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Learning to lead organizational change: assessment of a problem-based simulation in Thailand

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This paper presents findings of a study that evaluated the instructional effectiveness of a problem-based learning module constructed around a computer simulation, *Making Change Happen*™. The *Leading Organizational Change* (LOC) course sought to enable students in a graduate management program in Thailand to learn to lead complex changes in organizations. This research compared student evaluation data collected from 1696 students who studied the LOC class over a seven-year period with evaluations of other courses that employed problem-based learning and courses that used a variety of instructional methods. The results revealed that students' ratings of the LOC course were both consistently high in absolute terms, and significantly higher than the comparison courses. The learning design employed in the LOC course facilitates students' action-directed learning, enhances student engagement, and uses assessment methods that support student learning. While the study did not directly assess learning outcomes, the results suggest that the problem-based, simulation-centered approach employed in the LOC course successfully responds to key critiques leveled at education in the professions in general, and management education in particular.

Keywords: organizational change; simulation; problem-based learning; management development

Introduction

Over the past 30 years, the global demand for graduate education in the professions to meet increasingly ambitious goals has led to experimentation with a variety of innovative methods of learning in universities (Bridges 1977; Barrows and Tamblyn 1980; Bok 1989; Romm and Mahler 1991; Murphy 2006; Bates and Eacott 2008). For example, learner-centered approaches reported internationally in management education programs include case teaching (Christensen 1987; Romm and Mahler 1991; Garvin 2003; HBS 2008), problem-based learning (PBL) (Bridges and Hallinger 1995; Merchant 1995; Copland 2000; Sherwood 2004; Hallinger and Bridges 2007), cooperative and collaborative group learning (Nelson and Obremski 1990; Johnson, Johnson, and Smith 1991; Kimber 1996), and simulation-centered learning (Romme and Putzel 2003; Lean et al. 2006; Salas, Wildman, and Piccolo 2009). This experimentation with new learning designs in professional education is a positive development that needs to be augmented by more systematic empirical assessment (Feinstein

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2001; Major and Palmer 2001; Adobor and Daneshfar 2006; Steadman et al. 2006; Salas, Wildman, and Piccolo 2009).

This paper describes the design, implementation, and evaluation of a course, *Leading Organizational Change* (LOC) taught in a Master of Management program at a business school in Thailand. The LOC course was constructed around a problem-based, computer simulation, *Making Change Happen*™ (The Network Inc. 2007), that was designed to develop the capacity of learners to lead the implementation of complex changes in organizations (Hallinger 2007). We note that the capacity of leaders to bring about improvement in schools and companies has received increased attention internationally with the advent of globalization (Drucker 1995).

This report is organized around three main questions:

(1) How does the design of the LOC course facilitate learning to lead change?
(2) Do students perceive this problem-based, simulation-centered course as an effective approach to learning?
(3) Does the LOC course create a learning environment that responds to key facets of critiques leveled at management education in recent years (Milter and Stinson 1995; Mintzberg 2002; Starkey, Hatchuel, and Tempest 2004; Bennis and O'Toole 2005; Levine 2005; Murphy 2006; Hallinger and Bridges 2007; HBS 2008)?

This research employed a *post hoc* non-experimental design using course evaluation data assessing the instructional effectiveness of the LOC course over a seven-year period. Data from student evaluations of 71 class sections of the LOC course were compared with evaluations of courses that used other instructional methods. In addition to an overall assessment of course and instructor effectiveness, the analyses also examined data on several dimensions associated with features recommended for effective learning in professional education: action-directed learning, student engagement, and assessment for learning.

This research makes three specific contributions to the literature on management education and education in the professions. First, the study describes an innovative approach to learning to lead change, a key competency for modern management (Drucker 1995). Second the research contributes to the empirical knowledge base on the effectiveness of using simulations in management education (Faria 2001; Adobor and Daneshfar 2006; Strauss 2006; Salas, Wildman, and Piccolo 2009). Moreover, it extends this knowledge base by elaborating on an approach for enhancing the effects of computer simulation through the use of design principles borrowed from PBL (Romme and Putzel 2003; Sherwood 2004; Steadman et al. 2006; Hallinger and Bridges 2007). Finally, it contributes empirical data on the use of PBL in management education, an important complement to a literature that continues to be dominated by studies conducted in medical education (e.g. Major and Palmer 2001; Gijbels et al. 2005; Koh et al. 2008).

Problem-based management education

PBL is an action-directed learning approach that creates an experiential basis for situated learning of content knowledge and problem-solving skills (Barrows and Tamblyn 1980; Bransford 1993). PBL incorporates several key dimensions that distinguish it from other problem-oriented learning methods.

- PBL presents a problem as *the initial stimulus for learning*; students always receive the problem scenario to be solved prior to encountering the relevant knowledge content to be learned (Barrows and Tamblyn 1980).
- The PBL unit takes place in the form of a *time-limited project* that students complete while working in *self-directed learning teams* (Bridges and Hallinger 1995).
- The learning teams access a variety of *knowledge resources* in order to understand and develop solutions to the problem (Barrows and Tamblyn 1980).
- To the greatest extent possible, students are expected to demonstrate or implement their "solution" to the problem, not only write about what they would do (Hallinger and Bridges 2007).
- Assessment of student work emphasizes formative evaluation designed to enable and extend current and future learning (Hallinger and Bridges 2007).

The goals of a PBL curriculum include knowledge acquisition and application, formation of life-long learning skills, enhancement of problem-solving, decision-making and teamwork skills, and the development of affective capacities necessary for successful professional practice. These goals are significantly more ambitious than those of traditional graduate education programs have tended to focus primarily on knowledge acquisition (Bridges 1977; Bok 1989; Mintzberg 2002). Moreover, we assert that these goals address important limitations identified in published critiques of management education (e.g. Buckley, Wren, and Michaelson 1992; Mintzberg 2002; Starkey, Hatchuel, and Tempest 2004; Bennis and O'Toole 2005; Levine 2005; Murphy 2006).

