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## **Keywords**

affective learning, cognitive learning, behavioral learning, problem-based learning, implementation, communication, leadership

## **Disciplines**

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**Problem-based Learning in Graduate Management  
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This article develops a model of problem-based learning (PBL) and shows how PBL has been used for a decade in one graduate management program. PBL capitalizes on synergies among cognitive, affective, and behavioral learning. Although management education usually privileges cognitive learning, affective learning is equally important. By focusing on real-world problems, PBL helps students appreciate multiple perspectives, recognize nonrational elements of decision making, and confront ethical quandaries. Together, cognitive and affective learning underpin the essential third element: behavioral learning about how to implement plans, lead teams, resolve conflict, persuade others, and communicate with multiple constituencies. Specific examples of PBL projects illustrate this interrelationship.

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## **Problem-based Learning in Graduate Management Education: An Integrative Model and Interdisciplinary Application**

The popular press, academic journals, and accreditation standards (e.g., American Assembly of Collegiate Schools of Business, 1994) have emphasized that higher education must develop individuals who not only have substantial knowledge but who can also apply that knowledge to make things happen in an increasingly complex world. Effective leaders must work productively in diverse groups, must use good judgment in handling complex issues, and must articulate a compelling vision to multiple stakeholders.

Leadership today requires more than traditional academic knowledge and practical skills. To effectively implement strategies and plans, leaders must develop the attitudes and sensitivities that lead to wise decision making and appropriate action. That is, learning must be affective as well as cognitive and behavioral.

Business schools have been charged with the daunting responsibility of transforming bright students into effective leaders (Linder & Smith, 1992; Neelankavil, 1994; O'Reilly, 1994; Porter & McKibbin, 1988). In response to this challenge, faculty members have developed internships and mentorships, introduced case studies and skills workshops, and experimented with other instructional innovations. Although each has its strengths, few attempt to integrate all three types of learning.

One recent educational approach, problem-based learning (PBL), holds great promise for achieving all three learning outcomes. This pedagogy uses a prototypical, real-world problem as the focus for student-centered active learning. After using PBL in graduate management education for almost a decade, we have found that in addition to helping students achieve cognitive and behavioral outcomes, PBL enables students to recognize how affective sources,

such as cultural orientation, personal style, ethical framework, and prior experiences, influence managerial effectiveness. With this insight, students are better able to develop competencies in the often neglected affective learning dimension. Focus on affective learning provides students with a more balanced understanding of complex management situations. Furthermore, affective learning serves as a critical link between cognitive learning and behavioral (skills-oriented) learning that motivates students and enhances educational outcomes.

This article begins by presenting a model that illustrates how a problem-based approach integrates the analytical learning process, based on cognitive sources, with the interpretive learning process, based on affective sources, and how this combination leads to skills development. Next, we explain how PBL has been applied to an interdisciplinary project in a graduate management curriculum. Finally, we conclude by discussing several assessment challenges that educators should anticipate if they adopt a PBL approach.

### **A Model of PBL**

PBL presents several critical shifts from traditional educational models (Bernstein, Tipping, Bercovitz, & Skinner, 1995; Duch, Allen, & White, 1997; Gallagher, 1997; Maudsley, 1999; Milter & Stinson, 1995). PBL was developed in the medical profession more than 30 years ago in response to the discovery that students who did well on tests often could not apply the concepts when later faced with patients in clinical settings. PBL's goal is long-term learning that results in behavioral change and not just conceptual mastery.

To achieve this goal, PBL methodology organizes learning around a realworld problem rather than in a linear sequence of topics or concepts. Student teams are presented with a problem that serves as the stimulus for subsequent learning. An important feature of PBL

methodology is the selection of a relatively unstructured, prototypical problem. Students learn how to define the problem as well as solve it, wrestling with alternative solutions and weighing the pros and cons. Yet because the problem is prototypical and not idiosyncratic, the learning is directly relevant to future problems that students will face (Conant, 1996; Marsick, 1990).

PBL also envisions specific relationships among the participants: individual students, teams composed of classmates, and the teacher. With self-management as an objective, PBL stresses that each student must be responsible for his or her own learning. Students work in teams so that collective insight will offset individual limitations (Clutterbuck, 2002; Ettington & Camp, 2002). The teacher becomes a facilitator and resource, asking key questions and providing instruction when students recognize the need for information and support.

