PBL Insight

to solve, to learn, together

Inside

A New Source for Gathering and Sharing Information about Problem-Based Learning

Claire Major, Editor, Coordinator of Problem-Based Learning Research and Communication

Welcome to the inaugural issue of *PBL Insight*, newsletter of the Samford PBL Initiative. The goal of *PBL Insight* is to present practices, ideas, and research about Problem-Based Learning from many different perspectives.

The theme of this first issue of *PBL Insight* is introducing the Samford PBL Initiative. Samford University is steeped in tradition, a tradition that began in 1841 when Baptists founded Howard College in Marion, Alabama. Howard College moved to Birmingham, Alabama, in 1887 and moved again in 1957 to its present 150-acre campus in the suburb of Homewood. The name changed in 1965 when the college attained university status. America's 87th oldest college or university, Samford University consists of eight colleges and schools: arts and sciences, business, divinity, education, law, music, nursing, and pharmacy. The University offers 24 degree programs, with more than 80 majors. It has an enrollment of 4,500 men and women from 40 states and 30 nations and a student-to-faculty ratio of 15-to-1. Throughout its history, Samford has sought to maintain high standards of teaching and learning, and Problem-Based Learning, an innovative instructional strategy, presents an opportunity to uphold those standards and, perhaps, surpass them.

This issue of *PBL Insight* is a one-time-only edition in that Samford faculty members and administrators have written all articles. The subject matter, when taken as a whole, outlines the origins and purposes of the Samford PBL Initiative. Thomas E. Corts, our president, describes his ideas about the concept of PBL in a "Just How New Is This New Learning?" Our associate provost of quality assessment, John Harris, describes how the Total Quality Movement at Samford University has laid the groundwork for the PBL Initiative in an article entitled "Crossing Another Street." David

Chapman, the associate dean of arts and sciences, illustrates how the curriculum at Samford University and the PBL Initiative are interrelated in his article "PBL and the Core." In an article entitled "PBL and Meeting the Challenges of Teacher Education," Carol Dean, assistant professor in the school of education and professional studies, explains how her department's efforts in curricular revision led to adoption of PBL as an instructional method. In the first article of what we anticipate becoming a regular column, Alan Hargrave, associate provost for learning resources, tells about our web page and lists some additional PBL resources. Each of these articles tells the story of the Samford PBL Initiative. Each presents that story from a different perspective. As you read, however, you will notice several themes emerge. Among those are Samford's involvement in the Quality movement, its strong push toward curricular revision, and its focus on teaching and learning resulting in a search for innovative instructional methods. These themes represent issues that have been felt deeply across all levels of the University. These issues have set the stage for the current PBL Initiative. We hope that these articles will provide insight into who we are and how we are using PBL to help us accomplish our goals. We will keep you updated about our efforts in a regular column.

In future issues, *PBL Insight* will present articles that describe PBL practices nationally and internationally; reporting those practices is an integral part of the Samford PBL Initiative. Each future issue is planned around a theme, and the theme of the next issue is identifying problem-solving outcomes. In that issue we will feature an article by Elizabeth A. Jones from West Virginia University and will reprint an article written by Barbara Duch, Deborah E. Allen, and Harold B. White III from the University of Delaware. We also invite your contributions on

The Samford
PBLInitiative

The Samford PBL Initiative, a project sponsored by a grant from The Pew Charitable Trusts, is a University-wide effort designed to answer the following questions:

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Will PBL improve student learning and help students acquire marketable skills, such as critical thinking, ability to work in groups, effective communication, inquiry skills?

Can PBL be successful in conventionally funded higher education?

How can traditional colleges and universities most effectively integrate PBL into their curricula?

Will the study, work, and play schedules of Americans permit successful integration of a new instructional model?

Can we implement PBL without unduly taxing faculty time?

Can we accommodate PBL with no or minimal instructional space changes?

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Samford plans to answer these questions by developing and field testing 35 PBL courses and by systematically assessing our efforts. We will also scout for and gather information from others who are using PBL, both nationally and internationally, with an eye toward seeking answers to these questions. We let you know how we're doing and what we find out through *PBL Insight*, which will be published three times a year, through course portfolios, which we will publish in-house and make available for other faculty, and through a web site.

We also hope to make presentations at relevant international, national, and regional meetings. At the end of three years, we plan to sponsor a national meeting on PBL. In 2001, we will publish a book summarizing what we learned from its development, from field testing PBL courses, and from the international search for PBL practices. We hope to create a national resource center of information and experience on PBL in undergraduate education.

This is a bare bones sketch of our Initiative, but you will learn more about the Samford PBL Initiative as you read the articles in this newsletter. In future issues, we will include a regular column in which we update you on our progress. ▲

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 in Higher Education.

Content

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

Format

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

Length

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

Style

APA style is preferred for documenting sources.

Deadlines

Future issues will be finalized one month before publication of the newsletter. Please send contributions for the next newsletter by August 1, 1998.

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Samford
University

Just How New is This New Learning?

Thomas E. Corts, President

"Suspense...carries its own pleasure,"
Eudora Welty once mused, a thought confirmed by our fascination with mysteries, puzzles, and problems. Indeed, curiosity is one of humankind's distinctive gifts. At some point, we've all had the experience of sheer wonder teasing us into hot pursuit of an answer — an answer that once found, provoked a delight out of all proportion to the magnitude of the question. Life is punctuated by both question marks and exclamation points.