Researchers have identified a number of positive outcomes associated with the use of PBL in higher education:

- Students studying in a PBL environment perform as well as students in traditional programs on tests of understanding of basic content, and also tend to demonstrate stronger results on understanding underlying principles.
- Students in PBL programs learn in a more active and engaging learning environment which leads to greater interest and effort as well as faster and higher rates of program completion.
- An explicit focus on the application of knowledge in PBL courses creates desirable attitudes among students such as learning for meaning rather than for reproduction of knowledge.
- There is also increasing evidence to suggest that PBL contributes to the development of stronger problem-solving skills. (Major and Palmer 2001; Gijbels et al. 2005; Koh et al. 2008).

The form of PBL that we describe in this study rests on six key principles: problem focus, cooperative group learning, self-directed tutorial groups, implementation focus, structured provision of learning resources, and multi-faceted performance-based assessment (Hallinger and Bridges 2007). These design components differentiate PBL from other methods of management education including case instruction as frequently used in business schools (Christensen 1987; Romm and Mahler 1991; Garvin 2003). We shall elaborate on these features as we describe the design of the LOC course.

The *Leading Organizational Change* (LOC) course

The LOC course employs a PBL design constructed around a computer simulation, *Making Change Happen*™. Thus, the instructional design seeks to exploit strengths of two related approaches to learning. In this section of the paper, we discuss the course structure, the design of the computer simulation, the learning process, and methods used to assess student learning.

Course structure

The LOC course was designed in the context of a graduate school of business (GSB) in Thailand that was undertaking a multi-year effort to design and implement a learner-centered curriculum. This initially entailed a redesign of core courses, development of a library of management-related video content, restructuring of capstone options, and faculty training in a variety of instructional approaches. The GSB admitted 375 new Master degree students annually and was committed to keeping average class size under 30 students per class. This decision resulted in the need to offer four to six class sections of core and capstone courses each term in order to accommodate student demand. This required multiple instructors for a given course. As part of the GSB's approach to quality assurance, the management made it an implementation priority for any course taught by several instructors to be taught in a similar manner. Thus, the three different instructors who taught the LOC course during the period of this research used the same curriculum content, learning sequence, and assessments.

Students in the Master of Management program were offered several capstone project options, one of which was a new Professional Practice Track. Students electing this capstone option were required to complete four six-week long PBL projects during their final two trimesters. The LOC unit was one of eight PBL projects from which students could choose. It was delivered as a six-week, 18 contact hour, 1.5 credit course graded on a High Pass, Pass, Retake, Fail[1] basis.

The LOC course was designed in line with the principles of PBL. Learning is largely student-directed with about two-thirds of classroom time devoted to self-directed, team-based activities. This is supplemented by periodic instructor-led mini-lectures and debriefings of the simulation, as well as structured team-to-team knowledge sharing (see Hallinger [2007] for in-depth description of the learning process). The learning process allows relevant conceptual frameworks to emerge out of the learners' collective experience of implementing organizational change as they play the simulation. The introduction of change theories by the instructor and through readings during the process of active problem-solving enables students to view theory as a practical tool (Bransford 1993). Thus, PBL serves as a pedagogical framework for use of the simulation in the LOC course.

The computer simulation: Making Change Happen™

The *Making Change Happen*™ (The Network Inc. 1997) computer simulation forms the core of the LOC course. It presents learners with a common, high impact problem to solve: implementation of a new information technology (IT) system in an organization. Although the simulation focuses on the implementation of a new IT system, lessons learned by students are broadly applicable to other types of organizational changes and innovations (e.g. re-organization, work process, merger).[2]

Students play the simulation in teams consisting of between two and four members. Each "project implementation team" is responsible for developing and applying a strategy for implementing the new IT system (named *IT 2020*) over a three-year period. The project team must develop and implement a change strategy that raises staff awareness of the new IT system, creates a broad base of staff interest, enables the staff to develop new skills, and generates commitment to using *IT 2020* effectively in their daily work.

Playing the simulation

After being introduced to the problem and their role, learners access other factual information concerning the change context. The project team will work with 24 people in two "pilot branches" as well as the head office (see Figure 1). The game screen (see Figure 1) displays relevant members in the pilot branches on the left-hand-side. Information on each staff member can be accessed by clicking on their icons. Descriptions of the staff members have been conceived taking into account a variety of factors including job position, social networks, organizational power and politics, personality type, and change adopter types (Rogers 2003). Successful implementation will depend upon the team's ability to understand the perspectives of these staff members towards the change (i.e. *IT 2020*) and respond with a strategy that addresses their personal concerns as well as organizational priorities, politics, and constraints (Hall and Hord 2001; Kotter and Cohen 2002).

Change activities are listed on the right side of the screen, again with clickable buttons providing access to information about the activity and its cost (see Figure 1).