The literature on PBL clarifies both these distinguishing features and the approach's core contributions (Bridges & Hallinger, 1997; Delafuente, Munyer, Angaran, & Doering, 1994; Lohman, 2002; Lohman & Finkelstein, 2000; Maudsley, 1999; Mayer, 2002). The growing number of educators who have successfully applied PBL to the management curriculum attest to its potential to dramatically change the next generation of business leaders (Chaharbaghi & Cox, 1995; Cockerill, Stewart, Hamilton, & Douglas, 1996; Kazem & Cox, 1995; Raelin, 1997; Stepien & Gallagher, 1993; Stinson, 1990; Stinson & Milter, 1996; Watson & Temkin, 2000).

We propose an integrated model of PBL (Figure 1) to explain how the analytical learning process, based on cognitive sources, and the interpretive learning process, based on affective sources, form the foundation for developing management skills and for making judgments about their appropriate application. Our model illustrates the relationships that PBL establishes among the three learning domains: cognitive, affective, and behavioral. Each leads to specific learning outcomes (Table 1).

The integrative model reflects our philosophy of and key assertions about PBL. First, although educational programs usually privilege cognitive learning, affective learning is equally important. Affective sources of learning, such as attitudes, values, ethics, and culture, counterbalance cognitive sources, such as knowledge, observation, and research. Second, behavioral learning, or skills development, is not an independent add-on, but it derives directly from the synergy between cognitive and affective domains. The analytical process of cognitive learning, complemented by the interpretive process of affective learning, forms a solid base for skills-oriented learning. Third, an interdisciplinary problem can serve not only as a catalyst to motivate students' cognitive and affective learning but also as an impetus for skills-oriented learning by providing team tasks that interweave challenges from several disciplines.

### **The Analytical Learning Process**

Through the analytical learning process, students draw on a range of cognitive sources, including traditional course materials, readings, and research, as well as observation, discussion, and study related to the specific problem. Advocates of PBL have frequently emphasized that the students achieve cognitive outcomes by developing their reasoning processes in solving real problems (Williams, Sewell, & Humphrey, 2002). Norman and Schmidt (1992), for instance, suggest that PBL results in three main cognitive abilities: (a) to acquire factual knowledge by seeking and using a variety of resources, (b) to transfer general principles and concepts to solve similar problems, and (c) to use examples acquired through PBL to solve future problems.

The analytical learning process has a restructuring character: Learners reuse and reformulate past knowledge to comprehend new knowledge (Shanley & Kelly, 1995). Analytical learning often begins with factual knowledge but moves quickly to the understanding of

principles that underpin business practice. Through the analytical process, learners compare and contrast concrete examples to identify those principles that apply to different situations. The cognitive outcomes of the analytical learning process are necessary for, but not sufficient in, handling real-world business problems.

### **The Interpretive Learning Process**

Although numerous advocates have highlighted cognitive learning as a key benefit of PBL, far fewer advocates have addressed an equally important outcome: affective learning. Within this term we include the ability to monitor one's own responses, to recognize how people's perceptions and motivations influence their behavior, to appreciate cultural differences, and to identify ethical dilemmas. Regardless of how much factual knowledge students acquire and how many business principles they can explain, implementing solutions to business problems requires insight into other people and oneself.

Affective learning results from an interpretive process. It starts with self-insight—exploration of one's own values, beliefs, ethical framework, cultural background, and personal style. Then, learners must compare themselves to others in these areas and must develop an informed insight that will influence their interaction with others. The interpretive learning process thus involves both distancing one's own viewpoints and feelings and moving closer to others' viewpoints and feelings. Like cognitive learning, affective learning is necessary for, but not sufficient in, addressing real-world business problems.

### **The Process of Developing Implementation Skills**

The greatest contribution of PBL is the opportunity for students to capitalize on the synergy of cognitive and affective learning by developing and demonstrating the concrete implementation skills needed to handle complex business problems. Implementation skills include such behaviors as interacting to make wise team decisions, convincing others, providing leadership, communicating with various constituencies, and following through.

A well-chosen problem, explored through the analytical and interpretive learning processes, yields a group of team tasks that requires integrated learning rather than fragmented learning. An interdisciplinary approach is realistic because business problems usually cut across typical curricular boundaries. Thus, PBL encourages students to develop implementation skills that mirror those required to meet future challenges that they will face.

