A Newsletter for Undergraduate Problem-Based Learning from Samford University

PBL Insight

to solve, to learn, together

Vol. 4 No. 1

Inside

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PBL in Science Education: A Curriculum Reform in Biology at University of Quebec in Montreal

Yves Mauffette, director of the Groupe Recherche Ecologie Forestière Inter-universitaire, and Laurent Poliquin, director of the undergraduate program in biology, Department of Biology, University of Quebec in Montreal

In science, ever-increasing amounts of information, specialized training and changing techniques challenge educators to rapidly adapt to demand. Science education should concentrate on the thinking process within the field and on teaching students how to learn.

Science educators should focus on highly selective examples to demonstrate clearly and effectively the necessary theories and methods.

Faculty have questioned our present educational approach, which involves content-laden lectures, and seek alternative methods. Problem-based learning [PBL] emphasizes understanding, learning how to learn and critical thinking skills. Others, such as Gallagher, Stepien, Sher and Workman (1995), have stressed the importance of using PBL in science classrooms to promote scientific reasoning. Because PBL addressed many of our concerns about overcoming some of the educational shortcomings of our present teaching, we developed a PBL program in biology at the University of Quebec at Montreal [UQAM].

Leading to Change

To initiate the change, a departmental committee was appointed in 1989 to evaluate the traditional bachelor's degree program in biology. The traditional program consisted of 90 credits, which can be completed full-time within three years. Students normally start the program after completing 13 years of schooling, whereby they have completed their basic sciences, such as physics, math and chemistry, prior to enrollment.

The committee sent a questionnaire to graduates and faculty members to assess their degree of satisfaction with the program. Survey results indicated a high degree of satisfaction with the material taught in the different courses but pointed out that the existing program failed to promote autonomy, a sense of responsibility, integration of the different fields within biology and social implications for students. The committee also established the potential roles, functions and competencies a biologist may have within society (Mauffette & Poliquin, 1997). Above all, the committee had to establish the basic objectives of a program that would solve the problems mentioned in the survey and convey to students the abilities to perform as biologists (Table 1). The committee set out to devise a curriculum based on PBL that would promote the objectives sought to enhance integration within the different fields of biology throughout the program.

Another critical issue was for students to master and to apply the scientific method. Poliquin and Mauffette (1997) demonstrated the parallel that can be drawn between the procedure followed during PBL group sessions and application of the scientific method (Figure 1). Therefore, the pedagogical format used to acquire specific knowledge also becomes an apprenticeship of the scientific method but carries on at the same time learning objectives sought within the program (Cowdroy & Mauffette, 1999).

Table 1: Training objectives

1. Autonomy
   - critical thinking and reasoning
   - communication and organization
   - time management
   - reflection
2. Scientific responsibility
   - hypothesis testing
   - interpretation
   - recommendations
3. Social implication and personal development
   - curiosity
   - ethics
4. Acquisition and learning
   - knowledge: from the molecular level to ecosystem
   - knowledge: specializing within options

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Editor's Notes:

Kristi Arndt

Should problem-based learning [PBL] be adopted as a curricular approach or as one instructional method to be used among others in a course? This question stirs up strong opinions among many PBL practitioners and certainly does not have a simple answer. As with any educational innovation, change requires commitment along with a lot of hard work. Therefore, the decision to implement PBL within a course or throughout a curriculum depends to some degree on how committed others are to PBL.

This issue of *PBL Insight* includes an example of each type of change. Yves Mauffette and Laurent Poliquin describe the process of changing their department's three-year, traditional bachelor's degree program in biology to PBL. Based on results from a survey of graduates and faculty members, a departmental committee designed a new curriculum comprised of theme-based units, integrating various areas of biology with social implications to promote student autonomy, group efficacy, personal development and social involvement, scientific reasoning and responsibility, and knowledge acquisition and learning. In contrast to the curricular approach, Jane Akister discusses how she converted what had previously been covered in three lectures to a two-session PBL segment within a social work course. The success of her initial efforts has encouraged Akister to work toward expanding PBL across the entire 10-week module.

Whether PBL occurs within a course or across a curriculum, it is bound to stimulate some response from the students. Akister describes the concerns of some students in dealing with real situations that were unresolved at the time, pointing out that this is exactly what they will face in their work as social workers. In a separate article, Sheella Mierson and her former student, Anuj Parikh, provide firsthand accounts of student response to PBL in a physiology course. From a teacher's perspective, Mierson enjoyed observing students' growth both intellectually and socially. For the student, as reported by Parikh, such growth involves some pain. However, with support from Mierson's liaison group, composed of one member from each tutorial group, Parikh and the other members of his group resolved their difficulties, becoming a productive group and learning important lessons about honest self- and peer-assessment as well as how to encourage and support others.

I hope this issue inspires you to take new steps in your PBL efforts and to share what you learn with the rest of us. Upcoming issues of *PBL Insight* will include synopses from and reflections on PBL portfolios developed through the PBL Peer Review project, supported by The Pew Charitable Trusts and Samford University. I invite you to visit the Samford PBL Web site at www.samford.edu/pbl to submit an application for a PBL portfolio mini-grant. ▲

PBL Insight

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Invitation for Submissions:

The editor welcomes contributions to *PBL Insight*. The following are guidelines for those who would like to contribute work on problem-based learning [PBL] in higher education.

Content

The editor welcomes both scholarly and research papers on PBL as well as reports of actual classroom practices.

Format

Scholarly papers, research papers, reports, essays, book reviews, news items, and letters to the editor are welcome. Please send both a hard copy and a disk copy of your article to the editor. Microsoft Word is preferred.

Length

Scholarly papers and research reports should be 1,000–2,000 words (four to eight typed, double-spaced pages). Book reviews, news items or work documenting practices should be 100–500 words.

Style

APA style is required for documenting sources.

Deadlines

Future issues will be finalized one month before publication of the newsletter. Please send contributions for the next newsletter by October 31, 2001.