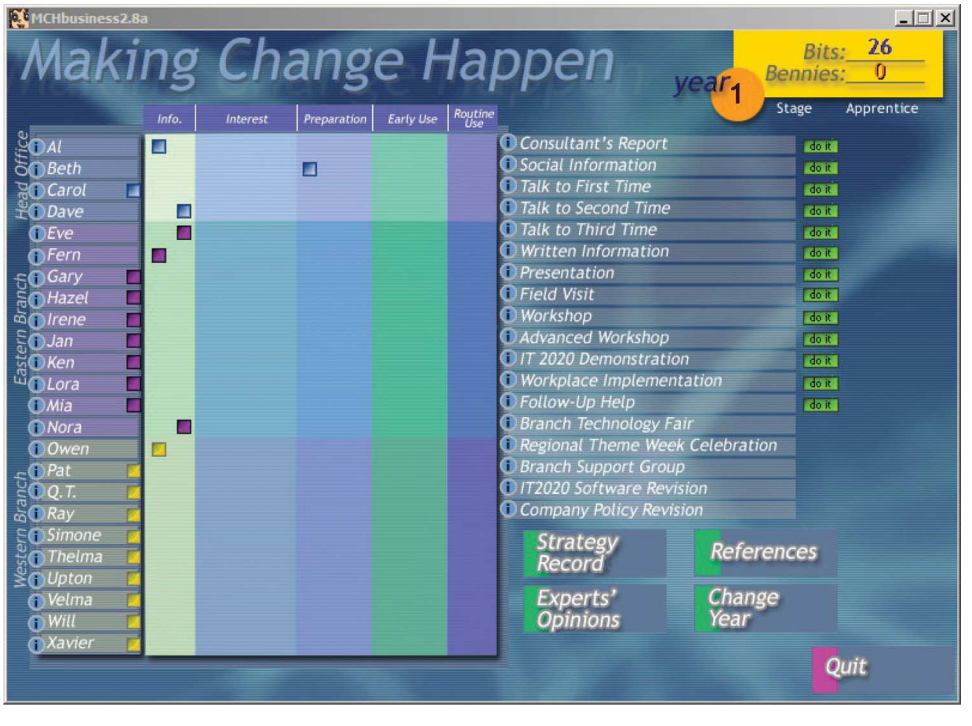

Figure 1. *Making Change Happen* game screen.

There are 16 change implementation activities that the teams can employ such as gathering more information, talking with people, distributing written information, conducting a presentation for staff about *IT 2020*, and holding a workshop, etc. The teams spend their annual budget on these activities until they run out of time or budget for a given year of implementation.

Listed across the top of the board are five stages of the change process: *Information*, *Interest*, *Preparation*, *Early Use*, and *Routine Use*. These stages of use are derived from Hall and Hord's (2001) *Concerns Based Adoption Model*. The game pieces representing the 24 staff members (see Figure 1) start "off the game board" because they have yet to begin the process of change. Few staff know anything about the *IT 2020* software system, except by rumor.

The teams have two goals in the simulation. The first is to move these 24 staff members from a state of knowing nothing about *IT 2020* to a stage of routine use of the new IT system in their work. The second is to gain productivity benefits (called Bennies) for the organization through the successful implementation of *IT 2020*. Bennies accrue during the simulation as staff members begin to use *IT 2020* in ways that increase efficiency and effectiveness.

A great advantage of the computer technology used with this simulation is that it allows seamless interactivity between the learner and the change context. The project team will "play" the simulation by considering first its strategy and then by selecting an activity to conduct with the staff members. Each time that a team "does" an activity in the simulation, several things happen:

- the cost of the activity is deducted from their budget;
- a feedback card pops up describing what happened in response to the activity;
- the game pieces representing staff members involved in the activity may (or may not) move one or more spaces across the game board;
- bennies, if any accrue from the activity, are recorded on the screen.

For example, after an activity has been implemented, the team receives immediate feedback describing what happened and why. The first time the team "Talks to" Al, Director of the Central Region, it receives the following feedback:

> Al is very busy. He is involved in other projects to improve the region's productivity and doesn't have much time to talk with you today. He suggests that you coordinate with MIS staff at the Head Office. On your way out he says, "I don't know they are always thinking up these new things for us to do." Al moves one space.

The first time that they "Talk to" Irene, she responds as follows:

> I just don't like computers. They're so impersonal. How can this new system help me anyway? And what will I do when the system breaks down and I have to get the credit reports out on time? Will I be blamed for the late report? Irene doesn't move at all.

Thus, unlike in a case teaching environment, the computer simulation offers learners the opportunity not only to analyze the problem, but also to implement their change strategy and see the results. Indeed, during the implementation process, the project team is confronted with widespread resistance to the mandated use of *IT 2020*. The nature, intensity and forms of the resistance vary based upon a variety of personal and organizational factors. The project team must deal with emergent obstacles arising

from resource constraints, politics, organizational structure, communication networks, corporate culture, and even "acts of God."

Team members usually find out that they must revise their initial strategy in order to meet the needs of the real situation. Over the course of the three-year simulated change implementation, the project team is able to "see" the results of their change strategy both in terms of staff usage of the new IT system and productivity gains. Thus, the team proceeds through a process of planning their strategy, implementing actions, getting feedback, reflecting on the results, and adjusting their strategy. Through the simulation, the team is able to see the *evolving results* of their strategy as the staff members begin to move through the stages of change.

Developing strategic thinking through the simulation

Use of the simulation in the LOC module enhances student capacity for strategic thinking by requiring them to engage in goal-setting and strategy formulation at the outset of each year of simulation play. Teams set annual goals that specify the desired rate of progress of staff through the stages of the change process (i.e. how many staff they hope to have in different stages of use at the end of the year) as well as the number of Bennies they hope to achieve by the end of that year. Learners begin to more explicitly link goals to strategies and results, strengthening their capacity to anticipate what could unfold in future and fostering deeper thinking about cause and effect relationships.

The underlying theoretical orientation of the simulation reinforces the point that each organizational context is different, and no single sequence of steps will bring about effective change in all situations. Therefore, memorizing or seeking to identify one best sequence is useless. As students play the simulation numerous times during the course, in the classroom and at home, patterns of action that characterize successful change begin to emerge. With the aid of instructor debriefings and structured intergroup sharing, these patterns gradually cohere into *principles* that underpin effective change strategies (see Hallinger 2007).

Effective learning in training programs often takes place when there is a culture of managers learning from each other (Cook 2006). When playing the simulation, with the provision of a complex multi-dimensional task, the project team members are more likely to feel that they need to rely on and mutually support each other in order to solve the complex problem. Therefore, cooperative interdependence within and between teams is enhanced. The strategies suggested by team members at each step draw upon their prior beliefs and experience as well as theory, thereby enhancing learning effectiveness (Buckley, Wren, and Michaelson 1992; Kimber 1996; Hallinger and Kantamara 2001; Hallinger 2007).