### **PBL in the Graduate Management Curriculum**

Over the past decade, a problem-based team project has been the centerpiece of the Master of Management in Hospitality (MMH) curriculum offered by Cornell University's School of Hotel Administration. The goal of this 2-year, American Assembly of Collegiate Schools of Business– accredited graduate program is to educate future leaders in the global hospitality industry, defined broadly to include lodging, food service, travel, tourism, real estate, consulting, and related sectors. The MMH program encompasses all the elements of a traditional MBA curriculum, enriched with applications, illustrations, and cases from the hospitality industry.

MMH graduates need not only solid technical knowledge about the functional areas of business but also the ability to implement plans through effective leadership in a multicultural, people-oriented industry struggling to balance traditional human values with technological

innovation. Special features of the MMH program that help students achieve this leadership ability include an assessment center, individual development plans, mentorships, internships, and benchmarking of communication and group-process skills to achieve a standard of excellence expected by industry employers (Brownell & Chung, 2001).

The problem-based team project unifies the required first-year MMH curriculum and is many students' most memorable educational experience. The second-semester project allows teams of six or seven students to apply what they learned in first-semester courses (organizational behavior, quantitative methods, information technology, financial economics, strategic management, and managerial communication) as well as what they are learning concurrently in second-semester courses (financial management, human resource management, food and beverage management, marketing, and property-asset development and management). All second-semester courses are integrated into the team project; students apply concepts and information from each course, and the assignments prepare students to complete the final project report and client presentation.

The interdisciplinary project problems that we have used address prototypical questions that hospitality businesses face:

Whether to build a new hotel or resort; if so, what the specific scope and features should be (Example 1: Whether to develop and build a new hotel in an urban renewal area in Boston. Example 2: Whether to develop and build a new luxury resort on Florida's gulf coast.).

Whether to renovate an existing hotel or resort; if so, how and for what part of the market (Example 3: Whether to renovate and reposition a hotel located in a New Jersey business park near several major corporate headquarters. Example 4: How to renovate and reposition an Annapolis, Maryland, resort property.).

Whether to renovate a historical building; if so, for what purpose and in what way (Example 5: How to transform a historic Manhattan insurance company

building into a contemporary hotel, while respecting and capitalizing on the historic structure. Example 6: How to best develop a historic apartment building in Washington, D.C. as part of a hotel complex, as an independent hotel, as a condominium, or for another use.).

How to capitalize on a new economic development, such as a convention center, urban renewal project, or economic initiative (Example 7: Whether to expand a New Orleans, Louisiana, convention hotel in anticipation of the state's approval of gambling and the construction of a large land-based casino. Example 8: What kind of hotel to build near Boston's new convention center, and what to do with a hotel near the old convention center.).

Each project helped students integrate their learning and apply concepts and principles to real-world challenges.

### **Distinctive PBL Elements of the Team Project**

How does the team project as implemented in the MMH program instantiate the unique features of PBL? The project has three distinctive elements of PBL—its goal, its methods, and the participant relationships. The goal is to help students recognize how, throughout their careers, they will apply business concepts like net present value, branding, and span of control, as well as methodologies like regression analysis, market research, and workforce planning. In isolation, these components of graduate management education often seem abstract and academic; in the integrated context of a real-world problem, they become concrete and relevant.

The methods of the team project help students develop problem-definition and problem-solving skills as they confront a prototypical business situation. By anchoring learning in an authentic, interdisciplinary problem faced by a real company, the curriculum helps students see the importance of a logical decision-making process: defining criteria, doing primary and secondary research, identifying alternatives, weighing the pros and cons of each alternative,

reaching team consensus on a solution, and communicating effectively with key constituents to persuade them of the wisdom of the proposed solution. Yet the team project balances team and individual learning as each student works on priorities defined in his or her personal development plan.

The participant relationships add richness and reality to the project. Although each student has ideas about how to approach the problem, the team context requires individuals to learn from and teach one another as well as to negotiate and compromise to reach consensus. By collaborating, each team capitalizes on its members' individual strengths and expertise. Teams also learn to handle inevitable disagreements and conflicts. Providing guidance, faculty members address questions about the project not only in class but also outside of class as they accompany students on the field trip to the site and work closely with teams throughout the semester. The executive in residence often plays a key mentoring role as well. As a result of these collaborative relationships, students see each other and the faculty as valuable resources (O'Neil & Hopkins, 2002).

Throughout the analytical and interpretive learning processes, as illustrated in our integrated model, the PBL team project leads to cognitive, affective, and behavioral learning outcomes.