Please address all contributions to:
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PBL in Science Education

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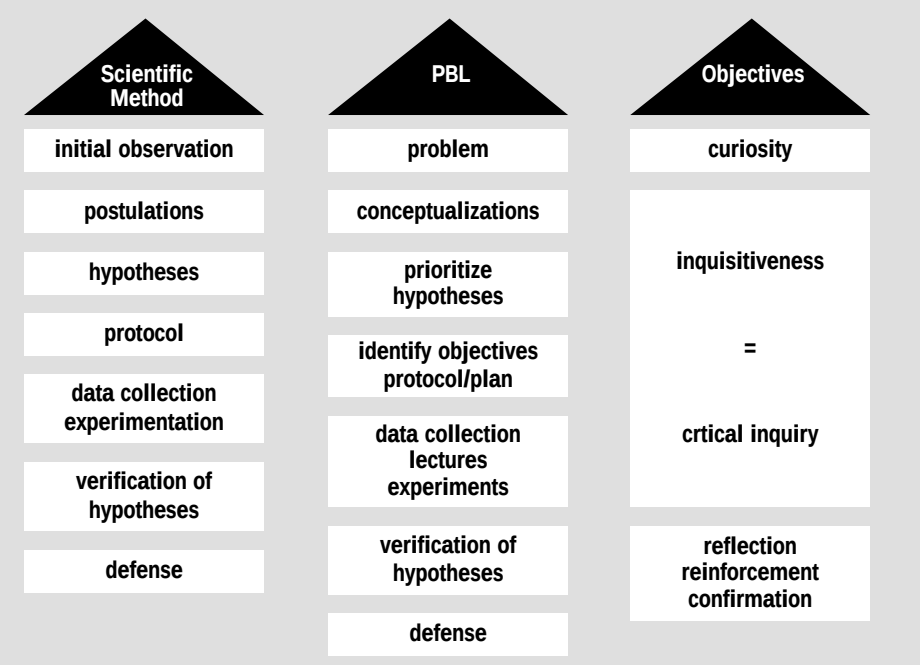
FIGURE I. Illustration of the parallel that can be drawn between the steps followed during problem analysis in PBL (center column) and the steps required during application of the scientific method (left column). Right column shows how each of these steps contribute to the objectives of the program.



A New Curriculum

The new curriculum is intended to provide a general training in biology for the first two years and to allow students to specialize during the last year. Faculty members were consulted to establish the basic requirements and main themes that should be covered within the first two years. A second consultation was also appointed for the final year of the program; faculty were grouped according to their specialty to identify the requirements of each option. Within their first year, students would study the diversity of living organisms (integrating elements of structure, function, evolution and classification). The second year, students concentrate on how these organisms function (integrating elements of molecular, cellular and organismal biology). The final year allows students to specialize by concentrating on specific themes of ecology, biotechnology/molecular biology or environmental health/toxicology, and also by initiating a research project in a specific field with a faculty member.

The definition of such a new program required eliminating existing descriptions and course structures of the traditional program and creating a completely new model. The new model is divided into units that vary in length and total three years. Students within the program can participate in only one unit at a time. Each unit consists of a sequence of problems or situations called prosits that lead to specific learning objectives. In groups ranging from eight to 12, students attend three-hour tutorials twice a week, completing two prosits a week. In addition, six-hour weekly laboratories are scheduled for students to make observations and acquire the practical skills associated with the unit material. If necessary, some units may have one or several workshops addressing particular topics not covered in tutorials or labs. For the first two years, 11 units were created, ranging in duration from one to nine weeks. Two specialty units and laboratory units were established for the third year (Mauffette & Poliquin, 1997).

Design of the Units

The coordinating committee initially established a number of subjects and themes that could be covered in a unit, as well as a time allotment based on relative importance and content. A faculty member specializing within the field of the unit outlined a concept map (Novak & Gowin, 1988). These concept maps allowed faculty to organize and set the basic objectives of the unit. Small committees ranging from three to five educators were then appointed to create the prosits. Once the units were created, the coordinating committee reviewed the prosits and chose a proper sequence to conceive a logical chain of learning.

The approach at a population and organism level in the first year gives rise to a macroscopic overview of biology, encompassing a large array of living organisms without specializing in one group (e.g., insects that would be covered in entomology in traditional programs). Within the first year, the prosits describe key groups or individuals reflecting a class or kingdom. They do so by depicting an actual or a fictional problem or situation relating to the organisms. This approach permits students to cover the basic biology of a group and gradually to integrate complementary notions pertaining to the problem or the situation. Considerable effort is required to establish the learning objectives of a unit that integrates the various disciplines into domains of biology, rather than splitting disciplines into separate compartments. For instance, plant morphology, taxonomy, physiology and ecology, as well as some genetic and biochemistry issues, can all be addressed during a first-year unit such as Plant Diversity in the examination of the major divisions of the plant kingdom (Laliberté & Mauffette, 1997).

During the second year, students should increase their understanding of living organisms at a submacroscopic level after they have understood the nature and the complexity of biological diversity during the first year. Here again, concepts are arranged such that disciplines of genetics, immunology, physiology, biochemistry, toxicology and molecular biology are constantly and simultaneously referred to in units, which will take students through cell regulation, plant and animal growth and development, defense mechanisms, and environmental interactions.

The units of the final year are specific to each option and have been elaborated by the specialists of the department pursuing research within these options. In this final year, the research specialist of a given field must assess the basic requirements of the option so that the student will acquire a satisfactory competence level within that option. Therefore, the final year revolves around problems and situations that are most pertinent to the option and will be constantly amended to fit recent progress within the field. The final year also complements laboratory and field expertise specific to the

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chosen specialization. Students acquire practical skills through intensive laboratory and field sessions and also during a research project. Finally, the third-year student has fewer tutorials, and focus is given to larger, more integrative prosits and a stronger use of recent specialized literature. Individual accomplishment is encouraged through the research project.

