

SO YOU'RE THINKING OF TRYING PROBLEM BASED LEARNING?: THREE CRITICAL SUCCESS FACTORS FOR IMPLEMENTATION

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Problem-based learning (PBL) shifts the traditional teaching paradigm. Rather than being teacher centered, PBL is student centered. Rather than presenting content first, PBL presents the problem first. Rather than presenting the students with a well-structured problem with a clear answer, PBL presents the students with an ill-structured problem with no clear solution. The research evidence, although still limited, indicates that PBL is more effective than the traditional teaching paradigm. However, to implement PBL successfully requires significant rethinking. The article examines three critical success factors essential for making PBL successful in management education. Those critical success factors are orienting students to this new instructional strategy, picking the problem, and forming the teams. The author shares his experiences using PBL and an instrument he has found useful in forming the teams.

Keywords: *critical success factors; problem-solving profile; adult learning; faculty roles in PBL*

Organizations are calling for people who can function as team players (Dench, 1997; Divita, 1996; Mill, 2002) and who can also be leaders (Bennis & Thomas, 2002; McGill & Slocum, 1998; Rana, 2001). These two competencies were the top two competencies identified by 125 companies when

Author's Note: The author appreciates the helpful comments made by Claudette M. Peterson on earlier drafts of this article and the reviewers for their very helpful comments and suggestions. In addition, the author would like to thank the editors who made very useful editing suggestions.

JOURNAL OF MANAGEMENT EDUCATION, Vol. 28 No. 5, October 2004 630-647

DOI: 10.1177/1052562904267543

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they were polled by Texas A&M University's Mays Business School's Fellows Program (*Focus Groups for the Business Fellows Program*, 1999). The management literature has shown that a common competency held by both good team players (Katzenbach & Smith, 1993; LaFasto & Larson, 2001) and effective leaders (Peterson & Van Fleet, 2003; Yukl & Van Fleet, 1982) is the ability to solve problems. Organizations regularly lament that new organizational members lack the ability to solve everyday organizational issues (Holt & Willard-Holt, 2000). Therefore, when an instructional strategy such as problem-based learning (PBL) comes along, is it any wonder that management educators would quickly adopt this learning strategy? In addition, adult learning theory (Knowles, 1980; Merriam, 2001) identifies as one of the five adult learning principles that adult learners are problem centered and interested in immediate application of knowledge to problems that they face in their workplace or personal lives. This also makes PBL an attractive instructional strategy for working professionals who are seeking undergraduate degrees or who are returning to obtain master's degrees in business.

However, to be able to implement PBL well, management educators must understand the factors that lead to successful implementation. In this article, I will first define PBL to provide a common frame of reference. Then, I will identify three critical success factors that I have found useful when applying a PBL instructional strategy to management education. I will provide examples of these critical success factors from my own experiences using PBL. Many of the critical success factors I identify in this manuscript came from doing my own PBL on PBL in my classroom during the past 13 years. When I am frustrated, when I am disappointed in the results, when I cannot stop thinking about the problem, when I am excited by a new insight about how to make PBL work better, I am reminded that this is how my students feel every day in my class. This may be the greatest critical success factor. PBL is only successful when I return to being a problem-based learner myself. In doing so, I experience the exhilaration of success, the agony of defeat, the determination to try again, and empathy for my students.

I have been using PBL since 1991. My first attempt at PBL was in a graduate organizational behavior class. The problem given to the students was to determine what human competencies the employers of our graduate students are looking for. In this first class, I learned how anxious students become when a problem is this ambiguous and complex. Students are not used to receiving problems like this. I think the thing that amazed me the most was that the students with high grade point averages (GPAs) were most anxious. This really caught me by surprise. As I reflect back on this experience, I realize I shouldn't have been surprised. I had taken away from the high GPA students their academic paradigm. The paradigm of take notes, read the book,

and study for the test did not work in this class. They were panic stricken. Some colleagues might have perceived that first class as a failure. The high GPA students complained to their advisors and to other faculty members. My department head called me in to ask me what I was doing in my class to have all the students stirred up. This doesn't sound like a success, and yet it was. I learned a very important lesson that semester. I too had to become a problem-based learner. My problems were different than the other learners in the room, but I had to completely embrace this new instructional strategy and in so doing, come to the deep understanding of what my students were experiencing. Once I realized this, I began to develop specific instructional techniques for this very different instructional strategy.

What Is PBL?