At the conclusion of the three-year simulation, team success is assessed in terms of the number of staff in the Routine Use stage of change and Bennies gained. Using these criteria, the project team's results are evaluated and assigned to one of six levels of expertise: Novice, Apprentice, Manager, Leader, Expert, Master. For each level, the simulation provides differentiated feedback on how the team could improve their strategy. The learning process used with the simulation seeks to link the principles that underlie effective change strategies to the results. By playing the simulation numerous times, the learners can "try out" different change strategies and evaluate them in light of results.

Note on adaptation of the simulation for different contexts

It should be noted that the original version of this simulation was based upon research on educational change conducted in North America. The simulation was subsequently adapted for use in different organizational (e.g. business) and cultural (e.g. Thailand, China, Korea, Malaysia) contexts. The process of adaptation has entailed conducting research into differences in how people respond to change in different organizational and cultural contexts. The findings were then used to revise descriptive information about the organizational context (e.g. roles, structure, culture) as well as the underlying decision rules (see Hallinger and Kantamara [2001] for a detailed description of the R&D process).

The version of the simulation used in the LOC course was the Thai business version (Hallinger 2007).[3] We would note, however, that other versions of the simulation have been used with success in management classes in other cultural and organizational contexts. In general, the instructional use of the simulation typically follows a pattern similar to the one described earlier regardless of the simulation version. Of course the length of time devoted to different tasks varies based on the time constraints of the instructional setting (e.g. a graduate course or a two-day management development workshop).

Assessment of learning

PBL emphasizes assessment that fosters learning (Hallinger and Bridges 2007). With this in mind, the LOC course employed methods of assessment that targeted teams and individuals, affective and skill competencies, and knowledge application as well as acquisition. Assessments included performance-based assessments as well as analytical papers and a test of knowledge acquisition.

First, each team writes a strategy analysis paper that describes their implementation goals, strategies, and results. The assignment requires the team to analyze its implementation effort by linking its intended goals and strategy to results. Students also reflect on their implementation in light of key theoretical content learned in the course (e.g. Hall and Hord 2001; Kotter and Cohen 2002; Rogers 2003). Without this assignment, students could master the simulation without learning to apply the underlying principles of organizational change.

Second, each student must complete the simulation one time individually. This provides an incentive for all students to practice the simulation during the course. Individual accountability also reduces the frequency of "free riders" within the teams (Johnson, Johnson, and Smith 1991; Bridges and Hallinger 1995; Hallinger and Bridges 2007).

In addition to the change strategy paper, all students write personal case studies that analyze specific changes being implemented in their own organizations. Students again draw upon theories of change, but in this assignment they must link lessons from the simulation-centered learning to their real-life experience. This fosters transfer of learning and allows assessment of individual students' depth of understanding at higher levels of thinking (Bransford 1993; Wagner 1993).

In order to foster development of teamwork skills, each team completes a Team Participation Assessment Form at the conclusion of the course.[4] The form is a four-level analytical rubric that asks each team member to rate other members' performance during the course on several teamwork competencies: responsibility, contribution of quality work, cooperation, and leadership. The completed rubrics are

scored by the instructor who then provides each student with a personalized summary that "anonymizes" the quantitative feedback from teammates. This offers individual students useful formative feedback and further strengthens team accountability since the rubric is made available to students at the start of the course.

There is a final exam which serves as a check on individual student understanding in a controlled environment. The first part of the exam is comprised of short answer questions that require analysis of a brief case. The second part consists of two short essay questions on which students apply key change principles to the change simulation. The final exam is useful primarily as a means of determining whether students can analyze and apply the fundamental knowledge of the LOC course.

We wish to make several final observations about this set of assessment tasks. First, they were designed to be comprehensive in scope both to meet the college's requirements for summative assessment in the Capstone portion of the curriculum to and foster continued learning. Second, this is a challenging amount of work for students to complete in six weeks. Third, based on our experience, the scope of work exceeds the assessment tasks for a typical three credit Master level course in most universities, and students were only taking the LOC course as a 1.5 credit module. Finally, with the exception of the final exam, student qualitative feedback consistently reaffirmed the utility of the other assessment tasks. We offer these remarks in order to offer perspective both for our later presentation of results on students' overall evaluations of the LOC course as well as on its approach to assessment of learning.

Research focus and methodology

This research was carried out in a Master of Management degree program offered by a graduate school of business in Thailand. The students participating in the program came from a variety of private, public, and education sector organizations. Most worked full-time and completed the program in two years. All courses were conducted with English as the medium of instruction.

Research focus

This study sought to evaluate the instructional effectiveness of the LOC course. The main research questions addressed included the following:

(1) Do graduate management students perceive the LOC course as an effective vehicle for learning to lead change in organizations?
(2) Does the simulation-centered LOC course provide a vehicle for effective teaching and learning?
(3) Does the LOC course create an action-directed learning environment?
(4) Does the LOC course engage students actively in their learning and to learn from each other as well as from the teacher?
(5) Does the LOC course use methods of assessment that contribute to learning?

Research design

This research employed a *post hoc*, longitudinal, non-experimental design in order to analyze the perceptions of students who studied the LOC course at the GSB. We examined seven years of data on the instructional effectiveness of the LOC using five rating dimensions: Overall Course Effectiveness Rating, Instructional Effectiveness,

Action-Directed Learning, Student Engagement, Assessment and Feedback. Ratings of the LOC course on these dimensions were analyzed both in absolute terms as well as in relation to ratings in Other PBL courses and all Other Courses (i.e. all other courses offered outside of the PBL Capstone Track).

Sample

The unit of analysis in this study is comprised of the course and its various class sections (i.e. a course could be offered in multiple sections within a term). We were interested in student responses on relevant course evaluation items for each class section of courses taught between June 2001 and September 2007. Since the GSB operates in a trimester system, the period of analysis included 19 trimesters. This period was selected because the PBL track, which includes the LOC course, was first incorporated into the GSB curriculum in the June term, 2001.