### **The Analytical Learning Process in the PBL Project**

At the beginning of the semester, the industry clients—representatives of the property owners, developers, and operators—visit the campus and meet with the student consulting teams. The clients discuss the problem in detail and provide a letter of engagement that explains their expectations. To meet these expectations, students must engage in an analytical learning process

that involves understanding complex concepts, conducting research, asking insightful questions, and pursuing other means of cognitive learning.

Understanding the stakeholder relationships, goals, and vested interests is an important initial learning experience. Owners may be individuals, partnerships, corporations, or institutions such as state teachers' retirement systems. Companies that develop properties are often separate from operators, such as major hotel chains that are hired under management contracts. However, operators sometimes make capital investment in the project.

After conducting secondary research on the economic, social, and political contexts, students take a 3-day field trip to conduct primary research, which involves exploring the site, interviewing the people involved, and investigating the competition. Throughout the rest of semester, each team works independently to analyze the information gathered and to develop a comprehensive proposal. Typically, this might involve building construction or renovation, interior design, restaurant concepts, a human resources plan, a marketing plan, and complete financial analysis and projections to justify the proposal. Concepts and principles from each core course are applied to the problem at hand.

The project promotes cognitive learning by structuring inquiry around a series of questions. PBL posits that a relatively unstructured problem is most realistic and appropriate (Cockerill *et al.*, 1996; Lewis & Dehler, 2000). A completely unstructured business problem—for instance, an open-ended question such as, “Where should the company be headed?”—is too broad to create a coherent curriculum design. Our projects have therefore addressed two questions, one more structured and one less structured. First, should the company take a particular action, such as building a new property or renovating an existing one, and why or why not? If the first question is answered in the affirmative, then the second, more open-ended

question is addressed: How should the company approach the project, and what specifically should it do?

The two-part question structure contrasts problems of uncertainty and problems of equivocality, as discussed by Weick and Van Orden (1990). Managers need to know appropriate analytical approaches for addressing both types. The problem of uncertainty—should the company take this action?—is best addressed by external research and quantitative analysis. The problem of equivocality—what is the best way to accomplish this action?—depends on a different type of analysis, one that draws on divergent thinking to move from established principles and facts to creative possibilities.

Some proposals have impressed the clients specifically because students' analytical learning process yielded innovative possibilities that corporate leaders had overlooked. For instance, for a new hotel in Boston (Example 8), one team proposed an ocean theme and a partnership with the Boston Aquarium. The hotel lobby would feature an impressive aquarium funded by the hotel owners but maintained by Aquarium experts, and the two organizations would use comarketing to promote one another. The hotel design and restaurants would continue the ocean theme. The students had confirmed with Boston Aquarium management that the plan was feasible, had factored the costs into their quantitative analysis, had compared their plan to existing comarketing initiatives, and had weighed the pros against the cons.

One cognitive outcome of the project is the ability to ask good questions. Students generate subquestions needed to answer the larger questions. For instance, in exploring how to develop a historic property in Washington, D.C. (Example 6), students posed the following types of subquestions:

To what extent and in what ways is historic preservation compatible with technological expectations and legal requirements in contemporary hotels?

Under what circumstances do hotel guests and clients value historic décor enough to pay a premium for it?

How might changing urban conditions affect the future real estate values of such a property?

How can the owners, the management company, and the employee union best work together to achieve successful business results?

How do the available financing and projected financial results compare for a condominium development's use versus a hotel development's use of the historic building?

Students generated and answered dozens of similar questions in the course of this particular project. The sources of information included interviews with everyone from owners to current managers to managers of competitors to line employees to guests. Students met with the head of the convention and visitors bureau, historic preservation commission, labor union officials, labor lawyers, and developers who had worked on similar projects. Research also included compilation of documentary materials from a wide variety of sources. By the end of the semester, through the analytical learning process, students gained substantive knowledge about how businesses work, mastered important business concepts, and recognized how methods of inquiry help elucidate complex business situations.

### **The Interpretive Learning Process in the PBL Project**

In the PBL project, affective learning occurs through an interpretive process as students recognize that their peers have different perspectives on the problem and as they begin to increase their self-awareness and self-management. By the end of the experience, students have discovered that few business decisions are made on purely rational grounds and that few action plans are implemented without encountering unexpected ethical quandaries.

*Recognizing multiple perspectives.* The interpretive learning process helps students explore multiple perspectives and recognize that wise decisions regarding what to do are also based on interpreting a set of affective sources. The project lets students talk to many constituencies involved in the project directly or indirectly to focus on others' ideas, not just their own, in solving a real-world problem. Housekeepers, desk clerks, and other line employees provide insights. Students must seek out, understand, respect, and interpret these variables to achieve good problem-solving results.