Overall, it was clear to faculty when elaborating the units and the prosits that a selection of information had to be made. Educators must recognize the impossibility of teaching all of contemporary biology as the number of pages increases in each successive edition of biology text books (Rigler & Peters, 1995). Faculty must make choices even in traditional programs. Therefore, when building these units, faculty had to select material that was most relevant to the field and that could be effectively covered. Above all in creating these units and prosits, faculty were encouraged to address learning objectives within real-life contexts whenever possible. For example, in the natural selection unit, one of the prosits describes a plant collector confronted with two plant specimens having distinct morphological attributes but being the same species. As future biologists, students know they could potentially face this situation.

Integration Units Throughout Three Years

A series of integrative units at the end of each semester were also established. These units provide a general assessment of the cumulative knowledge acquired during the semesters and are meant to specifically assess higher-order cognitive abilities, namely analysis and synthetic judgement. The requirements for this unit, for semesters one through six, are listed in Table 2. As students progress through the program, the scope of analytical and synthetic reasoning abilities and of critical judgement is expected to increase. The requirements also aim at verifying progressive integration of learning through the curriculum. Integrative units increase students' capacity to integrate the subjects encountered in the different units and also allow an assessment of writing and oral skills.

In the final year, students negotiate their learning objectives within their option. Early in the final year, students set out their goals with a facilitator and establish a framework of agreed objectives. It is only at the end of the year that the students will be questioned by a panel to assess their objectives. This form of negotiated assessment processes [NAPS] primarily focuses students to accept responsibility for their own learning decisions (Knowles, 1990).

New Assessment Tools for New Objectives

A primary result of the change to PBL was to displace emphasis from knowledge transmission by professors to knowledge acquisition by students. In doing so, the program became more role-oriented and now addresses students' development of autonomy, critical analysis, and ability to transfer knowledge and to adapt to new situations by becoming self-learners. The change also aimed at developing ability to interact in group work. Traditional knowledge acquisition assessment, while present, had to be complemented with new forms of assessment that would measure the success of PBL in promoting these objectives.

Assessment of the student progression in the integrated PBL program had to include tools that would take into account the development of personal qualities. Most of these qualities can be qualitatively measured, at least in part, by observation of individual behavior during group work, both by tutor and peers. To support this observation, a questionnaire or grid was devised to allow students to identify personal qualities and attitudes in biweekly student reunions. The grid is filled for each student at the end of a unit by each peer and by the tutor. Values awarded to each indicator are compiled, and the total is given a 20 percent weight in the final unit evaluation. The qualities assessed by the grid and the indicators used are listed in Table 3.

Evaluation of some of the problem-solving process and analytical skills can also be complemented to variable degrees, depending on the unit, by using exercises such as "Triple Jump Exercise" (Painvin, Neufeld, Norman, Walker, & Whelan, 1979), "Concept Mapping" (Novak & Gowin, 1988) or experimental design by the students. In view of the resistance to depart from factual knowledge verification often encountered in science learning assessment, the accumulation of these types of exercises is somewhat slower in the earlier years. Therefore, it is mainly for the third-year students that we have introduced the more novel assessments such as triple jump.

Table 2: Design of integration units

1. Job interview	Research and development in an agronomy company, with emphasis on regional/national crops knowledge, biodiversity and durable development, plant resistance to infections
2. Book review	*Jurassic Park* and *The Lost World* by Michael Crichton (Spring 1997), with emphasis on the biological arguments; *The Origin of Species* by Charles Darwin (Spring 1998)
3. Job interview	Research and development in an agronomy company, with emphasis on plant growth and biotechnological plant and crop improvement
4. Written proposal	Justification of choice for third-year option, with personal career aims
5. Oral presentation	Presentation of multidisciplinary project
5/6. Tutored analysis	Personal development objectives for third year, with means to attain them; regular meetings with tutor during the year to verify evolution toward objectives
6. Oral presentation	Presentation of personal research project

Conclusion

Faculty members involved in this program have shown an enormous amount of enthusiasm for this instructional approach and have been surprised by the efficiency shown by the students in learning and questioning. Faculty have noticed that the change in student behavior is most striking at the end of three years, where the benefits of this pedagogical approach are most evident. The adaptation of the faculty to the PBL method is a gradual process. King (1999) has related that faculty experience going from an initiation phase to an institutionalization phase; we experienced similar trends. It is clear that several question the merits of the new approach at UQAM. In part, there is an

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entrenched long-term conservatism in education, which is reinforced with conservative expectations, but there is also a strong resistance to change.

At this point, the first cohort of students that completed the program was very satisfied. Based on a survey held at the end of their third year, 90 percent said they would redo a PBL program and were satisfied with the relevance of the program objectives and the extent to which the program served those objectives (Leckman, Lévesque, & Audet, 1999). Overall, our experience strongly suggests that the PBL method does provide an adequate platform through which students not only achieve the basic knowledge required for a scientist in the field of biology but also develop the thinking process used by science majors.

The change to a PBL program has led to strong interaction between teaching assistants (mainly graduate students), administrators, lab personnel and faculty to coordinate the information between units and harmonize the activities. Such a program also requires constant adjustment because of the numerous interactions at the different levels and continual coordination among the program managers and tutors, between units and labs, etc. During the three-year program, students complete more than 100 problems, and these problems are evaluated and validated ahead of time to facilitate the progression of the learning objectives. Each year, a number of the problems are rewritten. Therefore, the time investment to coordinate the program is much greater than in more traditional programs, but it prevents overlaps, confusion and dysfunction. ▲

Table 3: Qualities evaluated through grids answered by both students and tutors

Contribution to group efficiency

Interest and involvement in the group's work
- active participation to group discussion
- participation in centering the group around its task(s)
- accomplishment of specific designated tasks

Ability to organize collected data
- receptivity towards peers' interventions
- reaction to critics and positive integration