Table 1 includes the sample characteristics broken down into three groups of courses offered between 2001 and 2007: the LOC course, Other PBL courses, and Non-PBL courses. During the period of the study, the LOC course was taught a total of 71 times by three different instructors. Ratings from the students in these class sections were compared with the ratings obtained from students in 360 class sections of Other PBL courses, and 1461 class sections of Non-PBL classes.

The LOC course was taken by 1696 students of whom 1603 returned valid questionnaires. The data in Table 1 indicate a level of student response for each type of course that is greater than 95%. The response rates for each type of course meet or exceed the requirements for this type of research. The higher response rate for the PBL courses can be attributed to the fact that the administrator of the Professional Practice Track monitored the course results more closely than other program managers for the purposes of formative evaluation.

Instrument

This research employed the GSB's Course Evaluation Questionnaire administered to classes at the conclusion of each term. Course evaluation questionnaires are subject to numerous constraints as tools for research (Scriven 1988). Points of criticism include mixed purpose questions, item wording that biases student responses, overly long forms, overly general questions, comparative questions, inconsistent or biased procedures for administration and processing of forms, and methods of analysis that provide a distorted picture of results (Scriven 1988; Lyon and Hendry 2002). The designing and procedures for using the GSB's form sought to address these features that can threaten the validity of such scales. We further note that with the exception of the

Table 1. Summary of information about course sections, students, and response rates.

Student and courses: 2001–2007	LOC	Non-PBL	Other PBL	Total
Number of class sections	71	1461	360	1892
Average students per section	23.89	24.76	23.15	24.4
Total number of students	1696	36168	8335	46199
Total returned questionnaires	1603	29454	7481	38538
Response rate	95%	81%	90%	

addition of two additional questions in 2004, the GSB's form remained intact for the duration of the period of this study.

Moreover, we would note that the course evaluations were highlighted in discussions by students as part of the GSB's quality improvement effort. That is, students were told that the evaluation results would impact on instructor assignments to classes and it was their opportunity to express their voice. Over time, as instructor assignments *were* impacted by the evaluation data, students came to take the evaluations quite seriously.

The questionnaire was administered systematically by the GSB's academic support staff who were explicitly trained for the task. The form was administered at the last session of a course during a 15 minute period designated for this task. During the administration of the questionnaire, the instructor was required to physically leave the room. Completed forms were collected by the staff member rather than the instructor. Completed forms were sent to an external company for data entry. These procedures were designed with the goal of increasing the validity of student ratings (Scriven 1988).

A common pool of 11 items was drawn from the evaluation form, which consisted of 17 Likert items and two open-ended questions. The questionnaire used a five-point Likert-scale in which a higher score represents a greater extent or higher effectiveness. The items were categorized into five dimensions: (1) overall rating of the course, (2) instructor effectiveness, (3) action-directed learning, (4) student engagement, and (5) assessment and feedback.

The overall rating of *Course Effectiveness* consisted of a single item that directly asked students how they would rate the course. *Instructor Effectiveness* was defined as the professional knowledge and capacity to communicate, organize and present information effectively to students individually and collectively. This dimension was assessed through four items that asked students to rate instructors' knowledge in the subject, preparation for class, clarity of responses to students' questions, and overall rating of the instructor. The alpha coefficient for this scale was 0.95.

Action-Directed Learning was defined as the extent to which a course was able to bridge theoretical knowledge and practical application in the business context. This was measured by two items that asked students how well the course helped them to understand the subject and make the theoretical content practical. The alpha coefficient for this scale was 0.95.

Student Engagement represents the intensity and emotional quality of students' involvement in participating in the module's learning activities (Skinner and Belmont 1993). This was measured by two items that asked students to rate the extent to which the course allowed them to become actively involved in their learning and encouraged students to learn from each other. The alpha coefficient for this scale was also 0.95.

Assessment and Feedback was defined as the quality of course design in assessing students' learning and providing feedback on their efforts. This was assessed through the summarizing of two items that asked students to rate the class on the appropriateness of assignments and quality of instructor feedback. The alpha coefficient for this scale was 0.90.

Data analysis

Data analysis focused on two main issues with respect to the four research questions. First we sought to understand whether students reported that the LOC course

consistently met the criterion at a high standard? This was accomplished first through analysis of descriptive statistics. Second, we compared student perceptions of teaching and learning in the LOC course with other types of courses. We used independent samples *t*-tests to assess differences in student perceptions of the LOC on the five dimensions with Non-PBL courses and Other PBL courses offered in the college.

Results

We begin by presenting descriptive statistics for the three types of courses, noting trends in the results across all three types of courses over the seven years. First, the perceived effectiveness of all courses in the GSB improved during this seven-year period (see Figure 2). In 2001 the mean course effectiveness score for all courses was about 3.70 (see Table 2). As the GSB implemented a wide range of measures designed to improve teaching and learning quality, the mean score of all courses improved term-by-term, stabilizing at a level around 4.00 in 2004. This represented a statistically significant improvement from the baseline level four years after initiation of the quality improvement effort ($t = 8.16$, $p < 0.001$). This pattern of results is relevant because it suggests that the LOC course is being assessed against a high quality standard of teaching and learning (i.e. in terms of student perceptions).

Second, we also wish to call attention to the pattern of variance in the students' course ratings. It is our view that in statistical terms instructional effectiveness (or quality) is achieved when there are *both* high mean evaluation scores and low variance across instructors and courses. This pattern of results would suggest that students are receiving high quality instruction consistently across classes and over time. The perspective, borrowed from the literature on quality and quality improvement, suggests that it ought to be a goal of the GSB to ensure that as few students as possible are receiving "defective" or poor quality instruction.