Preliminary research and observation support a strong case for "inquest-uous" learning — laying hold of information, knowledge and understanding by conducting a small group inquest into a well-defined issue. Having been engaged for a number of years in Continuous Quality Improvement, the Samford University faculty had already grasped the concept of emphasizing learning over teaching, the wisdom of team work, and the value of facts and information as the basis for decision-making. It has been a natural progression for Samford leaders to be drawn to new learning initiatives in medical and veterinary schools, and to benefit from on-site observation at the University of Aalborg in Denmark, the only known university in the world wholly given to the new learning.

The bold investment of the Pew Charitable Trusts in "Problem-Based Learning" at Samford University is an attempt to experiment more aggressively with new learning styles in the traditional arts and sciences, and to broadly disseminate the results of that experimentation. The possibilities seem endless, and the time is right at Samford, where we have just completed the first year of a new curriculum and a new undergraduate course-schedule format. Nationally, higher education realizes that it is part of the shifting paradigm, and it must find more effective ways of transmitting information and values to Generation X and to future generations. Samford can serve its students, the public, and the cause of higher education by serious trial-and-error efforts with problem-based learning in the "softer," less black-and-white disciplines, where human volatility and unpredictability are more dominant variables, where the concept of "problem" has fewer specific variables that can be manipulated with clinical accuracy and precision. It is a challenge our faculty readily accepts.

> **"Life is punctuated by both question marks and exclamation points."**
>
> *Thomas E. Corts*

Just how new is this new learning? So new that a proper "handle," name, or designation has not yet become common in educational taxonomy. Early advocates seem to have centered on the phrase "problem-based learning," a term familiar to the sciences — especially engineering and veterinary schools where the concept originated — though, perhaps, less familiar to the dialogical and dialectical, the ratiocinatory traditions of the arts and humanities.

A term such as "curiosity-based learning" highlights humankind's natural ability to be dazzled by circumstances, and to be induced to quest for solutions or explanations. Posing problems before proceeding to identify answers, we acknowledge the proclivity of the brain to be intrigued by Rubik's Cube, by intellectual puzzles, by mind challenges. In such manner, learning happens.

"Inquiry-based Learning" was the term used in the recent report of the Carnegie Commission, *Reinventing Undergraduate Education: A Blueprint for America's Research Universities.* In the way researchers accomplish their work — i.e., starting with a knowledge of basic factors and perhaps some hypothesis — inquiry, exploration, and learning proceed on a need-to-know basis in the direction of a solution. Sometimes researchers have to learn first the better way to pose the question. Sometimes, they even "solve" another problem, rather than the one they set out to deal with. Discovery has its serendipities.

Participatory, problem-solution learning may appear to be a fresh concept in the modern classroom, but it has been in common use for centuries. Problem-based learning enfolds the concept of so-called Socratic dialectic, learning that takes place by questions-and-answers. It also involves the classical Hegelian dialectic, whereby a thesis is asserted, followed by an antithesis, and succeeded by joining elements of the two into a synthesis. Plato's various dialogues skillfully sketch contexts of group learning out of the dialogue of questions-and-answers.

Samford University is challenged to work with the broader higher education community in the dialogue about a newly recovered style of learning that ricochets between the awe and mystery of the question mark and the "a-ha" of the exclamation point! Our efforts should tweak the curiosity of each of us. ▲

Crossing Another Street

John Harris, Associate Provost for Quality Assessment,
Project Coordinator, Samford PBL Initiative

Samford's present PBL Initiative flows from the University's focus on continuous improvements. While our improvement journey has not been easy or entirely successful, Samford's institutional readiness for PBL comes from its quality efforts. For all the positive steps and the missteps of the quality movement at Samford, its focus on continual improvement seems to have contributed to increasing clarity about Samford's mission, a focus on student learning, and an atmosphere open to change and cooperation across disciplinary and administrative lines.

It is difficult to establish any fixed point for the beginning of academic renewal at Samford, but one marker is 1991, Samford's sesquicentennial year. To celebrate this anniversary, 12 committees were established to review every aspect of Samford academic work and to propose changes for the future. One of the 12 committees focused on general education and developed a comprehensive, interdisciplinary general education core curriculum—Cornerstone. While the Cornerstone program proved too controversial and expensive to implement, its derivative, co-neXus, is now successfully finishing its first year of full implementation.

Senior seminars as we now know them at Samford also came out of the sesquicentennial effort. Almost every undergraduate program now has a senior seminar where students do research or other creative or scholarly projects which are read by external examiners. This feedback allows faculty to see how well their respective majors have acquired the knowledge and/or skills associated with the respective major.

The president returned from a sabbatical leave with two driving concerns: to intensify student learning and to reduce the number of undergraduate courses faculty teach in an academic year so they can devote more time to facilitating their students' learning. He met early in 1995 with the chairs of biology and English and challenged them to explore how they could reduce the number of courses taught in each department while intensifying student learning in the remaining courses. By the end of the Spring 1995 semester, they reported that they could reduce the number of courses in their departments by 30 percent. The biology and English chairs reported their finding to their fellow arts and sciences chairs and then to the full arts and sciences faculty.

This led to an effort to review every undergraduate program — not only in arts and sciences majors and general education program, but also business, education, music, nursing, and pharmacy.[1] The Curriculum Coordinating Council was established to facilitate and lead an across-the-board review and change of Samford's undergraduate curricula.

One of the most far-reaching changes occurred in class scheduling which bodes well for active, team, project learning. The new system is built on course credits and not

The following dramatic changes resulted:

▶ co-neXus was established as a true general education core of interdisciplinary courses.