Furthermore, students work with a diverse group of team members. Each MMH class typically includes an even number of men and women, a wide range of ages, and 12 to 15 nationalities, with Americans in the minority. Undergraduate educational backgrounds range from art history to engineering, and although every student has several years of full-time work experience, the organizations for which they worked vary greatly. Individual students often develop a strongly held conviction about the ideal solution to the problem that the project explores. But in understanding different perspectives and working with team members, they gradually grow in what some call emotional intelligence: the ability to recognize others' contrasting viewpoints, to empathize even when disagreeing, and to use alternative ways of

thinking to reach a better solution (Boyatzis, Stubbs, & Taylor, 2002; Goleman, Boyatzis, & McKee, 2002).

***Increasing self-awareness and self-management.*** Emotional intelligence leads to the ability to monitor one's own behavior as well as recognize its impact on other people. With the insight gained about others' perspectives, students become more aware of how their own biases, personal styles, cultural backgrounds, and ethical foundations affect team members. Students who tend to dominate group discussion learn to restrain themselves, and passive students learn to take initiative. Several activities help increase self-awareness. After observing some team meetings in person and other meetings on videotape, a faculty facilitator leads discussions, replaying video clips so that students see themselves as others see them. Students write reflection papers, an activity that provides a concrete application of group dynamics principles that students studied in their organizational behavior course. Several times during the project, students evaluate their own and teammates' contributions and write constructive criticism, which the faculty facilitator consolidates and shares with each student. The role of the faculty facilitator is critical to ensuring that the interaction remains positive, constructive, and supportive.

Students' increased self-awareness also helps them make more informed personal decisions and helps them better manage their behavior (Boyatzis, 1994). This is particularly important in the multicultural, multinational team environment where members practice such skills as active listening, including withholding judgment. Students also learn to manage the use of humor; jokes, witty remarks, and friendly bantering are all culturally based and thus easy to misinterpret.

***Discovering that decisions are not always made on rational bases.*** A third way that PBL projects enhance affective learning is to reveal that, contrary to what textbooks suggest, business

decisions often are based on emotional as well as rational bases. Despite the emphasis on cognitive elements—careful analysis, thorough research, logical decision making—most of our PBL projects have included moments of revelation about the less-than-rational components of business decision making.

The two projects that involved historical preservation (Examples 5 and 6) included this element. Financial analysis alone often would lead to a decision not to renovate a historic building but to tear it down and use state-of-the-art construction methods and technologies in a new building. As students discussed the cultural values and architectural aesthetics of the buildings under consideration, they realized that intangible, as well as tangible, considerations go into wise decision making.

An even more striking example of the role of emotion in business decisions occurred in a project involving a wealthy individual who was considering developing a hotel complex (Example 1). Whether the hotel development made a profit was, in large part, unimportant to him given the extent of his wealth. Although he had a business purpose in mind for the development, his goals were not primarily financial. Thus, his decision criteria were not fully compatible with what students had learned in finance, marketing, and property-design courses. The internal rate of return—a critical decision element in most projects—was of interest but was not a major constraint. Some of the design decisions about the guest rooms were based not on consumer research but on the idiosyncratic preferences of the owner. As students talked to architects and developers of the project, they learned the extent to which decisions were based on multiple dimensions, some rational and some emotional.

***Confronting unexpected ethical conundrums.*** A fourth way that PBL projects provide affective learning is to raise ethical issues, which often juxtapose human and commercial values.

Many times, students discovered ethical conundrums or complex situations without solutions that would benefit all parties.

One striking example occurred in the New Orleans project (Example 7) in which owners of a convention hotel wondered whether to expand in anticipation of the major land-based casino's opening. Competitors had announced expansion plans, and space was available immediately adjacent to the existing property. If the project was approved, the existing hotel would have to close for 6 months, and most employees would be laid off. Unemployment benefits were limited, and many low-wage employees and their families would suffer by losing their incomes and health insurance. When meeting with the human resources director, students asked whether the company could keep everyone on the payroll during the closing. The director explained that with no revenue coming in, it was not fiscally responsible because the management company had legal and ethical obligations both to the hotel owners and, as a public company, to its shareholders.

Complicating the situation, the company wanted the employees to return to work when the renovation was complete. At that point, the company would need experienced employees. Students were shocked by what seemed to be a cold-hearted layoff that demonstrated the company's lack of loyalty to employees, combined with a campaign to persuade employees to be loyal to the company. Having talked with the line employees—housekeepers, maintenance people, cooks, desk clerks, and bell staff—students gained insight into the human dilemma, set in what at first appeared to be a straightforward business decision.