Data in Table 2 and Figure 3 describe the consistency of student perceptions of course effectiveness *across courses over time*. The variance shown in Figure 3 (see

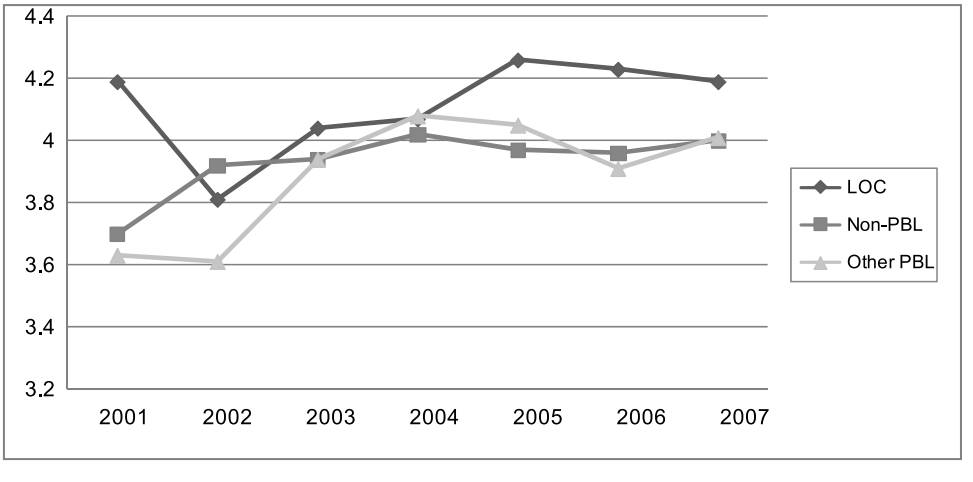

Figure 2. Trend of means of overall course effectiveness: 2001–2007.

Table 2. Measures' information, means, and standard deviations for assessment dimensions.

Dimensions	Number of items	Cronbach's alpha	2001 *M* (SD)	2002 *M* (SD)	2003 *M* (SD)	2004 *M* (SD)	2005 *M* (SD)	2006 *M* (SD)	2007 *M* (SD)	Total *M* (SD)
1. Overall Rating	1	—								
LOC			4.19 (0.32)	3.81 (0.27)	4.04 (0.18)	4.07 (0.22)	4.26 (0.15)	4.23 (0.22)	4.19 (0.25)	4.11 (0.27)
Non-PBL			3.70 (0.46)	3.92 (0.35)	3.94 (0.45)	4.02 (0.45)	3.97 (0.43)	3.96 (0.42)	4.00 (0.43)	3.92 (0.44)
Other PBL			3.63 (0.44)	3.61 (0.39)	3.94 (0.34)	4.08 (0.28)	4.05 (0.27)	3.91 (0.35)	4.01 (0.35)	3.90 (0.39)
2. Instructor Effectiveness	4	0.95								
LOC			4.29 (0.34)	4.02 (0.29)	4.24 (0.20)	4.32 (0.19)	4.41 (0.17)	4.45 (0.17)	4.40 (0.18)	4.30 (0.26)
Non-PBL			3.91 (0.40)	4.13 (0.31)	4.16 (0.37)	4.21 (0.41)	4.21 (0.38)	4.15 (0.41)	4.18 (0.42)	4.13 (0.40)
Other PBL			3.81 (0.35)	3.83 (0.35)	4.11 (0.31)	4.27 (0.26)	4.26 (0.26)	4.11 (0.31)	4.19 (0.34)	4.08 (0.35)
3. Action-Directed Learning	2	0.95								
LOC			—	—	—	—	4.37 (0.22)	4.34 (0.24)	4.29 (0.18)	4.33 (0.21)
Non-PBL			—	—	—	—	4.05 (0.44)	3.95 (0.47)	3.99 (0.48)	3.98 (0.47)
Other-PBL			—	—	—	—	4.16 (0.24)	3.98 (0.34)	4.07 (0.36)	4.05 (0.33)
4. Student Engagement	2	0.95								
LOC			4.16 (0.37)	3.91 (0.33)	4.20 (0.25)	4.16 (0.23)	4.35 (0.22)	4.33 (0.19)	4.32 (0.20)	4.20 (0.29)
Non-PBL			3.65 (0.40)	3.91 (0.34)	3.96 (0.40)	4.02 (0.45)	4.01 (0.41)	3.97 (0.42)	4.00 (0.43)	3.92 (0.43)
Other-PBL			3.71 (0.36)	3.64 (0.41)	4.00 (0.30)	4.13 (0.30)	4.18 (0.29)	4.01 (0.30)	4.07 (0.34)	3.97 (0.37)
5. Assessment and Feedback	2	0.90								
LOC			4.06 (0.21)	3.87 (0.21)	4.18 (0.18)	4.12 (0.17)	4.19 (0.20)	4.28 (0.19)	4.28 (0.15)	4.13 (0.22)
Non-PBL			3.60 (0.38)	3.84 (0.35)	3.89 (0.38)	3.95 (0.42)	3.94 (0.37)	3.91 (0.40)	3.96 (0.41)	3.87 (0.40)
Other-PBL			3.59 (0.30)	3.59 (0.35)	4.00 (0.34)	4.12 (0.28)	4.12 (0.26)	4.00 (0.30)	4.08 (0.32)	3.93 (0.37)

Notes: *M* = mean; SD = standard deviation.

also Table 2) suggests trends that complement the pattern of improvement in mean course evaluation scores. First, in general, both the LOC course and Other PBL courses demonstrated lower variance in the overall course rating across class sections than Non-PBL courses. Second, the LOC course showed a substantially smaller average standard deviation (i.e. 0.27) than Other PBL courses (0.39) and Non-PBL courses (0.44) across the seven year period. Moreover, the trend for the LOC course was quite stable over time. For example, during the last three years the mean course effectiveness rating was over 4.20 on a five-point scale with a variance of about 0.24. These data suggested a high level of stability and consistency in student perceptions of high course effectiveness for the LOC course over a substantial period of time regardless of the class section or instructor.