Participation in conflict solving

Scientific reasoning and responsibility

Preoccupation for exact information

Ability to justify the argumentation, and acknowledgment of its limitations

Ability to
- identify relevant questions
- classify information
- formulate questions and hypotheses
- contribute to the verification of hypotheses

Ability to build a synthetic and critical judgement

Personal development and social involvement

Active attitude demonstrated by
- enthusiasm and curiosity
- recognition of plurality of possible approaches to a problem
- consideration of complementary (ethical, social) aspects

Autonomy

Ability to complete expected work within available time

Creativity and originality demonstrated during tutorial

Initiative

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Stories from the Field: PBL from a Teacher's and a Student's Perspective

by Sheella Mierson and Anuj A. Parikh

Editor's note: This article contains an excerpt from Sheella Mierson's article entitled "Stories from the Field: Problem-Based Learning from a Teacher's and a Student's Perspective" reprinted from Change: The Magazine of Higher Learning, *January/ February 2000, pp. 20–27, published by Heldref Publications, Washington, D.C.*

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The full article contains vignettes and insights from the professor's perspective about PBL. We are also including the student perspective that accompanied this excerpt, written by Anuj A. Parikh. Parikh, a former student at the University of Delaware, is now a medical student at Jefferson Medical College. Parikh's excerpt is based on his experience from Mierson's physiology class at the University of Delaware. Mierson retains the copyright for the full article. All names other than Parikh's are fictitious.

by Sheella Mierson

I have just received Anuj's article about his experiences in this class last year. What a good writer! I was not even aware of much of what he describes in his group. I am particularly moved by two things. One is his obvious pride in what his group accomplished. The other is that my role in resolving the conflict he describes is merely supportive; the students were the active ones. That is as it should be. It is as education should be.

Anuj and the students in his group have developed some key emotional competencies during the semester. It is widely recognized that in many fields, content knowledge alone is not sufficient for the work world (National Research Council, 1996; They Boyer Commission on Educating Undergraduates in the Research University, 1998). Daniel Goleman (1998) documents the importance of what he calls emotional intelligence in distinguishing star performers in a wide variety of fields; he maintains it can be more important than IQ, advanced degrees or technical expertise. Loosely defined, emotional intelligence is the capacity to recognize and handle our own emotions, to recognize others' feelings and to motivate ourselves. Emotional intelligence seems to be largely learned. Ideally, problem-based learning students get a head start on these emotional competencies.

My biggest joys in teaching are watching students' faces as they wrestle with complex topics, seeing the students learn to function in a group, watching their pleasure when things go well—both pleasure in learning physiology and pleasure in the process—and their obvious pride when they resolve conflicts and solve problems. The students respect each other, cheer each other on, root for each other and take turns explaining difficult concepts to one another. They make sure everyone understands the subject matter. They take pleasure when everyone in the group does well. They think, not only about the subject matter of the course, but about each other. We teachers often have a picture in our heads of scholarship as a solitary activity. It need not always be so.

Initial Typing of Problems: An Undergraduate Student Struggles with Group Work

by Anuj. A. Parikh

I had taken a problem-based learning [PBL] course before and it was a piece of cake. Your group decides what you want to talk about, you go home and look some stuff up in a few reference books, pare it down so that all the details are absent and the main idea is clear. Then you present it to your group.

I learned very quickly that I would have to set a new benchmark for myself after the first class sessions of PBL physiology. This course would require me to work with my group to decide which issues were the most important, spend hours in the library learning all the details for a given process and be able to thoroughly yet concisely present this information to my group. On top of that, we had to play these silly ice-breakers, spend about two and a half hours per class period together and try to get along as well as we could.

At first it seemed a doable task, but I quickly found out that we had our work cut out for us. During the first few class sessions, our personality differences and limitations became clear to one another, and we knew that it was not going to be a smooth ride. Fred and Gwen hated explaining things on the board (especially Fred). Amy did so much research she presented us with "books" at every class meeting. I was just trying to convey the big picture. On top of that, Gwen and I dominated the conversations, while Amy and Fred remained silent most of the time. Whenever one of us would question the other, it would turn from questioning to rude questioning to personal attacks.

About the fifth or sixth week into the course, Gwen and I had serious problems working together. Our group was silent. The tension was almost unbearable, and we were not learning as effectively as we could. Something had to change.

About three or four weeks into the semester, Dr. Mierson formed her liaison group, consisting of one member from each tutorial group. Our job was to meet together during the lunch hour once a month to discuss our groups. We would generally discuss what was going well for our groups, what needed to improve, and, if necessary, what role we could play in making those changes.

We got to hear how other groups solved their interpersonal problems, and we found out about any other challenges the groups were having. It was in these meetings that I learned some skills that I know I will be able to use later during my career as a physician. While the liaison group did not solve all our problems, it did teach me a few practical solutions that helped move things along during the year.

During one of the first liaison meetings, I commented that there were a few members of my group who did not like explaining concepts on the chalkboard. The way the classroom is laid out, each group has access to a chalkboard and each group member is encouraged to draw concept maps or diagrams to help the group understand a particular concept or process.

One member of the liaison group offered a brilliant idea to counter this lack of enthusiasm to go to the chalkboard. He noticed that Amy and I sat closest to the board so for everybody else it was a long trip over there.

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The solution was for me to get to class a little bit early and sit at the chair farthest away from the chalkboard and tactfully place everybody else so that Fred was closest to the chalkboard. Next, we would have to politely encourage Fred to diagram his concepts on the chalkboard to help us understand. At first, Fred was very uncomfortable with the whole idea. When he got to the board, he would hesitate and sit back down as quickly as possible. At our weekly group feedback sessions, we gave Fred positive reinforcement. After a while, the shell cracked. Now, in another PBL class that Fred and I are in together, Fred uses the board plentifully. When he wants to explain a concept, he jumps to the board, carefully draws a diagram, explains it and remains at the board to answer questions about it.