▶ Most undergraduate courses changed from being three-hour courses to four-credit courses.

▶ Many departments reduced the number of courses offered and tightened their majors.

▶ Faculty teaching load shifted from teaching eight to nine three-hour courses to teaching six four-credit courses each academic year.

student credit hours, thereby "unbundling" seat time from learning. Faculty are freed from having to provide a certain number of instructional hours and can concentrate on learning outcomes. At the same time, the class day was reorganized so that it accommodates three-or four-credit courses and faculty can relate credits to seat time if they so choose. Second, the new class period schedule increases the amount of time student teams can work together in scheduled class time—from 50-to 65-minute class periods on Monday, Wednesday, and Friday and 75 to 110 minutes on Tuesdays and Thursdays.

In all of the reshaping of general education, liberal arts majors, and professional education curricula in the '90's, faculty have been exploring more active pedagogies within these curricular changes. Beginning in 1994-95, faculty and deans began visiting the Veterinary School of Mississippi State University in small groups to see and discuss how PBL had replaced the traditional instruction in the first two years of the basic sciences. These trips gave faculty from biology, exercise science and sports medicine, teacher education, nursing, and pharmacy opportunities to observe veterinary student teams dealing with clinical problems which they could only diagnose and treat by learning the relevant basic sciences. Some of these faculty soon began bringing elements of PBL in to their courses.

We learned of Aalborg University in Denmark built entirely around PBL. In the Fall of 1996, the provost, four deans, and several department chairs and associate /assistant deans, along with an associate provost, went to Aalborg, spending three days on campus observing student PBL teams and discussing PBL with faculty and administrators. In the Spring of 1997, the associate provost for academic administration took about fifteen faculty to Aalborg for first-hand observation and discussion of PBL. The Aalborg trips developed considerable interest in PBL. We saw students energetically engaged in learning and faculty thoroughly committed to PBL while continuing with their own research. One could sense that the visiting Samford faculty and academic administrators liked the Aalborg learning environment.

Nevertheless, we were daunted by how we could ever transfer what we saw at Aalborg to the Samford campus. First, Aalborg was built from the ground up to be a PBL university. From its beginning in the 1970's, faculty and students were recruited for PBL learning and teaching. Also, from the ground up, the campus was designed for PBL with 1,000 small group (4-8) study rooms for a student body of 10,000, all of whom would learn through team projects. Second, the Aalborg faculty and administrators believe an institution cannot do PBL

partially; for them, it's all or none. In contrast, Samford at 156 years old has been a very traditional campus. Many Samford faculty, as is common in the academy nationally, favor the content-coverage paradigm—instructing primarily by lecture-discussion. Samford's traditional Georgian buildings contain typical college classrooms with conventional study chairs, often with fixed seating; small group study areas are rare.

Samford's exploration of PBL led it to a difficult dilemma. On one hand, faculty and academic administrators wanted to try it in their undergraduate classes. On the other hand, we had only observed it in very rarefied environments, i.e. Mississippi State Veterinary School and Aalborg University—both insisting on total adoption. Because of the following differences, we could not see how we could make the total transformation:

Smaller Faculty/Student Ratios

Veterinary medical schools have much smaller faculty/student ratios than Samford and other undergraduate institutions. The entire first year class of 49 students is divided into 7-person teams and each team has a faculty facilitator that meets with the team three times a week and is available for consultation throughout the week.

Student Maturity

Students in veterinary medicine have completed demanding undergraduate programs earning very high grades. They are very focused and obviously four or more years older than typical beginning freshmen. Danish freshmen also tend to be about one year older than American freshmen, and, we believe, have completed much more demanding secondary education programs than one usually finds in the U.S.

Affinity for Professional/ Technical Fields

While PBL pervades all the disciplines at Aalborg, we perceived that it is more completely adopted in engineering where securing real world problems is much easier than in the liberal arts.

Student Time

Veterinary students typically do not work while they are in school, and Aalborg students have free tuition and receive an annual stipend of approximately $7,000 per year. In contrast, Samford students and their parents have to finance their tuition and living expenses. Consequently 33 percent of Samford students report working up to 20 or more hours per week.

Student Schedules

PBL demands a great deal of out-of-class work time which will have to compete for time with students' work schedules. In veterinary education students move through the curriculum in cohorts; therefore, all first-year students will be in and out of class at the same times. Since Aalborg is totally committed to PBL and team-project learning, students on a given team tend to have similar schedules. Obviously, six students working together on a PBL project in English are unlikely to be in and out of other classes at the same times.

As we weighed these major differences and the advice that if an institution does PBL it must go PBL all the way on not at all, we hesitated. Perhaps, it's just at this juncture where many academic

What is Problem-Based Learning?

Problem-Based Learning (PBL) is an instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions.

In PBL, the student actively, and often collaboratively, pursues knowledge and gains problem solving and critical thinking skills. Students are self-directed and, therefore, assume greater responsibility for their learning. The instructor acts as facilitator, resource guide, and/or task group consultant, while retaining the role of subject matter expert and carrying out the tasks of determining critical course content and desired learning outcomes. The instructor aids student learning by providing guidance and instruction. Problems function to provide a context for the information. They allow students to develop flexible, cognitive strategies which help them analyze unanticipated situations to produce viable solutions. To that end, PBL emphasizes the importance of interdisciplinary connection and finding and using appropriate learning resources.

