we, as professors, are so determined to share our own individual insights and knowledge. These conversations can ensure that these lectures are just a first step to knowledge, and not the only step.

The mission of my Asymmetric Warfare class is to have the students probe Vietnam centrally, but other Cold War insurgencies/interventions as well, for lessons appropriate to the War on Terror. They are tasked with writing a major research paper that surfaces a lesson from one particular aspect of the Vietnam War. Following this, they meet in small groups of four or five students and present their papers to each other. After a full class period of small group discussions, each group presents a "composite" set of lessons from their set of papers to the class as a whole. Students have universally found these discussions to be invaluable, and have lamented over how they wish they could rewrite their papers to take into account all of the insights they gained from their fellow students. The final class session is devoted to a plenary discussion of distilling a set of consensus lessons on Vietnam for Iraq.

The intellectual pay-off from these conversations comes in the final assignment of the course. Instead of a final exam, I have the students turn in a five page "op-ed essay," as I call it, on what they think is the single lesson from Vietnam for the War on Terror—or what they think is the best approach for drawing lessons. I have taught this class only twice, but the quality of these pieces is, collectively, the highest of any paper assignment I have given in my twenty-five year academic career.

In my Politics of the Future seminar, the main project of the course is a twenty-five page Paradigm

of the Future Essay. In this project, the students have to construct a future political system (both national and international) set 30 to 100 years ahead that is the best practical reflection of their core life value. The fundamental objective of this seminar is to stimulate a process of student reflection of their entire undergraduate education and focus it into the articulation of a life credo rooted in a central value. Students are also required to write their own obituaries and to analyze and compare two "future" novels for their ring of political truth. These assignments call for the integration of the rational and imaginative functions of their brains, and it triggers a lot of stress—a stress that I build in deliberately as the critical way to create the intellectual fusion necessary to write this final essay.

In coping with this stress, the students need to know that they are not alone in this agony. Consequently, I have the class break into small groups frequently. In addition to the pedagogical learning of the group assignment themselves, these small groups turn into support groups for the students to help each other survive the course. The benefit of the small discussions is that each student broadens his/her horizon of insights from these literary excursions into the future.

Another conversation revolves around an exercise in arriving at the "best possible" future. The start of this exercise is for each student to take a quiz on what he/she individually thinks is going to happen in the future a generation out in St. Louis, the United States, and the World. Then they meet in small groups to compare notes. It is remarkable, over the years, how most of these groups are able to talk their way to a basic consensus in each area. From this set of conclusions, I then task the groups to discuss what they would ideally like the future to look like in St. Louis, the United States, and the World. There can be, and usually are, some differences here. This becomes a "teaching moment" to illustrate the importance of values in creating differences over the future.

What these classroom conversations remind us is that, regardless of the subject matter or the discipline, though learning is an activity that must occur in each individual, especially in terms of accountability, it can best be completed and fulfilled by the group learning that comes from the conversations that permit us to mine the minds of others. We do no injustice to John Donne's famous observation about our essential communal nature as a species to also insist intellectually that, man or woman, "No man is an island entire to himself."

From the Director

In the early 70s, Dr. Howard Barrows introduced Problem-Based Learning (PBL), an active learning strategy, into the medical school curriculum at McMaster University. Since that time PBL has emerged as a strategy used not only in medicine but in a wide range of disciplines, and in educational levels ranging from k-12 to professional and graduate programs.

PBL is a learner-centered, problem-driven approach to teaching that draws upon each learner's prior knowledge and interest in solving real-world, ill-defined problems. An ill-defined problem is a problem that does not have a unique or easily defined solution. Students, usually working in small groups, analyze the problem, generate hypotheses for solving the problem based on what they already know, and determine what they need to know or learn to test their hypotheses. The process is iterative in that once students have completed their research on what they need to know, they revisit the problem and possible solutions to identify what if anything they must still learn before proposing a solution. Students learn both content and acquire problem-solving skills through the process of solving the problem. Individual reflection and assessment of learning is integral to the PBL process. Many hybrid forms of PBL are currently used in education. A PBL problem can drive learning within a single class session or over an entire semester or program.

PBL is used world-wide. Recently Stuart Slavin, M.D. (School of Medicine) and I spoke at a seminar on Active Learning Strategies in the Health Care Professions, with particular emphasis on PBL, held in Belo Horizonte, Brazil. Several of the on-line resources listed in this newsletter are from international sources. At Saint Louis University, PBL is employed in a variety of programs. Candidates for a Doctor of Education (Ed.D.) degree in the department of Educational Leadership and Higher Education use PBL "to investigate a significant problem related to the field of education." This fall the department of Aviation Sciences introduced a revised curriculum that incorporates PBL to freshmen majors. This issue of the Notebook features articles on the use of PBL from faculty members in several disciplines. You will also find a selection of resources on PBL for faculty members interested in learning more about this teaching strategy.

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