Most management educators are familiar with the more traditional teaching paradigm where we identify some content to be learned. We then teach this content through lecture, reading, watching or hearing an audiovisual piece, or some combination of these. At this point, we might have the students practice their new knowledge on a well-structured problem. This way, we know if the student is getting the correct answer. Finally, we assess the students' knowledge by providing them with a set of well-structured problems, usually in the form of a test. This teaching paradigm of teach, learn, practice, and assess is comfortable for both the teacher and the students because the roles are clear. The teacher's responsibilities are to teach and to assess the learning. The students' responsibilities are to learn and to demonstrate that they have learned the required information. This paradigm is consistent with Palmer's (1998) dominant and yet mythical method of knowing the truth. However, this is not the way that problems will appear in the workplace, this is not the way problems are solved in the workplace, and this is not how people's performance is assessed in the workplace.

In the workplace, problems are ill structured, ambiguous, messy, complex, and most often do not have one correct answer that can be found at the end of the book in the answer key. These are the types of problems both teachers and students really face in their professional and personal lives. These types of problems provide a powerful learning opportunity. When confronted with a problem of this nature, a traditional teaching paradigm makes little sense. These types of problems require a learning paradigm in which we (teacher and students) are confronted with an ill-structured situation that requires resolution. We must own the problem to make it authentic. The outcome must have an impact on us to make the problem challenging. We must

be stakeholders in the situation to make us commit to the problem's resolution. This new learning paradigm also makes the learning process messy. No longer are the roles clear. No longer is the path to success clear. This paradigm requires that the students first identify what the real problem is, next identify what they know and need to know, and then identify viable solutions through both creative and critical thinking. The teacher plays the role of teacher but also the role of student at times as the teacher learns from the students during the investigation of the problem. This new paradigm is consistent with Palmer's (1998) community of knowing model where everyone is a knower and everyone is a learner.

PBL is based on a fundamentally different learning process. It is defined as "the learning that results from the process of working toward the understanding or resolution of a problem" (Barrows & Tamblyn, 1980, p. 18). The process makes the student an active member in the learning process. In the PBL method, the students have to first determine what they know about the problem, what they do not know, and what they need to know. They become actively engaged in the problem. Second, the students must make sense of the problem for themselves versus having the problem defined for them. PBL asks the students to make sense out of the problem and to formulate the questions to be asked. It requires the students to actively engage in problem identification and definition. It acknowledges that both the instructor and student are knowers in the process of seeking understanding and resolution to the problem. During the 13 years I have been using PBL, I have found three critical success factors that have led to successful implementation in management education.

What Are the Critical Success Factors?

The three critical success factors are orienting the students, picking the problem, and forming the team. These three critical success factors require the faculty member to perform many different roles. I have identified seven distinctive roles required of me when using PBL as an instructional strategy. I have listed these seven roles with a definition in Table 1.

None of the success factors require all of the roles, but each requires some of the roles. For example, orienting the students to PBL requires explaining that as the instructor you can be both a manager and leader. Some situations call for a manager and others call for a leader. When picking the problem, at one moment you may be the coach and the next moment a cheerleader. Quite often, forming the team requires both the mentor role and the facilitator role. What is critical is that we must be willing to assume all of the roles and be

TABLE 1
Seven Roles of the Faculty Member
Using Problem-Based Learning

<i>Roles</i>	<i>Definition</i>
Lawgiver	To establish criteria for acceptable task quality and team performance
Mentor	To provide advice on team issues and task issues
Coach	To teach the doable steps of a specific task or process
Facilitator	To help clarify issues for the team or an individual
Cheerleader	To encourage and recognize specific accomplishments
Manager	To use legitimate, reward, and coercive power to influence
Leader	To use expert, network, and referent power to influence

able to move smoothly between roles if PBL is to be a success in our classrooms. This is meta-PBL at its best and provides our students with a real example of managerial leadership in action. Just as metacognition is the process of thinking about how we think, meta-PBL is conducting PBL on PBL. This is a critical capacity required of all instructors who elect to use PBL in their classes. We must be willing to continuously examine our knowledge about how students learn in light of new information. We have to be willing to reexamine how the problem can be represented and about possible solutions. Finally, we have to be willing to reexamine the situation (in our case the classroom) to determine what is the appropriate response to different events based on the dynamic interaction of the students and the problem.

CRITICAL SUCCESS FACTOR 1: ORIENTING THE STUDENTS

The first semester that I used PBL taught me two very important lessons. The first was that I had to become a problem-based learner myself. The second was that this new instructional strategy made the students anxious. Of course, one of the reasons for this anxiety was that I had shifted the paradigm away from what the students knew and had been successful with in the past. They didn't have a set of rules for this new paradigm. Although I had read both Kuhn (1970) and Barker (1992) on paradigms and paradigm shifts, I was now experiencing a paradigm shift firsthand. In addition, I had read the research (Hellriegel, Slocum, & Woodman, 1998) on the inverted-U relationship between performance and stress. The research indicates that at low levels of stress, people are bored and unchallenged and therefore do not perform at their best. As stress rises, so does performance, but only to a point. Beyond this point, performance begins to deteriorate (Xie & Johns, 1995) and people become too anxious, uncertain, and agitated. At this point, they begin to

focus more on the stressor and less on the task. I was now seeing the inverted-U phenomenon for the first time among my students. However, students seemed more energized and interested than in past semesters.

