For publication in the Journal of Higher Education Policy and Management, *33*(3), 199–203.

Implementing Problem-Based Learning in Higher Education in Asia: Challenges, Strategies, and Effects[i]

Philip Hallinger[1]

Jiafang Lu[2]

Hong Kong Institute of Education

Keywords: Problem-based learning, leadership, curriculum implementation, curriculum change, organizational change, higher education

[1] Dr. Philip Hallinger is the Joseph Lau Chair Professor of Leadership and Change at the Hong Kong Institute of Education. He is also Director of the *Joseph Lau Luen Hung Charitable Trust Asia Pacific Centre for Leadership and Change*. He received his doctorate in administration and policy analysis from Stanford University. His research interests are in educational change and reform, organizational leadership, leadership development, and problem-based learning. His email address is Hallinger@gmail.com.

[2] Dr. Jiafang Lu is Research Assistant Professor in the *Joseph Lau Luen Hung Charitable Trust Asia Pacific Centre for Leadership and Change* at the Hong Kong Institute of Education. She received her PhD. in applied psychology from the Institute of Psychology, Chinese Academy of Sciences in Beijing. Her research interests are in leadership, change and work-life balance in organizations.

Abstract

During the past 30 years academic leaders have advocated for the adoption of 'pedagogies of engagement' in the hopes of increasing student involvement and retention, as well as learning outcomes in higher education. More recently, universities in Asia have joined this movement, despite barriers arising from cultural norms and teaching traditions that reify knowledge and reinforce status differentiation between teachers and students. This paper explores the implementation of problem-based learning (PBL), one pedagogy of engagement, in higher education in Asia. The research presents a longitudinal, mixed-methods case study of PBL implementation at a graduate school of business in Thailand. The data, collected over a 7-year period, suggest that implementation of a PBL track in the college's management curriculum was successful when judged on a variety of faculty and student indicators. Although the generalizability of case study findings are inherently limited, the statistical analyses suggest that PBL can positively impact instructional effectiveness in an East Asian context known for its reliance on traditional approaches to teaching and learning.

During the past 30 years academic leaders have advocated the adoption of 'pedagogies of engagement' (Edgerton, 2001) as a means of increasing student involvement and retention, as well as the capacity of graduates to apply knowledge and skills gained in tertiary education programs (Astin, 1999; Bok, 1989; Levine, 2005; Murphy, 2006; Smith, Sheppard, Johnson, & Johnson, 2005). This has led to increased experimentation with learner-centered pedagogies including problem-based learning (Barrows & Tamblyn, 1980; Boud, & Feletti, 1991; Bridges & Hallinger, 1993, 1995), cooperative learning (Kimber, 1996; Smith et al., 2005), simulations (Salas, Wildman, & Piccolo, 2009), and case teaching (Christensen, 1995; Garvin, 2003). Yet, these learner-centered approaches represent a major departure from traditional teaching practice and their implementation requires a significant commitment of resources without a guarantee of success (Boud & Feletti, 1991; Margetson, 1991; Hallinger, 2010; Hallinger & Bridges, 2007).

More recently, higher education institutions in East Asia have joined this global movement towards the use of more active teaching and learning methods. However, barriers arising from cultural norms and traditions that reify knowledge and reinforce status differentiation between teachers and students have made the change to learner-centered education even more challenging for universities in this region (Altbach & Umakoshi, 2004; Hallinger, 2010; Hallinger & Bridges, 2007; Hallinger & Lu, in press; Walker, Bridges, & Chan, 1996). Shaw elaborated on the manner in which these cultural norms impact attitudes towards teaching and learning in Asia.

> Blaming Asian schools for focusing on memorization -- as opposed to "thinking" – is too pat an excuse, as schools reflect the basic values of a society. It is ingrained in the Asian psyche that "correct" answers always exist and are to be found in books or from authorities. Teachers dispense truth, parents are always right and political leaders know better. (Shaw, 1999, p. 23)

Problem-based learning (PBL) is a learner-centered, constructivist method pioneered during the 1980s by medical educators (Barrows & Tamblyn, 1980; Bok, 1989; Engel, 1991). Subsequently, PBL migrated into other fields of higher education including architecture, nursing, education, law, engineering, and management (e.g., Bridges, & Hallinger, 1993, 1995; Brownell & Jameson, 2004; Major & Palmer, 2001; Smith et al., 2005). This study explores whether PBL can "work" in the context of higher education in Asia. The research employed a mixed-method, longitudinal, quasi-experimental design to analyze the implementation of a problem-based management curriculum at a graduate school of business (GSB) over a 7-year period in Thailand. The goals of this report are to:

- Discuss the context in which PBL was implemented,
- Describe the implementation process as it unfolded over seven years,
- Present evidence concerning the impact of PBL on faculty performance and satisfaction.