The situation provided the faculty with an unexpected educational opportunity. We prepared an assignment asking students to write the letter that the human resources director had told them he would send. In this letter, he needed to give notice of the layoff, required by law,

and at the same time convince the employees to remain loyal to the company by returning to work when the hotel reopened.

Each project raised different sorts of ethical questions and revealed the human impact of business decisions. From these PBL projects, students gained empathy for others in a way that traditional courses could not provide. The affective learning not only complemented the cognitive learning but also helped students develop the implementation skills that managers need.

### **Skills Development and Application in the PBL Project**

Our PBL model (Figure 1) suggests that cognitive, affective, and behavioral outcomes are interrelated. By expanding cognitive learning through an analytical learning process, students gain knowledge of business concepts, principles, and methods. By expanding their affective learning through an interpretive process, students gain the sensitivities to consider multiple perspectives and the impact of various options on constituencies. The synergy of cognitive and affective learning forms a solid base for the development and informed application of implementation skills: the ability and wisdom required to put plans into action, to lead teams, to resolve conflict, to convince others to support ideas, to communicate with multiple stakeholders, and to follow through. The team tasks that arise from the problem are the catalysts that encourage students to develop these skills.

Discussing action learning, Raelin (1997) asserts that two types of knowledge are important: explicit and tacit. Explicit knowledge, emphasized in most educational settings, is knowing that something is true. Tacit knowledge, often difficult to teach, is knowing how to do

something. Cognitive learning leads to explicit knowledge, whereas behavioral learning leads to tacit knowledge. But how are these types of knowledge connected in practice?

We assert that the consideration of affective sources through the interpretive learning process is the link. Knowing that (cognitive) a renovation decision should be based on financial analysis, combined with an awareness that (affective) factors such as employees' values and beliefs will affect their perceptions, leads to knowing how (behavioral) to respond. Behaviors, or the skills of implementation, involve such tasks as collectively developing decision-making criteria, reaching a team decision that maximizes positive outcomes for as many constituencies as possible, and communicating the proposal effectively. At the end of the semester, each team writes a comprehensive report and gives a multimedia presentation to the clients and faculty, all of whom provide feedback and evaluation of the results.

An example of this linking function of affective learning occurred in the project involving a decision of whether to renovate and reposition a New Jersey hotel located in a business park near many corporate headquarters (Example 3). The hotel's clientele consisted primarily of business travelers, many of whom stayed for weeks or months to attend nearby corporate training programs. By talking to these trainees, students gained insights into what it means to live for a long time in a hotel room. Most trainees were young, missed their families, and had grown tired of restaurant food. It is one thing to study in marketing class about the business traveler segment, but it is another thing to talk to business travelers and understand their perspectives. As part of this project, students also solicited the concerns of the line staff. Many were recent immigrants who commuted long distances, worked long hours, and earned low wages as they struggled to master a new language and support their extended families. The

workforce included a number of maintenance workers who were deaf, but few managers had learned sign language to communicate with them more effectively.

Through these interactions, students were better able to propose how to position the hotel to appeal to its target market of business travelers as well as how to modify working conditions without excessive expense to meet the needs of its workforce and thus to reduce turnover. Students combined cognitive learning (e.g., knowledge of internal rate of return and other finance concepts) with affective learning (e.g., empathy with guests' and employees' needs) to enhance their behavioral outcomes (e.g., to create a persuasive proposal and communicate it effectively to the clients). As this example shows, the greatest benefit of the PBL approach is that the synergistic interplay of cognitive and affective learning, set in the context of a real-world problem, helps students develop implementation skills that they can apply throughout their careers.

### **The Challenges of Assessment in PBL**

Most educators are familiar with assessing cognitive learning through written examinations and other measures that test students' knowledge. PBL's extended focus on the affective and behavioral domains, however, requires a significant shift in the way student learning is assessed. In addition, PBL is an iterative process; there is continuous change as participants learn through their experiences and then apply that learning in subsequent project tasks (Bernstein *et al.*, 1995; Vernon, 1995). This iterative process complicates the choices of time, place, and methods of assessment. Implementation of an effective PBL experience requires that educators focus on the challenges of assessment (Kazem & Cox, 1995). Therefore, this

section addresses several concerns that educators interested in adopting the PBL method may want to consider.