As the tension in our group built, we merely went through the motions of the team-building activities Dr. Mierson recommended. We would pretend we had done them, to ease our consciences, and then we would leave class early. One day in a liaison meeting, I put our problem to the group. I told them that we were running out of things to say and that class was becoming boring. Dr. Mierson asked the other liaison members to share what they had been doing in their groups to keep themselves busy and on task. Most everybody said something to the effect of, "We just go over everything to make sure we understand it in detail."

After I got the opinion of the three liaison members, Dr. Mierson offered her diagnosis of the problem. According to her, our floundering could be occurring for several reasons. The first was that we were not putting in the required number of hours per week of out-of-class work. The second was that we were not researching our learning issues in enough depth to have meaningful discussions.

She hesitated to say the last bit of advice, but I think that she said it anyway to make sure she covered all bases. She told me that there might be some sort of underlying conflict in the group, and that conflict was impeding our discussion and therefore our learning. I froze in my seat because that was exactly what was wrong, and while she did not know the problems that Gwen and I were having, some of the other liaison group members did.

One idea I got from the liaison meeting was that we had to make our group more fun. I mentioned to my group that the other groups had loads of fun and that we should start doing the same. The group next to us, for example, was doing something that they called "Friday Food and Fun." We decided that this was something we should do as well. So one Friday, Amy brought some sushi in for us to sample. Something as simple as sushi sparked an interesting conversation at our table, and before long we were actually talking with one another. Not only that, we were working efficiently together as a team. On top of that, the tension started to subside.

Throughout the remaining four weeks of the semester, each of us would bring something in—cookies and milk one day, candy the next, and the list went on. About this time, our group started to have an upswing in overall tolerance for one another and in efficiency in learning. While we were not doing the formal team-building activities, we had come up with our own way of making the class more comfortable and casual.

As a result, our productivity increased for a very interesting reason. Now that we were interacting with one another on a more personal level, we were brainstorming better than we ever had before. Through this brainstorming, we came up with some great ideas, and we were excited about going to research them. As a result, our learning became more active, and we were actually retaining what we were learning and discussing.

One of the most important lessons that I learned from the course was how to use criticism effectively. Often, we make mistakes when presenting complex ideas to our colleagues. What we do not count on is their picking up on those mistakes and grilling us about them. I will be the first to admit that I was guilty of grilling members of my group for presenting information that I thought to be false. I soon found myself picking fights, and others in the group took my lead. As I mentioned earlier, there was a great deal of tension between Gwen and me, and this tension began to mushroom into other courses that we were in together. One day in another class, we ended up yelling at one another in front of the class. Afterward, we had a talk, and I began to understand why Gwen and I were having so many problems.

Through the conversation, Gwen and I learned that we are very similar. We are both leaders, and we both have to be right all the time. As a result, when one accused the other about being wrong, we took it personally. It was really just that simple, but we did not know that while it was happening. All we had to do to remedy the situation was to come up with ways that we could critique one another professionally and not personally.

It basically entailed being polite to one another and rephrasing questions so that they were not so aggressive. For example, "You're not right" turned into "Gwen, please explain that concept to me again." Slowly and steadily, we began to get along, to the point where we could work with one another and even carry on a decent conversation. This coincided with the time that our group started to have fun, so the end result was that we started to function effectively overall as a group.

While this short summary only scratches the surface of what went on with our group during the year, it provides insight on several things. First, I learned that I can help others help me by giving them as much positive reinforcement as possible and encouraging them to stretch themselves. If our group had not supported Fred the way that it did, I'm sure that he would not have made the 180-degree turn that he made concerning chalkboard use. I also learned what a difference it makes to socialize within a group over cookies or carrot sticks! This way, we were comfortable with one another and free to brainstorm with each other.

Finally, I learned that criticism is good only if it is constructive. It's easy to dish out destructive comments like, "You're not right," but in reality, these comments do not serve much of a purpose other than to enrage the colleague who is criticized. By taking a few extra moments to make the comments constructive, we can get the information we want while simultaneously keeping things professional. Aside from physiology, these are the lessons that our group learned during the semester, and I'm positive that we will use these lessons to our advantage during the remainder of our professional careers. ▲

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Problem-Based Learning Segment with a Large Class Studying Social Work

Jane Akister, Social Work department,
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After reading an article by Pamela Sims in *PBL Insight* on the possibilities of using problem-based learning [PBL] in a large class, I decided to try a PBL segment with my own large class of 50 students. The program is for students training to be social workers, and the modules are delivered in 10 weekly, three-hour teaching sessions. The module was "Social Work Power and Responsibility." Since this was my first step into PBL, I selected three lectures that I had delivered previously and designed a two-session PBL segment based on these.

Sims writes of the importance of structure to "provide problems which were structured enough to lead the students to important learning issues without a guide or facilitator working with each group, but 'ill-structured' enough to allow the students to assume some responsibility for their learning" (1999, p. 11). At the time, there was a real-life situation where welfare workers had just been sent to prison for allegedly allowing drug dealing to take place in a provision for homeless people. There was a lot of media coverage of this, and feelings were running high. Setting the scene using some media articles to identify the polarized views on this case, I posed a series of questions for the students, designed to access the material that would have been covered in the lecture sequence.

The questions were the following:

> Using what we know about this prosecution and the issues, values and attitudes raised by some of the debate in the media, we will explore six areas key to the responsible use of power in social work.
>
> 1. What is social work? What should social workers be doing?
> 2. Will understanding the cause of homelessness affect the type of intervention believed appropriate?
> 3. How are decisions made about public issues?
> 4. What is a social worker's power to influence?
> 5. What is the role of voluntary, independent and statutory organizations?
> 6. What is the relationship between social work and the law?

Initially, some students were concerned to be exploring aspects of a real-life situation as yet unresolved. However, we were only investigating issues raised by this case that would be relevant to all social workers in practice and not trying to judge the specifics. In social work, the issues relevant to power and responsibility take place in situations of uncertainty and crisis where social workers have to be accountable for their decisions and where final outcomes are unknown.