The study makes several contributions to the literature. First, it provides a detailed empirical examination of the process of curriculum change in higher education. Although the investigation focuses on the experience of a single school, quantitative analysis of a large longitudinal data set comprised of student course evaluations allows for a more robust set of findings than often derive from case studies.

Second, the study affords insight into the implementation and effects of problem-based learning in an Asian university. Asia currently represents the highest growth region of the world with respect to students entering tertiary education (Altbach & Umakoshi, 2004; Cheng, 2010). Despite

increased efforts by universities in the region to adopt pedagogies of engagement, our search of the literature found no published studies that evaluated the use of PBL in Asia. Thus, many continue to question the efficacy of using PBL and other pedagogies of engagement in the region.

Finally, the study contributes to the largely descriptive literature on problem-based management education (Bridges & Hallinger, 1993, 1995; Brownell & Jameson, 2004; Hallinger & Bridges, 2007; Sherwood, 2004). Although business schools have long been bastions of case teaching (Christensen, 1995; Garvin, 2003; Gragg, 1941), even these practice-oriented professional schools have been criticized for a lack of efficacy in producing learners capable of applying knowledge in the workplace (Ehrlich, 2009; Heskett, 2005; Mintzberg, 2002). This study offers among the first empirical evidence concerning the efficacy of problem-based management education.

What is Problem-based Learning?

The method that became known as PBL emerged in the 1980s and gradually metamorphosed into several related species. Despite these variations, we suggest that PBL has six defining characteristics:

1. The starting point for learning is a problem, not a theory.
2. The problem is one that students are apt to face in the workplace.
3. Curriculum units are organized around problems rather than subject disciplines.
4. Students assume a major responsibility for managing their own learning.
5. Most learning occurs in the context of small groups rather than lectures.
6. To the extent possible, students 'demonstrate' simulated solutions to the problem. (Hallinger & Bridges, 2007)

The advantage of this approach to learning is that students become more aware of how they can put the knowledge that they are acquiring to use. Prawat (1989) has suggested that adopting a problem-solving mentality, even when it is marginally appropriate, reinforces the notion that the knowledge is a useful tool for achieving particular goals. Students are not simply being asked to store information, but to examine how it is applied in particular situations. This increases accessibility of the knowledge when needed in the future.

Research, conducted primarily in medical education, provides increasing empirical support for the effectiveness of PBL (e.g., Dochy, Van den Bossche, & Segers, 2003; Major & Palmer, 2001; Norman & Schmidt, 2000). While the differential effects of PBL on learning fundamental knowledge appear to be non-significant, there is growing evidence that PBL produces positive effects on learning *principles* that underlie the application of knowledge (Dochy et al., 2003; Gibjels et al., 2005). Moreover, studies suggest that PBL produces a more engaging and motivational learning environment for students (Hallinger & Lu, in press; Major & Palmer, 2001; Norman & Schmidt, 2000; Smith et al., 2005). This leads to higher rates of student retention, more rapid program completion, and the development of more productive attitudes towards current and future learning (e.g., Colliver, 2000; Gibjels et al., 2005; Hallinger & Lu, in press; Major & Palmer, 2001; Newman, 2001; Norman & Schmidt, 2000).

Conceptualizing Instructional Effectiveness in a PBL Environment

The study's conceptualization of instructional effectiveness proposes that effective teaching should *motivate* students to *engage productively* in learning how to *apply knowledge*. The rationale for this was stated by Edgerton (2001) who claimed, "Learning 'about' things does not enable students to acquire the abilities and understanding they will need for the twenty-first century. We need new pedagogies of engagement that will turn out the kinds of resourceful, engaged workers and citizens that America now requires." Smith and colleagues (2005) elaborated on Edgerton's concept of 'pedagogies of engagement' by providing additional empirical support for the outcomes that accompany productive engagement in learning. This perspective towards instructional effectiveness informed the evaluation of PBL in this study.