### **The Challenge of Assessing Affective Learning**

Although we have made a case for the significance of affective learning, outcomes in this domain remain the most difficult to assess because sensitivities and attitudes are intangible. Learners' diverse cultural backgrounds influence their interpersonal sensitivity and even the degree to which they recognize affective sources. Furthermore, students often do not immediately appreciate the extent to which they have increased their sensitivities or the multiple ways that this awareness improves decision making and leads to more effective and appropriate implementation strategies. Having become accustomed to measuring learning by grades on papers and examinations, students may not realize the extent of their affective learning until they have an opportunity to test themselves in the workplace.

Increases in students' self-awareness and self-management, a central goal of PBL, are particularly difficult to assess. To address this issue, we ask students to reflect continuously on how their backgrounds, styles, and characteristics influence their own and others' perceptions of their behavior. Insights gained through standardized self-assessments in the second-semester PBL project, for instance, help students better understand the behavior dynamics of their team. Continuous feedback, both from the faculty facilitator and teammates, provides further opportunities to check self-perceptions against the observations others provide. There are always a number of students, however, who resist such efforts. Regardless of the consistency in feedback from faculty, peers, and assessment instruments, some students reject all labeling of their behaviors or personal styles. Other students rely too much on standardized assessment

profiles to justify team conflict as inevitable and insoluble because of team members' inherent differences.

### **The Challenge of Assessing Skills**

Although faculty members are accustomed to setting high standards for cognitive learning within the context of their individual courses, skills-based behavioral learning, like affective learning, is more difficult to measure. With regard to skills-based learning, faculty must have a clear vision of what excellence looks like and must be able to distinguish high performance from simply accomplishing the task. In addition, philosophical and pedagogical issues come into question (McEnrue, 2002). For instance, will native and nonnative speakers of English be assessed using the same standards in oral and written communication?

An example of a skills-based assessment challenge in the PBL project concerns the most appropriate learning objectives for oral presentations delivered to clients and faculty. Should all team members participate to enhance their skills and highlight their contributions? Or should the goal be to impress the clients however possible, which might leave only the most accomplished speakers presenting the findings? For each scenario, what evaluation method is most accurate and fair? Educational goals sometimes conflict with the goal of making the project as real world as possible.

### **The Need to Situate and Balance Assessment Opportunities**

Two additional assessment challenges are readily apparent when PBL is introduced. The first concerns the degree to which student assessment can be situated in the PBL project itself rather than fragmented in individual courses offered concurrently during the project semester.

Although cognitive assessment in our program occurs most frequently in separate courses, skills assessment is divided more evenly between courses and the project itself. The final written project report and its oral presentation to the clients require students to synthesize learning from all functional areas. Evaluated by both clients and faculty, these reports provide the basis for an integrated assessment of PBL outcomes. Feedback on interpersonal skills, provided by the faculty facilitator to each student and to each team, as well as the feedback each student receives from his or her teammates, is entirely situated in the PBL project.

Assessment must also be balanced between team and individual performance. In our situation, as described above, cognitive learning is assessed individually through tests, cases, and papers. Affective learning focuses on the individual student and is assessed primarily through team project activities. Skills-based learning is assessed for individuals in course assignments and for teams in the PBL project reports. However, students receive less individual assessments of their skills as demonstrated in the PBL project because the majority of the deliverables are team products.

## **Conclusion**

Despite the challenges of PBL, we believe that after nearly a decade of rethinking and refining our application of this educational approach, its advantages far outweigh its drawbacks. Responses from alumni surveys as well as the rate of graduates' career advancement offer evidence that this approach provides substantial and sustained learning. Certainly, PBL consumes more faculty time, demands more resources, requires more coordination, and presents more assessment challenges than traditional methods. Yet as one early educator put it, history bears eloquent testimony to the fact that individuals who are dedicated to a compelling vision

and who possess the essential character and competencies can shake the world (Weaver, 1959). Students who have learned to stand up and take responsibility, who have confronted dilemmas, and who have emerged weary but undefeated find that as business leaders, they too can shake the world. As management educators, what more could we hope to accomplish?