The concepts behind problem-based learning are not new. Educators have long emphasized the importance of students actively participating in the learning process. Cognitive theory has shown that students learn better when they are able to contextualize information. The often cited phrase that the instructor should move from being a "sage on the stage" to a "guide on the side" shows that faculty value their role in facilitating learning.

PBL allows us to move beyond concepts into actual practice and in that sense is a new and different instructional technique. PBL provides a vehicle for drawing together instructor goals and student needs with an eye toward employer and societal demands. By encouraging students to develop the skill of transferring knowledge into new domains, a skill that students can carry with them throughout their lifetimes, PBL can help us help students achieve success in their futures. ▲

► Resource articles:

Allbanese, M. A. and S. Mitchell. (1993) "Problem-Based Learning: A Review of Literature on Its Outcomes and Implementation Issues." *Academic Medicine* 68, no. 1: 52-81.

Aspy, D. N., C.B. Aspy, and P.M Quimby. (1993) "What Doctors Can Teach Teachers about Problem-Based Learning." *Educational Leadership* 50, no. 7: 22-24.

Mayo, P., M. B. Donnelly, P.P. Nash, and R. W. Schwarts. (1993) "Student Perceptions of Tutor Effectiveness in Problem-Based Surgery Clerkship." *Teaching and Learning in Medicine.* 5, no. 4: 227-233.

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Problem-Based Learning and the Core Curriculum

David W. Chapman, Associate Dean of A&S

The past two decades have been a time of major change and experimentation in university curricula. The writing-across-the-curriculum movement focused attention on the importance of sophisticated writing skills as one of the basic objectives of a university education. Reforms in math and the natural sciences have attempted to broaden scientific literacy and to encourage more interest in science by women and minorities. Even more fundamentally, the focus in higher education has gradually begun to shift from the means of faculty teaching to ends of student learning.

The focus on student learning has led faculty to explore alternative approaches to traditional classroom instruction. One approach that holds great promise for undergraduate education is Problem-Based Learning (PBL). The use of a problem-based curriculum has a long history in medical schools (Barrows, 1996, p. 3) and has become a growing influence in other professional schools. In a problem-based curriculum, the courses are structured by the problems to be solved rather than by discrete units of content to be covered. The result is that students are driven to acquire knowledge by their desire to solve a real problem instead of merely studying for a test. As Robert B. Barr and John Tagg have noted:

> To say that the purpose of colleges is to provide instruction is like saying that General Motors' business is to operate assembly lines . . . . We now see that our mission is not instruction but rather that of producing learning with every student by whatever means work best. (1995, p. 13)

Problem-Based Learning

Obviously, there are many differences between graduate students—in knowledge, in ability, in maturity—and undergraduates. When Samford University was awarded a million-dollar grant from The Pew Charitable Trusts to pursue the development of problem-based approaches with undergraduates, many questions emerged. Do undergraduates possess the maturity required for the independent study and research that is

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The courses are structured by the problems to be solved rather than by discrete units of content to be covered.

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one of the hallmarks of problem-based education? Is a search for "real world" problems appropriate in a liberal arts environment where the question of "How shall we live?" is at least equal in importance to the question of "How shall we make a living?" Is the success of PBL dependent on students who are already highly motivated to succeed in their chosen field?

These questions are particularly pronounced for students entering the core curriculum program in their freshman year. Freshmen are already dealing with many additional pressures in college life. Most are living away from home for the first time. They have greater freedom and responsibility for scheduling their activities and studies than they have previously experienced. The use of problem-based instruction, which is radically different from the lecture-and-drill approach that most experienced in high school, is a high hurdle for most of these students.

The Purpose of a Core Curriculum

The requirement of a core curriculum for undergraduates may seem to be contrary to the spirit of problem-based learning. The heart of most core programs is the list of required texts that is reminiscent of the University of Chicago's Great Books program

and Columbia's legendary Western Civilization course. Such programs conjure up images of celebrated faculty members speaking in large lecture halls to unenlightened masses of students. Although such scenarios do exist, not all core programs are built around the "sage on the stage."

In many core curriculum programs the faculty do not simply pass down the heritage of Western and non-Western civilizations. They understand that the mission of liberal education is frequently misunderstood and undervalued. Before students can begin to be educated, they must understand the purpose of an education. This is especially important when students are completing their general education requirements prior to their major. Allan Bloom's *Closing of the American Mind* brought widespread attention to the problem of general education at the university:

> When a student arrives at the university, he finds a bewildering variety of departments and a bewildering variety of courses. And there is no official guidance, no university-wide agreement about what he should study. . . . It is easiest simply to make a career choice and go about getting prepared for that career. (Bloom, 1987, p. 338)

No one who has spent much time in general education programs can doubt the truth of Bloom's charge. Students generally see general education requirements as a distraction from their real purpose in coming to the university. At best they may pick up a few skills, a smattering of buzzwords and clichès, but only the academic major provides any sense of direction and coherence. Any university which intends to provide meaningful general education must consciously design courses which provide an introduction to the liberal arts. The core curriculum, as Ernest Boyer repeatedly argued, should help students "put their learning in historical, social, and ethical perspective" (1990, p. 14).

Problem-Based Learning in the Core

Samford University's Howard College of Arts & Sciences is where most general education requirements are fulfilled. Prior to the adoption of a university-wide core curriculum, the general education requirements varied by school and major. Often students were presented a range of options for fulfilling their general education requirements in science, humanities, and fine arts.