Research Method

This study employed a mixed-method, longitudinal, quasi-experimental research design (Creswell, 2007; Yin 2008). Collection of qualitative and quantitative data unfolded concurrently, term-by-term over a 7-year period. Data analysis sought to provide a long-term, in-depth picture of PBL implementation at a Graduate School of Business located in Thailand. A key strength of this study's design lies in the longitudinal perspective on change gained through a combination of descriptive and analytical growth modeling of curriculum and instructional processes over a substantial period of time (Davies, 1994).

Data Collection

This study employed two main categories of data: qualitative data used to construct the implementation narrative and quantitative data employed to assess trends and effects of PBL implementation. Information used to construct the narrative of PBL implementation was drawn from two sources. First, the lead author was a participant in the PBL effort and maintained personal notes concurrent with implementation. Second, the research draws upon an array of formal and informal documents to construct the historical narrative and make sense of the quantitative results. Documents included a quality audit conducted in 2000, a report on faculty assessment practices, annual reports from the Coordinator of the PBL curriculum track summarizing the implementation results, and formative student feedback gathered from "Talk Back Sheets" collected at the end of every PBL module.

The main quantitative data collection tool employed consisted of GSB's Course Evaluation Questionnaire (CEQ) administered to students at the conclusion of each course. Course evaluation questionnaires are subject to a variety of potential problems when used in academic research (Aleamoni, 1999; Scriven, 1988). Nonetheless, a substantial body of research supports the reliability and validity of purposively designed, systematically administered course evaluation questionnaires (Aleamoni, 1999).

Questionnaire design and procedures for administering and using GSB's CEQ explicitly addressed features that threaten validity (Scriven, 1988). The CEQ was designed after a thorough review of scales used by other universities internationally, and in consultation with psychometricians. The CEQ was administered systematically by GSB academic support staff who received several rounds of training. During administration of the CEQ, instructors were required to physically leave the room and completed forms were collected by academic staff, not by instructors. Data were collated and entered electronically by an outside company. The academic staff handled these data

with great care since they were used as a critical tool for ongoing decision-making by the management team in the college.

The 15 item CEQ used a five-point Likert-scale in which a higher score represents greater extent or effectiveness. For the purposes of this study, 11 items were selected and categorized into five dimensions that were aligned with our conception of instructional effectiveness: 1) Course Effectiveness, 2) Instructor Effectiveness, 3) Action-Directed Learning, 4) Student Engagement, and 5) Assessment and Feedback. These formed latent indicators of faculty performance based on the perspective of students.

The rating of Course Effectiveness consisted of a single item that directly asked students how they would rate the effectiveness of the course. Instructor Effectiveness was defined as the instructor's professional knowledge as well as the capacity to organize and communicate knowledge effectively to students. 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 (alpha = .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 understand the subject and made theoretical content practical (alpha = .95).

Student Engagement represents the intensity and emotional quality of students' involvement in participating in the module's learning activities (Edgerton, 2001; Skinner & Belmont, 1993; Smith et al., 2005). This was measured by two items that asked students to rate the extent to which the course actively involved them in learning, and encouraged students to learn from each other (alpha = .95).

Assessment and Feedback was defined as the quality of assessment of students' learning and provision of useful feedback that contributes to learning. This was assessed through two items that asked students to rate the class on the appropriateness of assignments and quality of instructor feedback (alpha = .90).

Finally, the study employed an observed indicator of faculty job satisfaction with teaching in the PBL Track. Teaching in the PBL track made four special demands on faculty. They were required to follow the design and delivery principles of PBL, to work as part of an instructor team, to follow an agreed upon instructional sequence, and to use a common set of curriculum objectives, materials, and assessments. Instructors always had the option to switch from the PBL track into other courses. Indeed, most of the instructors teaching in the PBL track also taught non-PBL courses in other parts of the management program. Finally, we also need to clarify that although the decision to teach in the PBL track was voluntary, continuation was based upon performance results.