Due to the short amount of time allocated, each of the six areas had pointers to structure the aspects of the problem examined. For example, with the questions of "What is social work?" and "What should social workers be doing?" the following guidelines were given:

They had identified and explored most of the areas and concepts that I would have presented in a lecture format.

> Consider the following issues:
>
> 1. Social forces and changing social needs
> 2. Public and political perceptions of social and personal need
> 3. Organization of services and agencies
> 4. Range and development of social work theories
>
> Focus on the role and task of social workers in relation to homeless people. Remember that social work is a socially constructed activity.

I divided the large group of 50 students into six groups and gave each group one topic and asked them to work on the problem and report their findings to the whole class. I structured the segment in this way to allay my fears that the students may not learn as much from this approach as from a more traditional lecture class.

Outcomes

The work produced by the students was extremely rich in that it combined the knowledge and ideas of such a large group. The students were completely absorbed in the tasks and were able to work in a very focused way throughout the sessions. There was really no scope for opting out or falling asleep as there can be in lectures! When the work was compiled, they had identified and explored most of the areas and concepts that I would have presented in a lecture format. Only one group had difficulty coming to grips with their area, which was the group looking at "decisions about public issues." This aspect focuses on the politics of welfare provision and delivery, how these decisions are made and how they can be influenced. Although I think that this is a very exciting aspect of welfare provisions, it is the one area that, in the past, the students have not been able to grasp easily from lecture input or reading. It is of quite considerable interest to me that it also presented difficulty in the PBL format. It may have to do with the structure of the course and learning up to this point, or just that the students do not see its relevance to the task of becoming social workers. Or perhaps both forms of learning are only as good as the input and that my input in this aspect needs revising.

I have also become aware that the level of knowledge required to design and facilitate PBL is exactly the same as required to write lectures. PBL is not an easy option for the teacher. Clearly, the facilitator cannot have all the answers, but the facilitator does need to be well versed in the subject area to enable the learning process.

For the Future

Encouraged by the success of this PBL segment with a large group, I hope to extend this to the whole module, enabling each student group to work on all six areas. I would also be interested in their using their results from each section for their assessment. This could be incorporated into a "Patchwork Text" format where they use the group results to develop their individual

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ideas (Scoggins & Winter, 1999). The Patchwork Text tries to combine the retrospective synthesis of the essay and the fragmentary nature of a reflective learning journal or portfolio by bringing together the separate pieces of work and requiring the student to examine the overall thematic framework. ▲

References

Scoggins, J., & Winter, R. (1999). The patchwork text: A coursework format for education as critical understanding. *Teaching in Higher Education, 4*(4), 485–499.

Sims, P. (1999). Can one professor use problem-based learning in a large class?" *PBL Insight, 2*:3, 11–12.

Who is using PBL?

If you are currently using problem-based learning [PBL] in your undergraduate courses, or if you know of someone at your institution who is using PBL in undergraduate education, please contact us. We are very interested in learning about your efforts and about PBL at your institution.

Please contact Kristi Arndt via E-mail (pbl@samford.edu) or regular mail at the following address:

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PBL from a Student's Perspective

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The Boyer Commission on Educating Undergraduates in the Research University. (1998). *Reinventing undergraduate education: A blueprint for America's research universities.* Stony Brook, NY: State University of New York.

Resource Roundup

Problem-based Learning in Higher Education: Untold Stories

Review by Agnes Tiwari, Centre for the Advancement of University Teaching, The University of Hong Kong
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Maggi Savin-Baden
The Society for Research into Higher Education & Open University Press, 2000
ISBN 0-335-20338-8, 161 pages
Price: £18.99

This book is a refreshing analysis of lived experience in problem-based learning [PBL], an area that is noticeably neglected in the current literature and yet vitally important for student learning. A consultant in higher education and a facilitator and researcher in PBL, Savin-Baden skillfully provides a compelling and critical account of the impact of PBL on learners and teachers. The account tells the untold stories—stories that reveal how learners and teachers involved in PBL "manage complex and diverse learning in the context of their lives in a fragile and often incoherent world" (p. 6).

The book is divided into four parts. Part 1 explores the theoretical and philosophical underpinnings of PBL and the reasons for its growing popularity in higher education. This comprehensive account provides a clear and basic understanding of PBL and would be particularly useful for teachers new to this approach of learning.

In Part 2, Savin-Baden presents a framework of Dimensions of Learner Experience. The framework, which emerged from her research and subsequently developed in practice, offers a useful way of identifying and understanding the interplay between the student and the learning context in PBL, and how conflicts in learning are managed. The framework, which brings to the fore the complexity and paradox of PBL, is clearly presented and reinforced with excerpts from the students' accounts. While the accounts focus on the students' PBL experiences in four British universities, the questions raised are of universal interest to those involved in PBL. A minor criticism of the framework is the apparent omission of cultural influences that impact on student learning. Given the multicultural and multiracial nature of student populations, this would be an important consideration.

Part 3 examines how the implementation of PBL can be effectively managed, including the recognition of disjunction and management of transitions in student learning. I am particularly impressed by the chapter on the interaction of public theories, personal interpretations, academic boundaries and professional territories in the context of PBL. In this chapter, Savin-Baden poignantly captures the dilemma with which teachers in higher education have to struggle on a regular basis: that of managing strategically the multiple agenda of higher education, professional education, practice contexts and personal ideals, and making critical choices. This should strike accord with those who are at the interface of academic ideals and harsh reality.

In the final part, five models of PBL are presented in terms of the kinds of learning experiences that students are likely to have and the ways that pedagogical and professional issues may play out. Not only is this a useful chapter for teachers to examine their beliefs about the potential of PBL, it also challenges those who aspire to helping students toward critical contestability.