During the next three semesters, I asked my students to complete an exercise during the third class period to better understand this phenomenon. When I use the term *class period*, I am referring to a 75-minute time block. My classes have all been either two 75-minute time blocks per week or evening classes that meet for 150 minutes. On the third class period, I would come to class with five 3 x 5 inch index cards for each student. I would ask the students to write down on each card one emotion or feeling that they were having about the class at this point in the semester. No names were put on the cards. When the students were done, I collected the cards and asked for two volunteers to sort the cards into categories of similar terms and to label the categories. Overall, I collected data from 176 students. Two important insights were gleaned from this exercise.

First, the two categories containing the most cards were labeled *uncertainty* and *excitement*. Words in the uncertainty category included *anxious*, *nervous*, *uncertain*, *stressed*, and *panic*. Words in the excitement category included *interested*, *motivated*, *energized*, *excited*, and *exhilarated*. This made me really reflect on when learning might occur. I have become more and more convinced that learning only happens when the learner is both excited and uncertain. Excitement and uncertainty are the conjoined twins of learning, and PBL creates both of these affects. The excited affect also energizes the learner to investigate, to seek, to think, to create, and to act. The excited affect tells the learner that there is something authentic and relevant to be gained from the effort of learning. On the other hand, the uncertainty affect tells the learner that there is a real possibility of failure. This real possibility of failure makes the learner anxious and stressed. It can make the learner afraid to try new behaviors. It can also cause the learner to become paralyzed with anxiety. This realization led to the second insight. Removing the uncertainty also removed the excitement; therefore, I had to find a way to reduce the uncertainty to an acceptable level so my students still were energized and yet could still perform.

To do this, I redesigned the first two class periods of my class. In all classes that I use PBL, I now follow this same format. I do not think PBL is the answer for all classes. I would not use PBL in the freshman introduction to business class because it is a class designed to create awareness more than application of a broad range of business topics. I also would not use it in management classes designated for nonbusiness majors because these classes are designed as service classes to the rest of the university and because these students are generally only seeking a general overview of the management dis-

TABLE 2
Teaching Paradigm Versus Learning Paradigm

<i>Teaching Centered</i>	<i>Learning Centered</i>
Content oriented	Plus process oriented
Knowledge based	Plus performance based
Student is passive	Student is active
Faculty as expert	Faculty as resource
Discrete assessment	Continuous assessment

cipline. However, in the classes I do use PBL, I still introduce the course and myself during the first period, but I spend the majority of my time presenting a lesson on learning. This lesson has five key components. First, I provide the definition of learning as the intentional study of a body of knowledge with the purpose of retaining the knowledge so it can be used in the appropriate situation. Next, I introduce the students to the difference between a teaching-centered paradigm and a learning-centered paradigm. Table 2 lists the key points of this topic. The learning-centered paradigm requires both content and a process orientation. The performance-based component requires that the learners have the knowledge to be able to perform just as the aforementioned definition of learning indicates. The faculty member becomes a resource to the students. However, the faculty member's expertise shifts to the ability to create and maintain the problem environment that the students need for learning to happen. Finally, the faculty member must not only assess the knowledge the student is learning but also the interpersonal abilities and professional attributes of the learners, and this must be done continuously rather than occasionally.

Third, I introduce them to the concept of adult learning. I want them to realize that adult learners are problem-oriented, self-directed learners. Then, I introduce them to PBL. I try to connect the dots for them by telling them that PBL is messy and that as in all learning, they will make mistakes as they learn how to perform the necessary task for this class. I go on to say that because the problem they are working on is ill structured, I will not always know the answer to their questions, but when I do not, I will learn right alongside them. Finally, I introduce them to the roles (see Table 1) I will play. I conclude this presentation by telling them that this type of class is always exciting, always meaningful, and always different and I am up for the challenge. The roles of leader and cheerleader are very important here. After the presentation, I hand out the course materials. I tell the students that during the next class period I will answer any question they have about the class, the materials, or me.