Therefore, in the context of this study we propose that faculty turnover in the PBL track represents a reasonable indicator of job satisfaction. The turnover rate was assessed by calculating the number of faculty members who left PBL module teams in a given term due either to dissatisfaction or poor performance divided by the total number of faculty members that had taught in the PBL track during the *prior* term.[ii]

Sample

The unit of analysis in this study is a course and its composite class sections. We employed data describing student perceptions of course sections taught between January term 2001 and

September, 2007 (i.e., 21 trimesters). Table 1 includes the sample characteristics for two groups of courses: PBL Courses and Other Courses. During the period of the study, courses in the PBL track were taught 395 times by 44 different instructors. Ratings from 9,213 student questionnaires obtained from these PBL class sections were compared with ratings obtained from 31,473 student questionnaires in 1,344 class sections of Other Courses.[iii] We are confident that the personal characteristics of students in the two groups of courses were essentially the same, since by the second year of implementation over 90% of students in the college were electing the PBL track. Table 1 indicates that the student response rate across class sections was greater than 80%, meeting the requirements for this type of research (Lyon & Hendry, 2002).

Insert Table 1 about here

Data Analysis

Data analysis focuses on several issues. First we describe the process of PBL implementation through reference to qualitative data drawn from the experience of the author and GSB documents. Second, the narrative description is complemented by quantitative analysis of student perceptions of PBL implementation over time using descriptive statistics and graphs. Third, we examine the extent to which change in student perceptions of PBL implementation were significant over time using Independent Samples t-Tests. Subsequent analyses exploited the longitudinal features of the data set through the use of growth modeling (Davies, 1994). We constructed mixed-effects models (Heck, Thomas, & Tabata, 2010) to assess the significance of change in student perceptions of the PBL Courses over time. Unlike the *t*-test, mixed models takes into account variability in individual instructors as well as variance in the change trend term-by-term. Finally, we assessed patterns of change in faculty turnover over the 7-year period. This measure of job satisfaction was graphed term-by-term for a period of 20 terms.[iv] This would reveal how faculty in the PBL responded to participation in the PBL track.

Narrative Chronology of PBL Implementation

The GSB was started in 1998 as the management school in one of Thailand's top-ranked universities. It was founded as a semi-independent unit in a government university that served more than 24,000 students. Initially, GSB offered the Master of Management degree (M.M.) taught in English, to 750 students annually in its international program. It later expanded to offer a Thai language M.M. program at a separate campus and a Ph.D. program at the main GSB campus.

From its inception, GSB was intended to be a center of innovation for the delivery of management education in Thailand. GSB was responsible on curriculum matters to the University Council of the parent university, but reported to its own separate Board of Trustees on matters of general policy. The college's mission to innovate was facilitated, in part, by its freedom from rules imposed by the government system.

Vision, Mission and Academic Organization

GSB's vision was to offer a personalized, learner-centered education that incorporated global and local perspectives on managing organizations. GSB's stated mission was to 'Develop students who are able to apply knowledge effectively in their work and in their lives.' The educational practices implied by this mission were reflected in the curriculum structure and facilities of the college.

Rather than offering a more structured MBA, GSB offered the M.M. degree in seven specializations (e.g., General Management, Entrepreneurship Management, Marketing and Management etc.). The rationale was both strategic (i.e., create a niche in underserved market segments), and consistent with GSB's learner-centered vision. The differentiation and course flexibility built into the M.M. programs gave students more options to tailor their education to individual preferences, one dimension of learner-centered schooling.

GSB facilities were purpose-built to foster student-to-student interaction. All classrooms were equipped with movable tables and chairs, state-of-the-art multi-media projectors, teacher workstations connected to the internet, and stereo sound systems. Maximum class size was set at 30 students. The combination of vision, mission, curriculum structure, purpose-built classrooms, and small class size was intended to create a new standard in graduate management education in Thailand and differentiate GSB from other local business schools (GSB, 2000).

Quality Audit in 2000

Despite this seemingly receptive context for innovation in teaching and learning, a quality audit conducted in its third year of operation (i.e., 2000) revealed a yawning gap between the GSB vision and reality. Most instructors kept the tables and chairs in a traditional classroom seating arrangement. The majority of class time was devoted to teacher-directed instruction broken up by occasional case discussions. Multi-media equipment was used for only the most basic function, electronic delivery of power point slides. Not a single instructor used the technology for multi-media cases or video-enriched content (GSB, 2000).

Although there was a formal curriculum on paper, the 'taught curriculum' was a randomly constructed and constantly changing amalgam of courses offered by part-time instructors from other local business schools. Selection of textbooks used in different 'class sections' of the same course varied with the instructors. Most instructors assigned American textbooks that offered few if any cases or activities that focused specifically on the Asian business context. An analysis of instructor assignments revealed a predominant focus on summative assessment of knowledge acquisition with little or no feedback beyond letter grades (GSB, 2000).