In this well-written and cogently argued text, Savin-Baden skillfully uses educational theories to inform her explanation of "lived experience" in PBL and presents some challenging and thought-provoking arguments. Whether one agrees with her argument or not that the potential and influence of PBL is yet to be realized, it would be difficult to ignore the compelling accounts of how students manage this complex form of learning in a fragile and often incoherent world. With many of the existing texts focusing on implementation issues and neglecting the impact of PBL on people and organizations, this book is a welcome and timely contribution to PBL literature. The book is accessible and very readable, with a useful glossary of terms and an impressive range of references. While this book should be essential reading for teachers new to PBL, it would be an important resource for all involved in PBL. Had I read this book

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National Teaching Fellows: Re-writing PBL for Literary Studies at the University of Manchester

Bill Hutchings and Karen O'Rourke, Department of English and American Studies, The University of Manchester, England

The significance of the National Teaching Fellowship Scheme is that it has made a clear, public statement of the importance of a professional attitude to learning and teaching in higher education. Naturally, all of the 20 successful nominees—and our colleagues nominated by other institutions who were equally deserving of the award—feel highly honored. The principal honor, however, is not personal, but being part of the movement to raise the status of teaching within our sector.

Like all good learning and teaching, the scheme is founded on cooperation—between colleagues, between institutions, between teachers and the Institute for Learning and Teaching, the Subject Centres and all other supporting agencies. The stimulus to developing one's teaching comes from all such means of help and guidance; but above all, it derives from students themselves. The most touching result of my own nomination has been the number of past and present students who have taken the trouble to contact me with their congratulations. The congratulations are really due to them, for it is their efforts and achievements that represent the value of our profession.

When I came to consider my own project for the award, I wanted to make it something that got to the heart of learning and teaching as a cooperative enterprise. I wanted it also to be something that located the teaching of literary studies within the wider educational experience, as well as recognizing the inherent and essential nature of literary studies as a discipline.

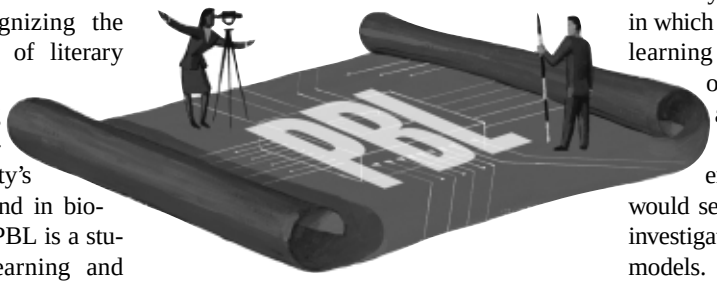
Problem-based learning [PBL] is already well established in Manchester University's Medical and Dental Schools and in biomolecular sciences at UMIST. PBL is a student-centered approach to learning and teaching that uses student groups as the key vehicle to achieve cooperative or collaborative learning. Actively identifying and managing their workload through carefully designed, subject-specific problems, tasks or case studies, students are motivated to identify, retrieve, organize and disseminate their findings in written or oral format to an audience that may consist of their immediate teammates, their peers, tutors or examiners.

The PBL Model offers a broader application of core skills and the development of interactive learning.

It is through research and debate triggered by challenging features within the problem design (sensitively guided and monitored by a tutor/facilitator) that the students' existing subject knowledge base is integrated and expanded, leading to deeper subject understanding and developing their ability to apply that knowledge in potential real-life situations.

In addition to providing a stimulus to learning, the PBL process delivers a variety of valuable experiences, including:

- Teamwork
- Collective management
- Communication (brainstorming, listening, debate, oral and written presentation)
- Development of analytical and critical skills
- Identification of resources and research methods
- Dealing with conflict
- Time management
- Peer and self evaluation



Arts programs already place emphasis on such core skills as research and communication. An increasing number of our programs include a strong oral component as well as the more traditional written element of communication skills. Self-directed learning through dissertation and project work is common practice. This, however, tends to be individual, with the key dynamic being that between an individual supervisor and an individual student. The supervisor acts as a source of advice, as a sounding board for ideas, as a supplier of references and as a checker of draft material. The PBL model, which encourages cooperative learning, offers a broader application of core skills and the development of interactive learning by "pay[ing] due respect to both student and teacher as persons with knowledge, understanding, feelings and interests who come together in a shared educational process" (Margetson, 1997, p. 39).

As a self-directed approach to learning that prioritizes cooperative learning and group-management of tasks as a key vehicle of delivery, PBL seems ideally suited to a discipline such as literary studies that works so much through discussion and debate, with a relative lack of clear target responses to questions. It might even be argued that the current dominance of tutor-directed models within literary studies actually runs counter to the real nature of the subject. A literary text seldom, if ever, has a single issue or problem as its concern, even when a critic or even the author claims that it does. There will always be a diversity of potential response generated among diverse readers. It is arguably in the apprehension of this diversity that the true creativity of the subject lies. A PBL method, in which it is the group itself that defines the learning objectives, tasks and methods of inquiry, seems particularly appropriate.

Arts disciplines generally, and literary studies in particular, therefore would seem to offer fruitful ground for the investigation of the applicability of PBL models.

My National Teaching Fellowship Award has facilitated a two-year project (commenced October 2000) that aims to implement a pilot PBL program in the Department of English and American Studies at the

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University of Manchester.