During the second class period, I answer questions about the materials I handed out during the first class period and about my philosophy. Students ask about specifics of the assignment, such as “Why do you require us to do the first practice presentation; wouldn’t it make more sense to spend that time on the project?” They ask about the process, such as “What happens if we make a mistake or do poorly on one of the tasks?” They ask about me, for example, “Why did you decide to become a teacher?” They ask about the philosophy of the instructional method, such as “How did you come up with this teaching style? It looks like a lot more work.” During this dialog, I attempt to reduce their anxiety level and yet I do not attempt to remove it. One common question is “Have any of the teams ever failed?” The answer is yes. This answer is certain to increase the students’ anxiety. However, I go on to explain that the team had received feedback from me starting in Week 4 that they were not performing well. The team had also received feedback every week thereafter that they were performing poorly, but the team had taken no action to correct the deficiency. This explanation seems to help the students understand that it is possible to fail, as is true of all learning. But they hear that if they respond to the feedback process, this should be prevented. After explaining this one time, a student said, “Sounds like they should have failed.” There were many nods of agreement throughout the class after this student’s comment. I always conclude this class period by reminding the students that this class is challenging and that it might not be right for them at this point in their academic career. I emphasize that I admire the students who realize for whatever reason that this class does not fit their needs and drop the course. Once again, this reassurance seems to help the students deal with their uncertainty and anxiety. Part of my responsibility at this point is to make it clear what the expectations are and that I accept the students’ decision to stay in the class or to go. The instructor’s role at this stage is very much facilitator.

CRITICAL SUCCESS FACTOR 2: PICKING THE PROBLEM

It should not be surprising that identifying the problem to be confronted by the students is a critical success factor. Dewey (1916) said,

A large part of the art of instruction lies in making the difficulty of a new problem large enough to challenge thought, and small enough so that, in addition to the confusion naturally attending the novel elements there shall be luminous familiar spots from which helpful suggestions may spring. (p. 157)

Stepien and Pyke (1997) said that a good problem is difficult to define, is ambiguous, is likely to change with new information, and has many possible

solutions. Duch (1996) expanded this list by adding that the problem must engage the students, has a good link between theory and application, and challenges the students to justify their reasoning and actions. In addition, the problem should be complex enough that students must work together and rely on each other to solve the problem. Problems can be derived from real problems and current events. For example, the problems my crisis in organization class deal with are real potential crises that the risk manager at the specific organization is wrestling with at the time. The problems my teamwork and leadership class confronted were community-based needs being experienced by not-for-profit organizations in the local community.

Some authors (Delisle, 1997; Edens, 2000) think that once the instructor has identified the problem, the next thing the instructor should do is list all possible outcomes for the problem so that the instructor can steer the student in useful directions. I couldn't disagree more when applying PBL to management education. When the management educator does this, PBL becomes a shell game of find the hidden pea. It doesn't take long for the students to realize that the instructor has already determined the best possible solution. Once the students realize this, the relevance and challenge are gone and the students lose motivation to investigate, think, and struggle with the problem. Actually, the temptation is great to try and identify all of the possible solutions because if you have done a good job of creating an ill-structured, complex, ambiguous problem, you as the instructor are also uncomfortable because you don't know the answer either. I encourage you to resist the urge to solve the problem. Otherwise, you cut the heart out of PBL. It is okay not to have all of the answers. It is okay to feel uncertain and anxious just like the students. It is okay for the students to go down blind alleys and dead ends. Real authentic problems have blind alleys and dead ends. As instructors, it is our role as facilitators to help the students to understand that a blind alley or dead end is not a failure; it is just part of the problem-solving process.

However, as a lawgiver, mentor, and coach, it is also our responsibility to see that the students do create some definition for their problem. Otherwise, the problem continues to remain an ill-structured, ambiguous, and unresolved issue. Quite often what management students experience at this point is the disappointment that they cannot solve the whole problem in just one semester. This is an important lesson for them to learn. Complex, ambiguous problems often must be solved in pieces and with continuous sustained effort. For the type of problems I provide to my students, I have found that requiring the students to develop a scope statement is a useful assignment. A scope statement is a way of defining the problem. It identifies what you are going to do (in this case the deliverable), for whom, why, and by when. It provides both the students and the instructor with a clear statement of the out-

comes of the PBL activity. For example, when one of my student teams worked for the Make-A-Wish Foundation, their scope statement read, "By May 15, 1995, procure and deliver a personal computer to our Make-A-Wish child, so she can write her memoirs." In my crisis in organization class, one of the scope statements read, "To develop a tabletop hostage exercise for the vice president of administration by May 3, 2002, so the hostage response team can begin developing their coordination."

In a management PBL class, having the students write a scope statement accomplishes three important issues. First, it can reduce the students' stress level. The scope statement provides a clear outcome. The students can now see the goal. At the same time, it allows them to set their own goal. Doing this increases the authenticity of the problem they are trying to resolve. I have also seen this increase the students' stress level. For example, once my students had developed their scope statement for their Make-A-Wish child, they said their anxiety went up because they did not want to fail the child and yet knew it was possible. In other words, the scope statement made the problem even more real for the students. This is one of the times when being both the coach and cheerleader is very important for the faculty member. This is a chance to teach to the moment. It is a time when you can coach the students on the tasks that need to be done and at the same time provide them with encouragement that you know they can do it. I find that at these moments my students are particularly receptive to learning.