Co-neXus (from "community" + "nexus"), as Samford's new curriculum has come to be known, is the culmination of over seven years of planning and experimentation. Thomas Corts, President of the University, suggested four principles that should undergird the new curriculum:

► *Service learning*

► *Technology-supported learning*

► *Team-shared learning*

► *Problem-based learning*

Clearly, the intention of the curricular reform was not simply to re-package the content of our old curriculum. In fact, none of these suggestions for educational reform would necessitate any changes in the curriculum. However, the core curriculum does provide an ideal setting for new approaches to student learning, including the problem-based approach.

First, the co-neXus curriculum encouraged an integrated approach to liberal education. In Cultural Perspectives classes, students can expect to encounter art and architecture, music and drama, history and political science, poetry and prose fiction, and religion and philosophy. Similarly, the Communication Arts courses brought together instructional objectives from composition, mass media, speech, and computing courses. Milter and Stinson have noted that one of the defining characteristics of PBL is a recognition that "learning outcomes should be holistic, not divided by narrow disciplinary boundaries" (1996, p. 36). The interdisciplinary nature of the core curriculum makes it an ideal site for addressing problems that aren't limited to single disciplines.

Another characteristic of the core courses is the emphasis on depth over breadth. Many of the traditional general education courses were survey courses. Students were asked to study "the political, economic, and cultural development of the United States from the period of discovery to the end of the sectional conflict in 1877" or "a survey of American literature from its beginnings through the Civil War period." The information explosion made the coverage model in traditional survey courses more and more difficult to defend. No one could claim to "cover" English Literature or World Civilization in a semester, or even two. Either the faculty raced through the major works or historical events in "headline news" fashion, or they abandoned the survey approach for an intensive study of representative authors or eras. The situation was further complicated by the hermeneutical sophistication of postmodern approaches. Even if one read only a single Shakespeare play, how would it be taught? As a political allegory? As a reflection of bourgeois values? As an example of linguistic indeterminacy? As a stimulus for individual reader responses? The modern propensity for theory and interpretation in all disciplines has made the survey course appear to be a hopeless relic of a simpler era.

The focus on depth in the core courses is also ideally suited to the problem-based approach. Solving a real problem is seldom a quick or easy process. If the success of a course is determined by the number of concepts covered in a class, then problem-based learning will inevitably seem an inefficient approach. However, if the success of a course is determined by what students actually learn and how long they retain this knowledge, then PBL may be the most efficient approach. In the core courses, the emphasis is not on how much is "covered" by the faculty member but how students develop as readers, writers, and thinkers.

Finally, the core curriculum has encouraged the use of group assignments. The model of traditional education was usually one of the isolated learner: reading alone in a study carrel, writing papers that no other student would see, and taking exams that attempted to measure individual performance. Of course, the importance of individual merit cannot be denied, but the ability to work collaboratively is one of the most prized skills in our society. When the Collegiate Employment Research Institute asked employers what they would emphasize in preparing students for the demands of the workplace, many recommended more collaborative efforts, including "team-based assignments," "group projects and associated evaluations," and "project management" (1995, p. 17).

But preparation for career demands is not the only reason to emphasize collaborative activity at the university. Many of us have been shocked and dismayed by the recent outbreaks of violence and racism on college campuses: graffiti expressing racist or anti-Semitic bigotry, the publication of articles denying the Holocaust, vandalism, and assault against minorities. The campus, like society at large, seems to be splintering into more and more "special interest groups." The classroom needs to be a place where students from diverse backgrounds and traditions have the opportunity to work together in a supportive climate.

The use of cooperative small groups is another defining feature of problem-based learning. In fact, assessments of PBL have tended to emphasize growth in group communication and problem-solving skills rather than improvement in test scores (Lieux, 1996, p. 19). A core curriculum which emphasizes the development of community and interdependence is a natural fit with the use of PBL methods.

The Future of PBL in the Core

This fall Samford will teach two of the core courses using a PBL approach, in addition to several other general education requirements in math, science, English, and geography. The PBL sections will build on the framework of the core curriculum which already emphasizes integrated learning, depth of learning, and group learning. Still, the PBL approach will represent significant change over the current course design. Charging the students with finding the problem and deciding what they need to know to solve that problem will be a departure from faculty-led lectures and discussions. Applying knowledge to problems that exist outside the classroom will be an invigorating, but challenging, process for faculty and students alike. Although the results of using PBL in undergraduate education raises many questions, what is certain is the commitment of the institution to instructional methods that promote student learning and that support the traditional goals of a liberal education. ▲

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Crossing Another Street

reforms stop. Too often in the academy, we prefer to reflect on theory rather than on the action of small experiments.

With the leadership and support of their respective deans, several PBL experiments began, particularly in Education and Pharmacy. Both the Education and Pharmacy deans began to use PBL in courses they taught. For example, the Pharmacy Dean set up a community pharmacy course around the problem of where and how to locate and develop a new, independent pharmacy in Birmingham. Students had to deal with the demographics, traffic flows, capital formation and line of credit, and all the other problems commonly associated with establishing a new pharmacy store. The Education Dean and her Teacher Education faculty began using PBL in Educational Administration and Methods courses. Education actually established a PBL Center in the Curriculum Materials Library.

From these experimental efforts, belief began to grow that we could adopt and adapt PBL to our setting and circumstances. This was confirmed when four of the five PBL deans, the provost, and an associate provost visited with Barbara Duch and her colleagues at the University of Delaware. She and her colleagues use PBL in regular undergraduate courses, sometimes with enrollments of 60 or more all within a conventional curriculum and class schedule. They use

PBL in a course where it makes sense and do not feel compelled to "PBLize" the whole course, much less the whole curriculum.