Nonetheless, we also acknowledge that the level of differences between the results for LOC and other courses was still relatively small in absolute terms (i.e. average difference of 0.20). Results of an independent samples *t*-test are shown in Table 3. These tests reveal that the differences in overall course effectiveness were significant when comparing LOC and both Non-PBL courses (mean difference = 0.19, $t = 5.50$, $p < 0.001$) and LOC with Other PBL courses (mean difference = 0.21, $t = 5.59$, $p < 0.001$). This provides greater assurance that the overall perception of high course effectiveness is meaningful in the context of the GSB's evaluation system.

Our next set of analyses explored the pattern of results associated with the LOC course on four dimensions of teaching and learning: instructor effectiveness, action-directed learning, student engagement, assessment and feedback. Results of independent samples *t*-test for the five dimensions of course assessment are presented in Table 3.

The results revealed significant differences between LOC and Non-PBL courses, and between LOC and Other PBL courses. Specifically, in comparison with students in Non-PBL courses, students who studied in LOC courses reported significantly higher instructor effectiveness (mean difference = 0.17, $t = 5.18$, $p < 0.001$), action-directed learning (mean difference = 0.35, $t = 7.53$, $p < 0.001$), student engagement (mean difference = 0.27, $t = 7.48$, $p < 0.001$), and use of assessment and feedback

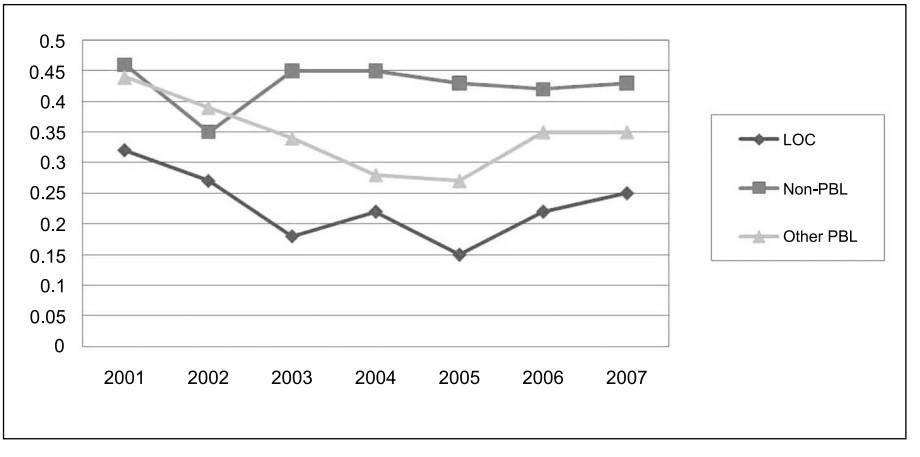

Figure 3. Trend of standard deviations of overall course effectiveness: 2001–2007.

Table 3. Independent samples *t*-test results of course assessment dimensions between LOC and non-PBL courses, and between LOC and other PBL courses.

Assessment dimensions	LOC versus Non-PBL			LOC versus Other PBL		
	Mean differences	*t*	Significance	Mean differences	*t*	Significance
Overall Rating	0.19	5.50	***	0.21	5.59	***
Instructor Effectiveness	0.17	5.18	***	0.21	5.90	***
Action-Directed Learning	0.35	7.53	***	0.28	5.58	***
Student Engagement	0.27	7.48	***	0.23	5.72	***
Assessment and Feedback	0.27	9.36	***	0.20	6.06	***

**$p < 0.01$; ***$p < 0.001$.

(mean difference = 0.27, $t = 9.36$, $p < 0.001$). Similarly, in comparison with students in Other PBL courses, students who studied in LOC courses reported significantly higher instructor effectiveness (mean difference = 0.21, $t = 5.90$, $p < 0.001$), action-directed learning (mean difference = 0.28, $t = 5.58$, $p < 0.001$), student engagement (mean difference = 0.23, $t = 5.72$, $p < 0.001$), and use of assessment and feedback (mean difference = 0.20, $t = 6.06$, $p < 0.001$). These results reinforce and extend the earlier findings with respect to perceptions of overall course effectiveness. That is, the LOC course was perceived by students to consistently demonstrate features associated with effective teaching, active learning, student engagement and effective assessment.

Discussion

We began this paper by citing important critiques of approaches to teaching and learning in management education programs. As far back as 1941, Charles Gragg at the Harvard Business School asserted that education in the professions must meet the standard of "preparing graduates for action" in their respective fields. Over the ensuing decades, this has led to persisting calls for the use of more active, practically-focused learning methods that enable graduates to use knowledge as a tool for solving real problems (Bridges 1977; Kolb 1984; Buckley, Wren, and Michaelson 1992; Bransford 1993; Romme and Putzel 2003; Levine 2005; Murphy 2006; Hallinger and Bridges 2007; Salas, Wildman, and Piccolo 2009). We note that even the Harvard Business School has in recent years accepted the need for significant adaptations to make case teaching more learner-focused (Harvard Business School 2008).

This paper presented the design and evaluation of a simulation-centered PBL module that focused on learning to lead organizational change. Competency in this domain is a high priority among leaders both in schools (Hall and Hord 2001) and in private sector organizations (Drucker 1995; Kotter and Cohen 2002). Yet, traditional approaches to teaching this management competency tend, at best, to emphasize analysis with relatively little attention paid to the complexities of implementation. The LOC course placed equal emphasis on analysis and implementation. Our approach to evaluating the LOC course assessed Master degree students' perceptions of overall course effectiveness, instructional effectiveness, action-directed learning, student engagement, and assessment and feedback.

Summary and limitations of the findings

Analysis of data collected over a seven-year period revealed that the LOC course achieved consistently high ratings with a low level of variance on overall course effectiveness. The mean rating on course effectiveness for LOC was significantly higher than the mean for Non-PBL and Other PBL courses in the Master degree curriculum. The same trends held when we compared the courses in terms of instructor effectiveness, action-directed learning, student engagement, and assessment and feedback. The findings suggest that these graduate students, a predominance of whom had working experience, found the simulation-centered, problem-based LOC course an effective way of learning to lead organizational change.