Second, a scope statement is part of planning that is a function of management. Therefore, it is an opportunity to teach and have students apply one of the major functions of management to a real situation. One of our concerns as management educators is whether the students retain the management knowledge we provide. This is a critical component in learning because learning only happens when the knowledge retained can be used in appropriate situations. Recently one of my finance colleagues came to see me. He wanted to show me the scope statement one of the finance teams had developed for the team's semester project. He said he was impressed because it clearly focused the issue to be developed. He said none of the other teams had been able to so clearly define the problem. He said when he asked how this team had come up with the idea, one of the students said she had learned about scope statements in her management class and could see how it would help the team focus their efforts, so she had suggested using it on the finance problem. He concluded this discussion by saying, "You should be proud. She actually remembered something from your class and can use it." Actually, PBL makes this possible when we link theory (planning) to application (scope statement) to authentic problems.

Third, creating a scope statement allows the students to engage in sense making. So often as instructors we do all the sense making for the students. We define the problem, we determine the right answer, and we structure the problem so the students find the right answer. We do not allow the students to take the fuzzy stimuli presented in an ill-structured problem and create their own frame of reference (Starbuck & Milliken, 1988). We do not allow the students to wrestle with the uncertainty that they might not be 100% right in their decision (Barrows, 1985), yet that is what they will face when they enter the organizational world of tomorrow. PBL allows the students to struggle with the nature of the problem, with what information is relevant, and with conflicting interpretations of the information available. It forces the students to ask the following three critical questions of sense making: "What do we know? What do we need to know? What are we going to do?" The roles of mentor and facilitator are very important in helping guide the students. Our responsibility is not to solve the problem for the students but to ask probing questions. A question such as "What is your purpose?" directs the students' attention to defining their outcome. On the other hand, a question such as "What assumptions are you making?" or "Given those results, what do you think you should do next?" directs the students' attention to thinking about their past thinking and actions. Gallagher (1997) argued that this is the first and foremost responsibility of the instructor, "to give voice to metacognitive questions" (p. 340).

CRITICAL SUCCESS FACTOR 3: FORMING THE TEAM

A good problem is generative in nature (Bransford & Vye, 1989). It should generate many questions. This generative nature of a good problem can help establish that the problem cannot be solved by a divide-and-conquer strategy used by many students (Michaelson & Razook, 2000). The problem must require cooperation and collaboration among the team members to successfully resolve the problem. Katzenbach and Smith (1993) found that the catalyst that brought individuals together into high-performing teams was to have a clear performance challenge placed in front of them. An ill-structured, authentic, and relevant problem is just the catalyst to make individuals come together. However, it takes more than just a good problem to make a group of people function as a team.

I certainly experienced this fact in my first attempt at PBL in 1991. In that class, I allowed the students to pick their own teams. Most students picked friends or people they knew from other activities. A few students were left out of these naturally forming groups and formed their own team. The self-selection process of teams caused an imbalance of intellectual knowledge,