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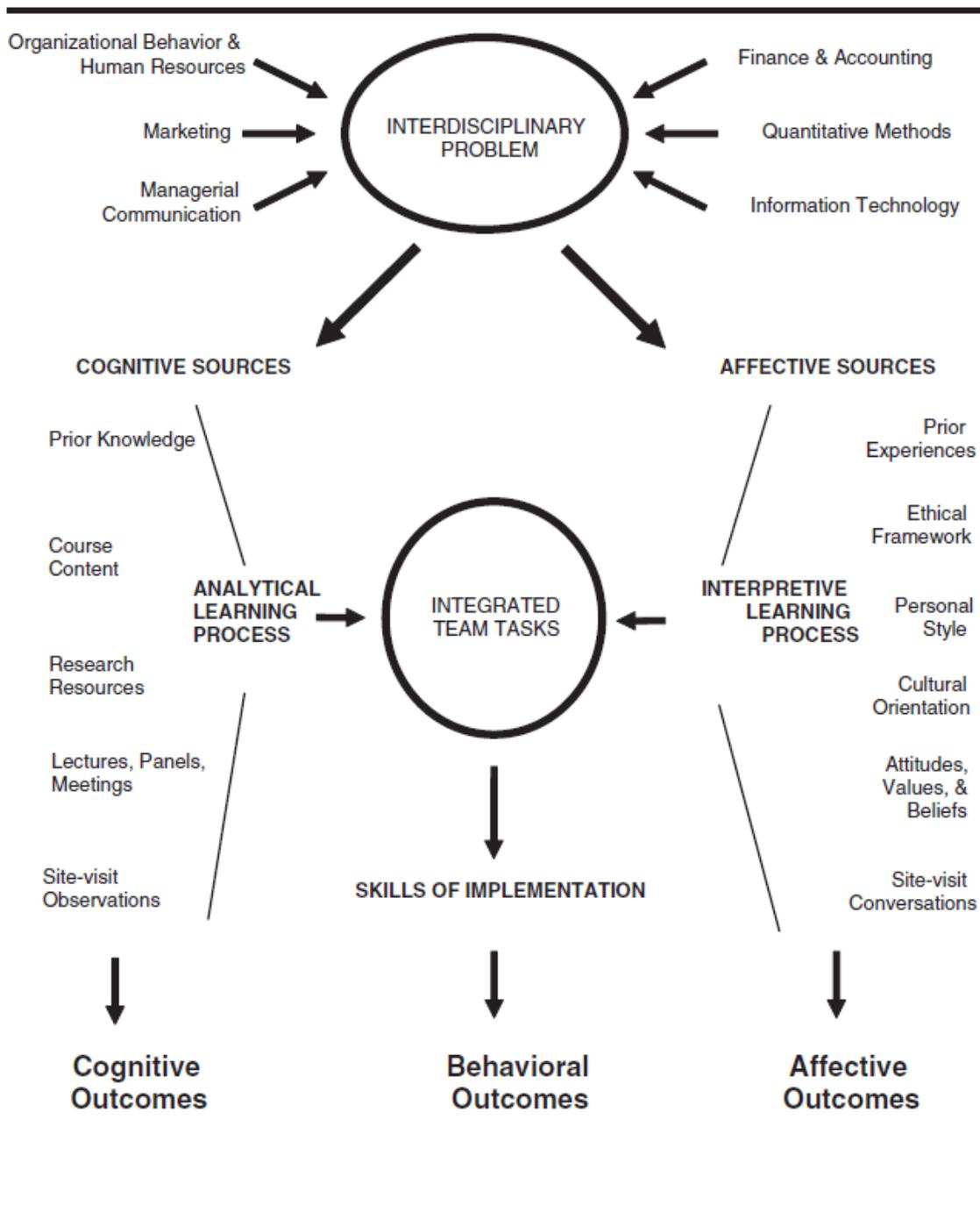
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**Table 1.** Examples of problem-based learning outcomes

<i>Cognitive Outcomes</i>	<i>Behavioral Outcomes</i>	<i>Affective Outcomes</i>
<i>Increase Knowledge</i>	<i>Increase Implementation Skills</i>	<i>Increase Awareness and Sensitivities</i>
Understand rational decision-making processes	Collaborate with others to identify, define, and solve business problems	Recognize people's perceptual differences
Increase factual knowledge	Interact effectively with all types of people	Increase ethical awareness
Know general principles of business	Conduct business research	Acquire greater interpersonal
Identify those general principles that apply to specific problems	Apply analytical methods to business situations	Increase awareness of impact that behavior has on others
Recognize those examples acquired through problem-based learning that are relevant to future problems	Deliver clear, organized written and oral reports	Shift from self-orientation to other-orientation
	Influence others' ideas, opinions, and actions	Recognize that not all business decisions are purely rational



**Figure 1.** Problem-Based Learning Model