We are developing PBL courses and significant course modules over the next two years; and over the next three years, we are committed to learning from our own experience. We don't know how widely and deeply PBL will permeate Samford academic programs, but this is great opportunity to try. We'll try to be candid with you about our efforts and will appreciate your candid observations.

One of the things we were supposed to learn in kindergarten was, "Hold hands when you cross the street." So we're about to try to cross a major street in learning and teaching at Samford where we do not face the same problems in dealing with change as the large, research universities. Nevertheless, change tires and drains us as it does most people.

This PBL exploration will test whether we have nurtured a climate friendly to deep change. My experience with change at Samford tells me we will succeed or fail in this effort to the extent that we hold hands and actively support each other's efforts. ▲

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[1]While the Pharmacy program at Samford leads to the Doctor of Pharmacy, it's possible for students to begin the program after two years of Pre-pharmacy.

New Source for Gathering and Sharing

that theme.

Themes of future issues include writing ill-structured problems, using PBL in the large classroom, and using PBL facilitators. In each issue, we will let you know the theme of the next, and we will invite your contributions on those themes. We also plan to feature a classroom practice in each issue of *PBL Insight*, so please contact us if you are currently using Problem-Based Learning. ▲

PBL Insight

PBL and Meeting the Challenges of Teacher Education

Carol Dean, Assistant Professor

When the Orlean Bullard Beeson School of Education and Professional Studies came under the leadership of a new dean and teacher education department chair, the employment rate of graduates from Alabama teacher education programs was below 50 percent. The dean was committed to significantly increasing the employment potential of Samford graduates.

As a faculty, we agreed to explore the current trends in education and the needs of our graduates and their employers. We convened focus groups of principals of local schools, graduates of the teacher education program, and current students. Surveys were sent to all graduates and their employers. We asked principals for qualities they expected in the teachers that they hired. We asked current students and graduates their perception about their preparation for specific aspects of teaching. Employers were questioned about their assessment of our graduates' performance in the classroom.

Results of these inquiries were clear. Employers wanted teachers who were not only academically well-prepared but who also could evaluate classroom situations to make good management and curricular deci-

of teachers that had existed for decades at Samford was no longer sufficient. The increased diversity of school populations, the charge to design an inclusive classroom environment to meet the needs of all children, an emphasis on higher level thinking, and the explosion of technology were just a few of the factors that posed challenges for teachers. Graduates could not learn in four years everything they needed to know to be successful. It was becoming apparent that in addition to a strong background in content, new teachers must have the skills to continue to learn and grow personally and professionally to meet current and unforseen educational challenges. They must learn to work in teams, to identify resources, and to use knowledge to evaluate and solve diverse problems as they arose in the work environment.

Faculty agreed to carefully review our present teacher education curriculum and consider possible revisions. During the summer of 1994, faculty met bi-weekly to discuss literature about current curricular needs and practices and evaluate the suggestions from our own graduates and their employers. We met informally in the

a more formal workshop setting with faculty from across the campus and from the community. Our faculty visited universities that had implemented innovative strategies designed to strengthen students' critical thinking and problem-solving skills. Two of these, Mississippi State Veterinary School in Starkville, Mississippi, and Aalborg University in Aalborg, Denmark, have designed curricula around problem-based learning (PBL). At both universities, all students work in small groups to solve open-ended problems. While we recognized that we could not (nor did we desire to) duplicate either of those two models, we recognized the value of engaging students in authentic problems and building teamwork skills as they worked on solutions.

Concurrently, we found in the literature considerable research that confirmed the need for innovative approaches to education. Educational, business, and political leaders supported the notion of an education with a strong content base but extending beyond knowledge of facts. Researchers concluded that to meet the needs of the future, quality education must include an emphasis on critical thinking and problem-solving skills. A favorite quote of the faculty was one by Robert Ornstein:

▶ *The increased diversity of school populations, the charge to design an inclusive classroom environment to meet the needs of all children, an emphasis on higher level thinking, and the explosion of technology were just a few of the factors that posed challenges for teachers.*

sions and work with other teachers to identify and solve school-wide problems. Graduates were overwhelmed with the complex issues they encountered each day–meeting the special needs of every child, managing classes of students from diverse backgrounds, and addressing parental concerns, all while creating an effective curriculum. In addition, they needed to be better equipped to work with older, often more traditional, faculty members in order to successfully implement innovative teaching strategies. Current students just wanted to feel "prepared" to be great teachers.

Our faculty became increasingly aware that our task was changing. The preparation

home economics living room with different faculty members responsible for specific topics each session. We shared books, articles, ideas, and opinions.

We invited recognized teacher educators from other parts of the country to speak to our faculty and the broader university community about best practices in teaching. Rita Silverman from Pace University, New York, discussed the use of cases to engage teacher education students in analyzing and evaluating educational issues. Beth Casey from Boston College shared her work with teaching problem-solving skills to young children. Each of these consultants shared informally with the teacher education faculty and then in

Solutions to significant problems facing modern society demand a widespread, qualitative improvement in thinking and understanding. We are slowly and painfully becoming aware that such diverse contemporary challenges as energy, population, the environment, employment, health, psychological well-being of individuals and meaningful education of our youth are not being met by the mere accumulation of more data or the expenditure of more time, energy, or money.... We need a breakthrough in the quality of thinking employed both by decision-makers at all levels of society and by each of us in our daily affairs (Berman, 1991, p. 10).