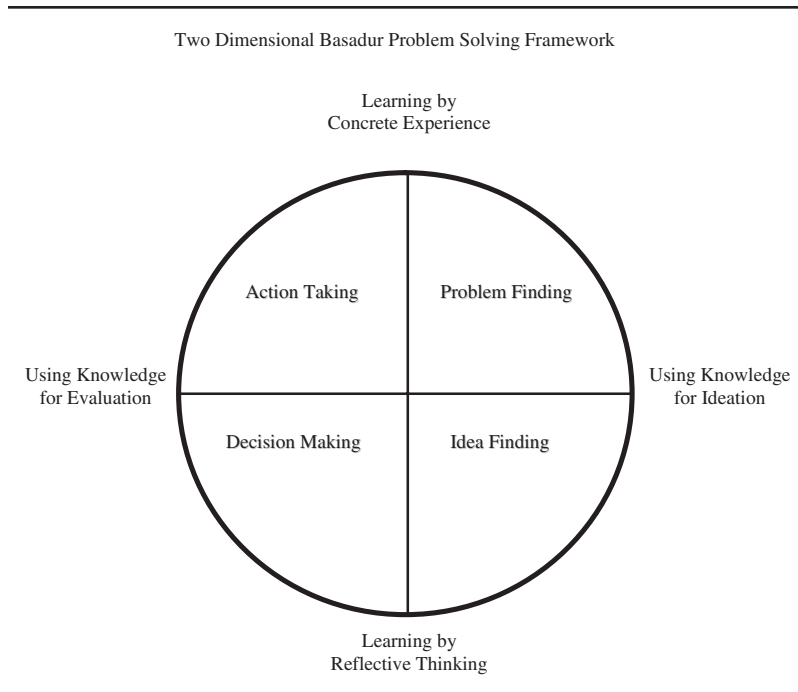


Figure 1: Two-Dimensional Basadur Problem-Solving Framework

problem-solving ability, and interpersonal competence. This self-selection process led to many difficulties on the teams. The quality of the work done by the different teams varied greatly. There was free riding by some members of teams and internal conflict between team members. But what was most obvious to me was that the teams were not very good at solving problems, whether those problems were related to the problem presented or their own internal team issues. It seemed to me that to form good problem-based teams, I needed a method of identifying the students' problem-solving preferences. In searching for a solution for this problem, I came across Basadur's problem-solving work (Basadur, Graen, & Wakabayashi, 1990).

The work of Basadur offered three attractions. First, it is grounded in theory. It is constructed on two dynamic tensions that past research has shown to exist in problem solving. Figure 1 depicts these two dimensions. The first dimension (y axis) shows two opposing ways to gain knowledge, either through concrete experience or through reflective thinking, which is based

on Kolb's (1976) learning process. The second dimension (x axis) shows two opposing ways to use knowledge, either for divergent thinking and the creation of new opportunities or for convergent thinking and the evaluation of new opportunities, which is based on divergent-convergent theory (Farnham-Diggory, 1972). These two dimensions create a 2×2 framework the students can understand.

Basadur gave each quadrant a descriptor (see Basadur et al., 1990), but I have not found these descriptors to be very useful for my students. I have found labeling each quadrant by one of the activities from that quadrant more useful. This way, my students start to build a language for talking about their problem-solving ability and where they are in the problem-solving process. For example, my students might tell me that they have identified the potential solutions for the problem and are now moving into the decision-making phase of problem solving, or they might say, "We need all of our idea finding ability at this point." The descriptors I have assigned to teach each quadrant in Figure 1 have proven to be more useful than Basadur et al.'s descriptors. Basadur et al. also developed an instrument called the *creative problem-solving profile* to measure one's relative preference for each of the four following characteristics: experiencing, ideation, thinking, and evaluation. The instrument and scoring method are available in the aforementioned article and on Basadur's Web site at basadursimplex.com. The instrument has provided a method for identifying each student's problem-solving preference.

Basadur et al. (1990) argued that for a team to be effective in problem solving, it must have strengths and interests in all four quadrants of the model. I started using the Basadur problem-solving profile to assign individuals to their problem-solving teams. The self-awareness that the profile provides to the students about their problem-solving preferences assists the students in realizing their own thinking process. This supports the metacognitive component of PBL. I have found that I can enhance this awareness by asking the students to create a team Basadur profile that simply plots which team members are in which quadrant.

I then ask the students to prepare a reflection paper on what they have learned from the process of creating this team profile. Students often write about their strengths and why they need the other members of the team to complement them. They also write about potential conflicts that could occur and how to deal with them. People in diagonal quadrants have a particularly hard time valuing each other's problem-solving preferences. By making this knowledge explicit, I find that my teams experience less internal conflict about the problem-solving process than they did the first time I used PBL.

One thing I immediately noticed when I started using the creative problem-solving profile to make team assignments was that the students were initially

not as satisfied with their teammates. Recently, Basadur and Head (2001) reported research that indicates that heterogeneous teams (someone from each quadrant) outperform both complete (all members from the same quadrant) and partial (all members from two quadrants) homogenous teams. However, they also found that satisfaction scores for heterogeneous teams were lower than all homogenous teams. I have found that by making the possibility of dissatisfaction explicit, I have reduced some of the dissatisfaction. I do this by presenting a lesson on the problem-solving process, team formation, and its implications. I also do this during coaching and facilitation sessions with the teams. I am quick to point out different team members' strengths during these sessions. By doing this, I advance the metacognitive awareness of the students and their appreciation for different cognitive abilities.

Implications

PBL has a lot to offer management education. Stinson and Milter (1996) reported on its success in a graduate business program. It facilitates the development of teamwork competencies and problem-solving ability. However, it also creates anxious students and conflict among team members. If the problem is not challenging and complex enough, the students will just divide and conquer and many of the benefits are lost. During the past 13 years, I have used PBL in both my graduate and undergraduate classes. My first experience with PBL taught me a great deal, the first lesson being that I had to be willing to become a problem-based learner myself. I had to be willing to embrace the messiness and uncertainty of the ill-structured problems that my students were confronting and also the ill-structured problems created by this new instructional strategy. In fact, what I have learned is that the better I get at making the problem authentic, relevant, and ill structured, the more uncomfortable I become. At the same time, I have learned to trust the robustness of the PBL process and to trust my students to wrestle with the problem.