The main aims and objectives of the project are as follows:

- Production of PBL learning packages for a variety of literary studies modules
- To pilot PBL systems in selected course modules from September 2001
- To move toward implementation of a PBL program in further selected modules
- Assessment and evaluation of the outcomes of PBL systems in comparison with conventional teaching patterns
- Development of materials for the delivery of PBL systems in a variety of literary studies modules
- Examination of the student experience of PBL
- Dissemination of project outcomes

My research assistant, Karen O'Rourke, is responsible for taking the principal role in investigating current PBL methods and systems. Since her appointment as research assistant (PBL) in October 2000, her work has focused on:

- Identifying and evaluating models of good practice (building on the existing bibliography and archive produced by a previous institutionally funded research project), and assessment and transferability of PBL methods
- Testing of models for their validity for literary studies teaching
- Assessing the appropriateness of PBL at particular levels of study and for different student groups
- Observing PBL sessions and gathering of feedback from students and tutors/facilitators
- Examining the changing role of the tutor/facilitator
- Problem design
- Assessing human and material resource implications (e.g. library provision, staff/student training and development, finding space for multiple small-group meetings)
- Developing specific materials to support the delivery of PBL in literary studies
- Investigating appropriate monitoring and assessment techniques in line with departmental requirements and PBL objectives
- Networking, training and dissemination activities

One of the most important outcomes of the project to date has been the realization that our initial PBL model will without doubt follow what has been dubbed the "hybrid" approach. By hybrid, we mean that the PBL sessions will be supported by a spine of tutor-led seminars. The aim of these seminars will, of course, not be to provide or hint at answers to the problems. To do so would run counter to the entire concept of student-centered learning, to confuse PBL with straightforward problem solving and to falsify the nature of the discipline. However, we think that—at this stage in the project at least—to subject students to pure PBL as a trial study would be too close to playing dangerously with their degree. The intention of tutor-led sessions (which will nonetheless be interactive in method) is to provide reassurance and to be part of the process by incorporating seminar-engendered ideas in research and critical methods. It may be, indeed, that such seminars can be a legitimate part of a functioning PBL model, taking their place as one—but only one—area of student inquiry and investigation. ▲

Reference

Margetson, D. (1997). Why is problem-based learning a challenge? In D. Boud & G. Feletti (Eds.), *The challenge of problem-based learning* (2nd ed., pp. 36–44). London: Kogan Page.

Samford Gets $100,000 FIPSE Grant for PBL Project with Maastricht

Samford's Howard College of Arts and Sciences has received a $100,000 grant from the U.S. Department of Education to support a joint problem-based learning [PBL] project with the University of Maastricht (Netherlands).

The grant from the Fund for the Improvement of Postsecondary Education [FIPSE] is designed to support cooperative work between U.S. and European Community schools. With the grant, Samford faculty will be paired with Maastricht faculty to develop 16 interdisciplinary PBL problems.

The project director is Dr. David W. Chapman, Samford arts and sciences dean.

Sample problem topics from the first year include "Forms of Democracy," "Ethical Dilemmas" and "Problems of Political Integration."

Second-year topics will include "Mass Media and Culture" and "Visual Culture."

The project is an outgrowth of Samford's work in PBL funded by The Pew Charitable Trusts. In 1998, Samford received a $1 million grant from Pew to explore the uses of PBL in undergraduate education. A follow-up grant of $750,000 in 1999 was awarded to support documentation and review of teaching using PBL course portfolios.

As part of the original Pew grant, five Samford faculty visited Maastricht in 1999, and three Maastricht faculty led a workshop at Samford later the same year. Wim Gijselaers of Maastricht was a keynote speaker at an international PBL conference hosted by Samford in the fall of 2000. ▲

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a number of years ago, much time could have been saved in circumventing (what I now realize as) the disjunction in learning! ▲

Mini-Grants Available for PBL Course Portfolios

The Samford University Center for Problem-Based Learning [PBL] is soliciting applications from prospective portfolio developers for PBL Portfolio Peer Review mini-grants. The $750 mini-grants will support the development of course portfolios that describe the implementation and assessment of PBL approaches in various disciplines. PBL is an instructional strategy in which problems serve as the organizing focus and stimulus for learning, and teachers are facilitators for the learning process. Students in PBL courses frequently work in groups to share information and investigate learning issues.

Faculty who are selected for the mini-grants are eligible to have their portfolios peer reviewed, and, if accepted, the portfolios will be placed into an online PBL registry. For more information about PBL and the mini-grant process, including application deadlines, visit www.samford.edu/pbl or E-mail pbl@samford.edu. ▲

PBL 2002 Conference Will Be Held June 16, 2002

PBL 2002: A Pathway To Better Learning, an international conference on PBL in higher education, will be held at the Baltimore Convention Center in Baltimore, Md., June 16–20, 2002.

The conference is sponsored by The Pew Charitable Trusts, the University of Delaware, the Institute for Transforming Undergraduate Education and the Unidel Foundation.

For more information on the call for proposals for contributed papers, workshops and posters, see www.udel.edu/pbl2002. Full registration materials are also available online. The program committee encourages proposals on any aspect of PBL in higher education, and suggestions for topics of high interest are included in the call for proposals at www.udel.edu/ce/pbl2002/proposals.

The conference is three and a half days of workshops, papers and poster topics related to the use of PBL in the undergraduate setting, including assessment of student learning, diverse models of PBL and the use of PBL in a variety of class settings and class sizes.

Introductory, intermediate and advanced tracks will be provided during the conference. In addition, discipline-specific preconference workshops will be offered on Sunday afternoon, June 16.

The contact E-mail for the conference is pbl2002@udel.edu. ▲

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Eighth Annual Workshop to be held in January

The 8th Annual Workshop on the Problem-Based Learning Process, Problem Design and Curriculum Development will be held by the Department of Medical Education at Southern Illinois University School of Medicine January 6–11, 2002, in Santa Barbara, California.

This intensive experience on the PBL process has attracted a mix of educators to provide a stimulating environment. Faculty include Ann Kelson and Linda Distlehorst. Kelson has been a leader in each of the previous problem design workshops, as well as a consultant for PBL in higher education for 16 years. Distlehorst is associate dean for the Office of Education and Curriculum and has guided faculty through educational change and has conducted outcomes reasearch on PBL.

For more information about the workshop, contact Rosemary Beiermann, Department of Medical Education, Southern Illinois University School of Medicine, P.O. Box 19622, Springfield, IL, 62794-9622, (217) 545-2103, or E-mail rbeiermann@siumed.edu. ▲

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