We recognized that calls for changes in the educational process are not new. Schools have long been criticized for their failures in promoting active and thoughtful learning. In his extensive study of American schools, Goodlad (1984) deplored the lack of student participation, involvement in learning, and excitement found by his researchers in schools. Gardner (1983) also criticized contemporary education for lack of depth.

We read the reports from the National Assessment of Educational Progress (NAEP) that indicated that although there is evidence of progress in student achievement in reading, math, and writing, these gains are primarily at the lower levels of achievement. NAEP suggested that the educational system in this country needs to extend its focus from the teaching and learning of skills and content to include an emphasis on purposeful use of skills and knowledge (Applebee, Langer, & Mullis, 1991).

Our discussions with employers confirmed the reports from business leaders that we found in the literature. Business and government leaders supported the call for a different kind of graduate. Wilson (1991) reported on a three-year collaborative project to develop a curriculum to meet the needs of learners for the twenty-first century. This report, based on a Delphi study of approximately 150 national business, government, and educational leaders, stressed that students must become lifelong learners. In order to be prepared for an ever-changing future, students must possess critical thinking and decision-making skills and the ability to access information and assimilate it to solve problems.

In June of 1994, a Wingspread Conference, sponsored by The Education Commission of the States, the Johnson Foundation, the National Governors' Association, and the National Conference of State Legislatures, made recommendations about the needs of college and university graduates. This report centered on the need for graduates to possess not only technical competence in a field but also communication and decision-making skills, flexibility, ability to work with others, and the ability to solve problems in complex, real-world settings.

In response to these reports, leading professional organizations have demonstrated their commitment to fostering thinking skills as a priority for the future. The national councils for mathematics, English, science, and social studies have included recommendations for teaching problem-solving and other higher-order thinking skills in their respective national reports (McTighe & Schollenberger, 1991).

What, then, is the role of teacher education institutions? We could see that we had an obligation to prepare teachers to assume the enormous responsibility for implementing these higher-order thinking and decision-making skills in the classroom. Goodlad (1984) concluded that a primary reason for failure of education reform in the 1950's and 1960's was "that the movement never became linked to the structures and institutions preparing and certifying teachers" (p. 293). In his study of teacher education, Penick (1989) noted that it is the teacher who must be prepared to structure a problem-based approach. But, he pointed out, teachers most often teach the way they have been taught, and very few teachers have experienced problem-based learning in the classroom. Teachers entering the classroom must be prepared to implement an innovative curriculum.

The consensus of the faculty was that we would completely revise the curriculum of our teacher education program to address the need for our graduates to become lifelong learners and problem-solvers to be better prepared to be successful in the constantly evolving classroom. It was clear to us that Edmundson was right when he stated that

> simply tinkering with requirements, organizational patterns, or admission standards will not suffice. The enterprise must be redesigned from the ground up to be congruent with a clear and expanded conception of what it means to be a teacher (Edmundson, 1990, p. 722).

The entire faculty worked together to create a curriculum and build individual ownership. We began with a zero base (as if no curriculum existed). We determined our primary objective to be "to prepare teachers to be successful in classrooms of the twenty-first century." Using an affinity diagram process, each faculty member wrote specific learning objectives on post-it notes, stuck them on a wall, and then grouped them into categories. These categories eventually became courses, and the

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courses were ordered into a logical sequence which became the curriculum. The curricular design was accomplished in four full-day sessions with the entire faculty working together.

In order to respond to the research calling for an emphasis on thinking skills and to affirm our view that success in teaching is based on the ability to be reflective and make effective decisions about all areas in the teaching process, the faculty decided to place a strong focus on problem-based learning. Our visits to PBL sites, conversations with colleagues, and discussions about the literature, convinced us that this was the direction in which we must go. During this same period of time, other schools at Samford were also investigating PBL. We were excited when given the opportunity to collaborate with four of the schools in applying for and ultimately receiving a grant from The Pew Charitable Trusts to explore PBL in undergraduate education. This grant has enabled faculty to explore best practices in problem-based learning throughout the world, develop models for our own school, and share with other schools of education. In addition, the goal of the school of education was two-layered—to encourage our graduates to become better problem-solvers and to teach them strategies to encourage higher-order thinking and problem-solving in their own K-12 classrooms. PBL strategies have been threaded throughout the curriculum.

The first course in the teacher education program, Issues in Education, was designed on a PBL model with students working in teams to investigate some of the fundamental educational issues. Professors wrote problems for the class based on information from interviews with classroom practitioners, many of whom were our own graduates. Students looked at some of the major educational philosophies and evaluated their relationship to historical and current concerns in education that are frequently editorialized in national and local newspapers and magazines, such as the scores on standardized tests, teacher competency, and funding. They analyzed the concerns of a fictional first-year teacher as she confronted the real problems of trying to meet all the needs of children from diverse backgrounds and with special learning needs.

Resource Roundup

Alan D. Hargrave
Associate Provost for Learning Resources

One of the primary goals of the Samford PBL Initiative is to serve as an international clearinghouse of PBL information. In this regular feature, we will explore various PBL-related resources. This will include books, articles, electronic mailing lists, World Wide Web pages and anything else we can dig up that might be helpful as you implement PBL on your campus or in your classroom. In this first installment, we'll get things started with a look at the Samford University web pages and some of the electronic mailing lists that you may wish to join.