In 1991 when I began using PBL, the problem was more tightly defined. It was the following: What are the human competencies that employers of our graduate students are looking for? Given my study of organizational behavior and discussions with many business executives, I had a pretty good idea what the results the students would find would look like. There were few surprises in the results. I was playing it safe. By 1996, I had evolved. The problem for my teamwork and leadership class was to identify a need or problem that a community not-for-profit was experiencing, identify possible solutions, and then implement the most appropriate solution. By this point, my

students had more range in defining their own problem, what the alternative solutions were, and how to implement the chosen solution. By this time, I was comfortable with the ambiguity and with the affective components of PBL. Today, the problems in my crisis in organizations class are developed between the team and the manager in the organization they choose. The questions start as broad as "assume our shuttle bus has an accident." That question has led to one team investigating if the organization should even have a shuttle bus service and another team developing a multimedia presentation as a proof of concept on how to make shuttle bus riders trained as first responders. The multimedia solution has led to some of the team members continuing with the project as an independent study to turn their proof of concept into a production system for the organization.

At this point, I have had the chance to implement PBL at three different universities. My teaching evaluations at each institution have reflected my arrival. The first semester is always difficult as the students come to understand what PBL really means to them and me. However, I have found a few things that have helped maintain my teaching evaluation at a 3.0 average on a 4.0 scale during the first semester. One of those things is the first critical success factor—orienting the students. The second is "I have learned . . ." statements from former students who have taken a PBL class from me. At the end of every semester, I ask the students to complete the aforementioned statement. I also ask if I have permission to use their comments. From those who give me permission, I select examples that explain what this class is like and what to expect. These statements have become a part of the materials I share with my new students on the first day of class. By the end of the third semester, my teaching evaluations go up to 3.4 on the average, ranging between 3.0 and 3.8.

Table 3 summarizes the seven lessons I have learned as I have used PBL. These seven lessons incorporate all of the material covered in this article. The first four lessons are insights I have gained during the 13 years I have used PBL. These insights are spread throughout the article but are summarized here for easy review. The last three lessons are directly related to the three success factors. The table provides a good overall summary of the article.

In conclusion, I have learned three factors that lead to success when implementing PBL. First, you must orient the students to this new learning paradigm. Don't be surprised if the best students are the most anxious. You are taking away from them their security blanket and asking them to venture into the learning jungle unarmed. Our role is to reassure them that they can do it. Second, identifying the problem is critical. I have found that having the students develop a scope statement assists the students in defining what they are to do. Your role here is both lawgiver and coach. We are responsible for

TABLE 3
Seven Lessons Learned in
Practicing Problem-Based Learning (PBL)

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1. You have to become a problem-based learner yourself. You have to be willing to embrace the messiness, uncertainty, and excitement of solving real problems.
 2. Your role in the classroom changes drastically. You will be a lawgiver, coach, facilitator, mentor, cheerleader, manager, and leader. Our responsibility is to be the role model for our students.
 3. You need to know that early on, the use of PBL might affect your teaching evaluations. You can reduce the impact by orienting the students to the process.
 4. Your best students might be the most anxious. You have taken away from them their academic security blanket.
 5. You will have better success with PBL if you take some time to orient your students to PBL and the concept of learning.
 6. You need to develop a problem that is ill structured, complex, and ambiguous. The more the problem satisfies these three criteria, the more uncomfortable you will be with the problem. That's all right, do it anyway.
 7. You need to take time to form the problem-solving teams well. The Basadur method has worked well for me; however, I am sure there are other excellent ways to form the teams. The key is to find a method for team formation that is based on sound team research.
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providing the students with feedback about whether they are on the right track, and it is also our responsibility to teach them how to develop specific, measurable, achievable, rewarding, and temporal scope statements. Third, a method for assessing the students' problem-solving preferences is essential. Using an assessment tool makes the problem-solving, cognitive process explicit to the students. It provides them a language for talking about their thinking. de Bono (1985) found that one of our difficulties with thinking is that we do not have adequate language with which to talk about the cognitive process. Our role is to facilitate this process and lead our students to discover for themselves the excitement of solving real and relevant problems while thinking about their own thinking.

References

- Barker, J. A. (1992). *Future edge: Discovering the new paradigms of success*. New York: Marrow.
- Barrows, H. S. (1985). *How to design a problem-based curriculum for pre-clinical years*. New York: Springer.
- Barrows, H. S., & Tamblyn, R. H. (1980). *PBL: An approach to medical education*. New York: Springer.
- Basadur, M., Graen, G., & Wakabayashi, M. (1990). Identifying individual differences in creative problem solving style. *Journal of Creative Behavior*, 24, 111-131.