At the same time, we must keep in mind several limitations of this study. First, the research design was non-experimental, limiting our ability to identify cause and effect relationships. Thus, despite the clear pattern of significant results over a substantial period of time, we cannot definitively attribute differences in results to specific features of the LOC course such as the simulation or the problem-based design.

Second, we acknowledge that student perceptions represent an incomplete picture when assessing instructional effectiveness. Indeed, we are aware that instructors often voice skepticism about the validity of such assessments. For example, interpreting the "meaning" of a 3.70 versus a 4.20 score can be challenging.

Nonetheless, we wish to make several points in defense of the use of student course evaluations. We begin by noting the high reliability of the scale dimensions. While reliability does not confirm validity, it is a prerequisite condition. We further assert that student perceptions represent one valid indicator of instructional effectiveness. This is especially true in a highly competitive market environment, such as graduate management education in Thailand, where consumer behavior must be considered. While it is possible that an indiscriminate focus on student opinion of courses could lead to various types of distortion, data presented in this report argue against these interpretations.

For example, we noted that the workload in the 1.5 credit LOC course was equivalent to or exceeded the workload in 3.0 credit Non-PBL courses at the college. Moreover, student assessment was comprehensive and the quality standard expected in LOC was high. The LOC instructors issued the highest percentage of "retake" grades among the eight modules in the Professional Practice Track (not tabled). In sum, this was not a course that gave students an easy ride.

As suggested earlier, the interpretation of student evaluation scores also requires contextual knowledge. We should, therefore, elaborate that these scores were used extensively for decision-making on instructor assignments, rewards, and contract renewal. Over time both students and faculty members came to take these scores very seriously because they were treated as important data for decision-making. For example by 2004, when the college-wide mean had risen to 4.00, instructors whose evaluation scores were below 3.60 (one standard deviation below the mean) were considered below the GSB standard. While space constraints do not permit an in-depth discussion here, this perspective is consistent with the earlier stated goal of reducing variance in instructor evaluations across classes.

The final limitation lies in the fact that the study did not analyze data on knowledge acquisition or transfer of learning to management practice. Thus, while the pattern of student perceptions was stable and consistent over a long period of time, we can only conclude that the students found LOC engaging and useful.

Conclusion

In this concluding section we wish to place these findings in both theoretical and practical perspectives. At the outset of the paper we asserted that this study had the potential to contribute to our understanding of how computer simulations can be employed within a PBL framework to achieve goals posited for high quality management education. The data, while not definitive, does suggest the potential of this complementary set of learning methods, both of which employ experiential learning (Buckley, Wren, and Michaelson 1992).

We earlier noted that most of the Master degree students in this program had work experience. This enabled them to employ their working knowledge in solving the simulated problem and to test their assumptions against the principles and decision rules embedded in the computer simulation. In contrast, students without work experience appeared to use the common experience gained via the simulation as a substitute for the real world experience in managing organizational change that they lacked. This was consistent with our use of the simulation with undergraduate management majors in the United States and full-time MBA students in China. Thus, we suggest that both groups of students benefitted from the simulation, but in slightly different ways.

As Kolb (1984, 21–22) has asserted, the use of concrete, "here-and-now" experiences in concert with immediate feedback allows learners to test their assumptions and ideas. Cognitive psychologists and adult learning theorists posit this as a prerequisite step in the process of changing "theories-in-action" and actual practice in the workplace (Schön 1983; Kolb 1984; Buckley, Wren, and Michaelson 1992; Bransford 1993; Wagner 1993; Salas, Wildman, and Piccolo 2009). The simulation-centered approach appears to accomplish this by providing immediate feedback to student decisions via the computer. PBL contributed to this learning process through collegial discussions in the learning team concerning "what happened", and by periodic instructor-led debriefings that enabled students to share their "experiences" across teams and reflect on the pattern of results in light of theory.

The final issue we wish to discuss concerns the use of simulations and PBL in Thailand and other Asian countries. Internationally, the past two decades have witnessed an increasing emphasis on learner-centered approaches at primary, secondary and tertiary levels of education. This paradigm shift is also emerging in Asia, though many have noted implementation challenges in this cultural context (Walker, Bridges, and Chan 1996; Hallinger and Bridges 2007).

The findings from this study support the view that Thai students can adapt and thrive in a learner-centered environment when the situation is moderately structured around engaging content. Indeed, the broader pattern of findings reported on the Other PBL courses taught in the Professional Practice Track suggest that PBL was well received by students in the GSB. Indeed, despite the heavy workload required for the completion of four PBL modules, over time, the Professional Practice Track attracted over 80% of the GSB's students in the capstone portion of the curriculum. In our view, this was an endorsement of the learner-centered curriculum more generally and reinforced our view of the potential of both simulations and other PBL in professional education in the region.[5]

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Notes

1. The capstone option tracks (i.e. Professional Practice, Consultancy Project, Independent Research Study, and Thesis) were treated as equivalent. The other tracks, all of which existed prior to the development of the Professional Practice Track, employed a traditional final report and "oral presentation and defense" of the report. Students were often required to make minor or even major changes to their reports, as opposed to receiving a Fail. With this in mind, the grading scheme in the Professional Practice Track offered students who did not pass a module (e.g. LOC) the first time, to retake it one more time. This "mastery learning approach" met the criterion of equivalence across capstone tracks, allowed the instructors to maintain a high standard, and enabled students to progress at a rate that was suitable to their circumstances.
2. We note that in the education version of the simulation, IT 2020 is a new platform for using IT in teaching and learning.
3. Due the fact that the Master degree program was taught in English, an English language version of the simulation that employs decision rules based on the Thai context was used.
4. Note that this is separate from the Course Evaluation Questionnaire.
5. Although it goes beyond the scope of this study, the trend of findings reported here are very consistent with evaluation data collected on the use of the simulation-centered course with management students in Hong Kong, Malaysia, and China.

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