Students were required to complete either a 12 credit Thesis or a 6 credit Independent Study (IS) project during the capstone terms of the program (i.e., 4th and 5th trimesters). The audit noted, however, that the curriculum contained no research courses, and that these capstone options were not well aligned to the GSB mission preparation for professional practice.[v] Moreover, the largely part-time faculty was ill-prepared and even less committed to providing support for student research. Finally, the audit observed that despite a low assessment standard, many students in the first two intakes were floundering in the capstone phase (GSB, 2000).

Formulating a Change Strategy

In early 2001, when GSB managers deliberated on the findings of this audit, they concluded that the college was not organizing to take advantage of its strengths. These included the brand name of the university, GSB's location, the best-equipped classroom facilities in Thailand, a healthy budget, freedom to innovate, and small class size. Located in a highly competitive market and positioned at upper-mid range in terms of fees, the management team concluded that GSB's survival would depend on the ability to differentiate its program from other local business schools on the

quality of teaching and learning (see Hallinger, 2010 for in-depth analysis from a perspective of organizational change)**.**

Moreover, threats were imminent. An expanded enrollment of 465 students admitted in the 3rd intake were about to reach the capstone phase and would require research advisors. In addition, the quality audit had confirmed the worst fears of the GSB Board of Trustees concerning academic quality. Absent a defensible strategy and immediate execution, the President was poised to change the management team and institute tighter regulation.

At a management retreat in March 2001, after consideration of several options, the GSB management team decided to implement a PBL track during the capstone phase of the M.M. curriculum.[vi] They did not, however, seek formal approval for this curriculum change. This would have required six to nine months of deliberation with an uncertain outcome. The urgency to act led the management team to take a controlled risk and engage in "guerilla curriculum implementation" (Abbott, 1994). With strong support from the GSB Director, the team proceeded to implement the PBL track under the vacant capstone course title of *Consulting Practice*. Despite this resolve to innovate first and seek approval later, we note that the question of future curriculum approval (or lack thereof) loomed ever-present during the first year of implementation.[vii]

PBL Curriculum Design

Instructors were recruited for PBL module teams based upon expressed interest as well as likely problem domains to be included in the PBL track. The start of the June term was only a few months away so curriculum design began immediately. These faculty members attended a workshop at which the instructor shared information about PBL and specifications for the design of PBL projects. Subsequently, the faculty group involved in initial implementation (about 15 instructors) met twice a month to review progress. Module design teams met more frequently. A *Consulting Practice* Coordinator was assigned to oversee implementation, and two experienced users of PBL acted as coaches to the design teams.

Within problem-based learning, there are two major variants: problem-stimulated learning and student centered learning (Barrows & Tamblyn, 1980; Bridges & Hallinger, 1995). *Problem-stimulated* PBL provides more structure to students by specifying the learning objectives and identifying the core learning resources (e.g., readings, videos). The implementation team believed that problem-stimulated PBL would represent an easier transition for both instructors and students, and therefore, decided to use a problem-stimulated design template for curriculum units (Hallinger & Bridges, 2007).

Each PBL unit was built around a high impact problem from the local business context. Over the next several years the faculty designed and implemented eight PBL projects that came to comprise the *Consulting Practice Track*.

1. *Leading Organizational Change (OC):* A simulation-centered module on implementing change in a Thai company;
2. *Retail to e-tail (R2e)*: Changing the business model from retail to e-commerce in a traditional Thai SME;
3. *Strategies for Success (SFS)*: Developing successful business strategies in a highly competitive business environment;
4. *Data to Intelligence (D2i):* Managing and analyzing information in order to identify problems and make intelligent decisions;

5. *Reorganizing for Competitiveness (RfC):* Using strategic human resource management to strengthen the competitiveness of a traditional Asian SME;
6. *Employee Selection (ES):* Designing and implementing a staff selection strategy aimed at solving a personnel problem at a local company;
7. *Projects and People (PP):* Using skills in understanding people and project management to solve a business problem;[viii]
8. *New Product Positioning (NPP)*: Analyzing a market and presenting a plan on how to position a newly launched brand in a competitive market. (see Halligner & Bridges, 2007 for detailed descriptions of the PBL instructional units)

Students would select four modules to fulfill the capstone requirement in the *Consulting Practice Track*. Each module held class meetings three hours per week for six weeks (i.e., half of the 13 week term). Given the large number of students that subsequently chose the *Consulting Practice Track* as their capstone option, typically over 350 students per year, each PBL module team was comprised of several instructors. It was mandated that all instructors of a module use the same learning objectives, content, learning sequence and assessments in their class sections. This was non-negotiable and raised the level of interdependence among instructors to a degree that was unusual in higher education, at odds with current practice at GSB, and distinctly uncomfortable for some instructors.