- Basadur, M., & Head, M. (2001). Team performance and satisfaction: A link to cognitive style within a process framework. *Journal of Creative Behavior*, 35, 227-248.
- Bennis, W. G., & Thomas, R. J. (2002). Crucibles of leadership. *Harvard Business Review*, 80(9), 39-45.
- Bransford, J. D., & Vye, N. J. (1989). A perspective on cognitive research and its implications for instruction. In L. B. Resnick & L. E. Klopfer (Eds.), *Towards the thinking curriculum* (pp. 173-205). Reston, VA: Association for Supervision and Curriculum Development.
- de Bono, E. (1985). *Six thinking hats*. Boston: Little, Brown.
- Delisle, R. (1997). *How to use PBL in the classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Dench, S. (1997). Changing skills needs: What makes people employable? *Industrial & Commercial Training*, 29, 190-193.
- Dewey, J. (1916). *Democracy and education*. New York: Free Press.
- Divita, S. (1996). Being a team player is essential to your career. *Marketing News*, 30(19), 8.
- Duch, B. (1996). *Problems: A key factor in PBL*. Retrieved December 23, 2002, from www.udel.edu/pbl/cte/spr96-phys.html
- Edens, K. M. (2000). Preparing problem solvers for the 21st century through PBL. *College Teaching*, 48(2), 55-60.
- Farnham-Diggory, S. (1972). *Cognitive processes in education*. New York: Harper & Row.
- Focus Groups for the Business Fellows Program*. (1999). College Station, TX: Mays Business School.
- Gallagher, S. A. (1997). PBL: Where did it come from, what does it do, and where is it going? *Journal for the Education of the Gifted*, 20, 332-362.
- Hellriegel, D., Slocum, J. W. J., & Woodman, R. W. (1998). *Organizational behavior* (8th ed.). Cincinnati, OH: South-Western College Publishing.
- Holt, D. G., & Willard-Holt, C. (2000). Let's get real: Students solving authentic corporate problems. *Phi Delta Kappan*, 82, 243-246.
- Katzenbach, J. R., & Smith, D. K. (1993). *The wisdom of teams*. Cambridge, MA: Harvard Business School Press.
- Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy* (2nd ed.). New York: Cambridge Books.
- Kolb, D. A. (1976). Management and the learning process. *California Management Review*, 18, 21-31.
- Kuhn, T. S. (1970). *The structure of scientific revolutions* (2nd ed.). Chicago: University of Chicago Press.
- LaFasto, F., & Larson, C. (2001). *When teams work best*. Thousand Oaks, CA: Sage.
- McGill, M. E., & Slocum, J. W. J. (1998). A little leadership, please? *Organizational Dynamics*, 26(3), 39-49.
- Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. In S. B. Merriam (Ed.), *The new update on adult learning theory* (Vol. 89, pp. 3-13). San Francisco, CA: Jossey-Bass.
- Michaelson, L. K., & Razook, N. (2000). Making learning groups effective. *Selections*, 26(1), 28-35.
- Mill, S. (2002). Become an indispensable asset. *Computing Canada*, 28(2), 25.
- Palmer, P. J. (1998). *The courage to teach: Exploring the inner landscape of a teacher's life*. San Francisco, CA: Jossey-Bass.
- Peterson, T. O., & Van Fleet, D. D. (2003, November). *Critical managerial leadership behaviors: An empirical study of crisis and stable environments*. Paper presented at the Southern Management Association, Clearwater, Florida.

- Rana, E. (2001). Cyber-guru calls for leadership. *People Management*, 7(22), 11.
- Starbuck, W. H., & Milliken, F. J. (1988). Executive perceptual filters: What they notice and how they make sense. In D. C. Hambrick (Ed.), *The executive effect: Concepts and methods for studying top managers* (pp. 35-65). Greenwich, CT: JAI.
- Stepien, W., & Pyke, S. L. (1997). Designing PBL units. *Journal for the Education of the Gifted*, 20, 380-400.
- Stinson, J. E., & Milter, R. G. (1996). PBL in business education: Curriculum design and implementation issues. In L. Wilkerson & W. H. Gijsselaers (Eds.), *Bringing PBL to higher education: Theory and practice* (Vol. 68, pp. 33-42). San Francisco, CA: Jossey-Bass.
- Xie, J. L., & Johns, G. (1995). Job scope and stress: Can job scope be too high? *Academy of Management Journal*, 38, 1288-1309.
- Yukl, G. A., & Van Fleet, D. D. (1982). Cross-situational, multimethod research on military leader effectiveness. *Organizational Behavior and Human Performance*, 30, 87-108.