The explosion of the Internet and the World Wide Web in the last few years gives us a great opportunity to make resources available to a wide audience. To this end, we have created Web pages that not only document our own PBL efforts but also serve as a link to information about other PBL efforts. You will find the Samford PBL pages at http://LR.Samford.edu/PBL/. Once there, you will find annotated links to PBL Web pages at other institutions, a bibliography of PBL resources, and a complete description of the Samford PBL Initiative.

Of course, anytime one strikes out on a venture such as this, it is useful to have the support of and to borrow from the wisdom of others. One of the best ways to do this in the electronic age is through the use of electronic mailing lists. For anyone not familiar with electronic mailing lists, they basically allow several individuals to send e-mail to each other without the overhead of each individual maintaining their own copy of everyone else's e-mail address. Instead, a central server (a list processor) keeps up with the list of subscribers and automatically distributes messages to everyone on the list. All one has to do to join a list is to send an e-mail to the subscription address. The sidebar contains information about three lists and how to join them.

Both the World Wide Web and electronic mailing lists are tremendous resources for peer support in your PBL efforts. In coming issues, we will examine these resources in some detail so as to provide some hints about where the best resources are to be found. Submissions of references to good resources are certainly welcome. Just e-mail me at: adhargra@samford.edu.

Three PBL Electronic Mailing Lists

Each of the lists below has a focus on some aspect of Problem-Based Learning. For each list, there is a web page that gives a description of the list and instructions for joining the list. We'll summarize here but you may wish to consult each of the Web pages for more detailed information.

List Name: **PBL-LIST**
List Host: Department of Civil Engineering, University of Monash, Australia
Subscription Address: majordomo@vifp.monash.edu.au
Detailed Information: http://civil-www.eng.monash.edu.au/affil/pbl-list/pbl-list.htm

List Name: **IMSACPBL-L**
List Host: Illinois Mathematics and Science Academy
Subscription Address: majordomo@imsa.edu
Detailed Information: http://www.imsa.edu/team/cpbl/web/listserv.html

List Name: **UD-PBL-UNDERGRAD**
List Host: University of Delaware
Subscription Address: majordomo@udel.edu
Detailed Information: http://www.udel.edu/pbl/ud-pbl-undergrad.html

To subscribe to one of these lists, simply use your regular e-mail program to create a new message. Address the message to the subscription address for the desired list. The subject of the message may be left blank. The body of your message should contain one line (and only one line) with the following text:

subscribe list-name
Where list-name is replaced by the name of the list to which you are subscribing. If your e-mail program automatically fills in signature text, disable that feature for this message since it may generate error messages when the list processor tries to make sense of it. As an example, to subscribe to PBL-LIST, your message would be addressed to majordomo@vifp.monash.edu.au and the body of the message would be:

subscribe pbl-list
Under most circumstances you will receive e-mail confirmation of your subscription request within a few minutes. Save the confirmation message. It gives information about the list, how to send messages to the list and (important!) how to leave the list. We hope you find these lists to be useful resources.

Two Books:

You might want to take a look at the following print resources:

Wilkerson, LuAnn and Wim H. Gijselaers. Eds. (1996) "Bringing problem-based learning to higher education: Theory and Practice." *New directions for teaching and learning.* 68 Jossey-Bass, San Francisco.

Bridges, Edwin M. with the assistance of Phillip Hallinger. *Problem-based learning for administrators.* ERIC Clearinghouse on Educational Management, University of Oregon, 1992.

Teacher Education

Each subsequent course in the curriculum had a PBL component that required students to investigate an unstructured problem. Some problems culminated in class discussion, others in a written piece, and many in open-ended projects. A part of students' final on-campus semester course work was designed to train them in effective questioning and facilitation strategies. These senior students would then facilitate the PBL groups in the introductory "issues" course.

Although the school is just beginning to implement the new curriculum, PBL has become an integral part of most of our existing teacher education courses. Through their program, students are presented with many "real world" problems to explore and resolve. For example, in Introduction to Elementary Education, a piece of writing by a child is placed on the web. Students must assess the piece, diagnose the child's deficiencies, and develop a plan to help him.

In Diagnostic and Remedial Reading, a fictional child created by the course professor with "real" reading difficulties is followed for the semester. The child's reading problem is presented, and students begin to diagnose and make recommendations. Subsequent disclosure provides more information for students to use as they continue to evaluate and suggest teaching strategies.

In Materials & Methods of Language Arts, students are given the unstructured task of creating a curriculum that must incorporate a wide variety of strategies for integration of subject areas, meeting special needs, use of technology, and open-ended problem solving. Without a structured format, students must create a plan that is educationally sound, encourages integrated, higher-level learning, measures student learning, and is clear enough to be used by other educators.

Each semester, students initially express discomfort in dealing with ill-defined problems. They struggle to find "the right answer" and to put the project together in "the right way." However, as they proceed through the program, they begin to learn to deal with ambiguity. Most find that they like the freedom to explore and create.

The faculty are committed to PBL as a way to encourage prospective teachers to become reflective practitioners and problem-solvers. We believe these new teachers will begin to move away from the search for recipes for teaching and will develop confidence in their own ability to make valid curricular decisions, especially in the area of critical thinking skills. They will more competently and more confidently approach the overall teaching/learning process for all students of the twenty-first century.

The strategy seems to be working. A careful survey of our teacher education graduates of the past two years shows that 96 percent are either teaching or in graduate school. Responses from their employers indicate high satisfaction with their performance. We expect that continuous evaluation of our program will help to consistently address the evolving needs of effective classroom professionals. ▲

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