Assessment posed another significant challenge. Grading in the *Consulting Practice Track* was designed to mirror grades used for IS and Thesis (i.e., High Pass, Pass, Revise, Fail). Students would have to pass four PBL modules in order to gain a Pass in *Consulting Practice*. The fact that students were studying in teams implied the need for methods of reliably assessing individual as well as team performance. Moreover, since the PBL projects resulted in the delivery of *products*, faculty needed training in performance-based assessment. Over time, this led to a system of assessment in the PBL track that exceeded assessment used for IS and Thesis in terms of scope, comprehensiveness and quality of feedback to students (GSB, 2004).

Initial Implementation

During the first year of implementation four modules were deployed. This was a case of curriculum development on-the-fly. New modules were being designed even as the first ones were being implemented. Copious formative feedback collected from students at the end of the module (i.e., every six weeks) was fed back to instructor teams as rapidly as possible in order to facilitate quick revisions for the next half-term classes.

Implementation challenges were continuous, especially in the first year when student choice of the PBL option far exceeded expectations. Subsequently, experience gained during the initial terms of implementation enabled new module development and delivery to proceed more smoothly. The positive response of students also gave encouragement to instructors.

Possibly the greatest challenge arose from the decision to require a common teaching approach from all instructors in a module team. Although this decision was initially made by the management team, student response to the PBL modules subsequently reinforced the logic of this decision. Students spoke continuously to their friends who were studying in other sections of the same module. They were highly sensitive to variations made by different instructors and voiced their displeasure when either the learning process or the standard differed visibly across module sections.

Consistency in implementation represented a 'tacit indicator' of educational quality in the eyes of students.

This issue generated continuous formal and informal debate among instructors during the early years of implementation. We note that the most experienced instructors (i.e., full professors) were often the least receptive to accepting either the validity of student perceptions of teaching or the requirement to follow a common methodology in course delivery. Over time, however, GSB faculty came to accept the validity of this point of view. Moreover, as the data show, faculty teams eventually achieved a high level of success in meeting this expectation of consistent delivery at a high level of quality (see Hallinger, 2010).

Assessment of Implementation Outcomes

Our analysis of PBL implementation monitored change in student response to the PBL courses over time and then compared them to Other GSB Courses on several dimensions of instructional effectiveness. Ratings of PBL Course Effectiveness for courses in the PBL track rose from an initial mean of 3.54 in the first term of implementation (i.e., June 2001) to a level of 4.06 by the end of the first year of implementation (see Figure 1). This positive change in ratings of Course Effectiveness for courses in the PBL track was substantial, meaningful in the context of the GSB, and statistically significant as confirmed by Independent Samples *t*-Tests (mean difference = .04, t = 1.51, p = n.s.). Moreover, as the graph suggests, the mean Course Effectiveness rating for PBL Courses stabilized at this higher level in subsequent years.

Insert Figure 1 about here

Figure 1 shows that the trend in Course Effectiveness ratings for PBL Courses mirrored a general improvement in these ratings across the college as other concurrent measures to improve teaching and learning gained ground**.** Both PBL Courses and Other Courses demonstrated significant improvement compared with a baseline for all GSB courses (mean = 3.62, SD = .59) in the term just prior to the implementation of the PBL track (i.e., January term 2000). To test the statistical significance of the growth trend, we established mixed-effects model by fitting higher order polynomials to Course Effectiveness over time. The results showed that the Linear term was significant (estimate of fixed effect =.04, $p < .001$). This reinforces the robustness of the finding of a consistent rate of growth in evaluations over the seven years. Significant results with the Quadratic term would suggest that the rate of growth or decline changed over time. However, a closer examination of estimates reveals that the magnitude of estimates were trivial (estimate of fixed effect = -.00, $p < .05$).

Independent Samples *t*-Tests confirmed that ratings of PBL and Other Courses in the college on Course Effectiveness were not significantly different (mean difference = .01, t = .29, p = n.s.). We interpret this finding to mean that the overall level of course effectiveness in the college improved dramatically over time. A variety of different innovations aimed at fostering active learning were resulting in increased levels of instructional effectiveness across the college. For the purpose of subsequent analyses that compare PBL and Other Courses, this suggests that the PBL Courses are being assessed against a high standard.

We next highlight the pattern of change in Instructor Effectiveness ratings for PBL Courses over the period of implementation (see Table 2). Initial student ratings of Instructor Effectiveness in

PBL Courses were lower than for Other Courses. Moreover, improvement of PBL courses on this dimension lagged behind a more general improvement in ratings of Instructor Effectiveness in Other Courses during the first three years of implementation. However, by the fourth year of implementation, student perceptions indicated that Instructor Effectiveness in the PBL track equaled or exceeded Other Courses term-by-term and year-by-year. Results of mixed-effects model reinforced the finding of a consistent rate of growth in evaluations of instructor effectiveness over the seven years. The Linear term was significant (estimate of fixed effect = .04, $p < .001$), while the Quadratic term was significant but trivial (estimate of fixed effect = -.00, $p < .001$). These findings suggest that it took more time for instructors making the *change to PBL* to fully develop their competence and confidence than instructors outside the PBL track who were free to choose from an eclectic array of instructional strategies.

Insert Table 2 about here

Understanding patterns of variation in course ratings offers an essential complement to the analysis of mean scores (Scriven, 1988). For example, we note first that both groups of courses demonstrated significantly lower variance in Course Effectiveness ratings than the baseline prior to implementation of quality improvement measures (i.e., SD = .59). Second, courses in the PBL track demonstrated significantly lower variance (7-year average SD = .31) than Other Courses (7-year average SD = .42) over a substantial period of time. Third, the magnitude of variance among PBL Courses tended to decrease more consistently over time (see Table 2 and Figure 2). Taken together, these data suggest a significant improvement to a high standard as well as more consistent growth and greater stability in the delivery of the PBL Courses over the seven years.

Insert Figure 2 about here

Another useful portrait of consistency in implementation is shown in Figure 3 which details the term-by-term standard deviation associated with Course Effectiveness ratings of individual PBL modules. This graph reinforces the conclusion that it took several years to achieve a reasonably high level of stability of implementation within and across modules in the PBL track. Again, we note that because modules in the PBL track were taught by instructional teams, they placed greater demands on instructor time for collaboration as well as communication to maintain a high level of consistency in delivery.

Insert Figure 3 about here

These analyses established that the trend of PBL implementation was positive, with improvement in the level and stability of Course and Instructor Effectiveness over time. Next we examined the trend of change for the more discrete dimensions of instructional effectiveness. The estimates of intercepts and fixed effect factors for each assessment dimension are presented in Table 3. The significant results for the Linear term reinforce the finding of consistent growth in evaluations of instructional effectiveness over the seven years. Involvement in PBL Courses monotonically increased student perceptions on Course Effectiveness (estimate of fixed effect = .12, $p < .10$), Action-Directed Learning (estimate of fixed effect = .12, $p < .05$), Student Engagement (estimate of fixed effect = .16,

$p < .01$), and Assessment and Feedback (estimate of fixed effect = .15, $p < .01$). We accept these results at a significance level of .10 because the magnitude of the effects conveyed meaningful practical significance in this context (Schutz, 1966).[ix]

Insert Table 3 about here

This impression of the pattern of change in instructional effectiveness is further complemented by reference to data on faculty turnover. Note that the shape of the change trend in the graph in Figure 4 is remarkably similar to the shapes in Figures 1, 2 and 3. The data reveal a high turnover rate in the first year (i.e., over 30%), followed by a stable level of low turnover in teaching teams in subsequent years (i.e., average turnover rate 7.62%).

Insert Figure 4 about here

This suggests that the change to the PBL methodology and the increased interdependency required in GSB's implementation strategy represented the greatest shock at the initial stage. Subsequently, instructors who considered joining PBL module teams had a clearer understanding of what was entailed beforehand. Moreover, when new instructors joined established module teams, the module's faculty leader typically acted as a coach providing support during the first few terms. While these data also confirm that PBL was not suited to all instructors, the low turnover rate suggests a high level of commitment and job satisfaction among those who taught regularly in the PBL track.

Conclusion

This study sought to offer insight into the implementation of problem-based learning in an Asian institution of higher education. Limitations of the study include the use of a quasi-experimental design to evaluate a single educational program in East Asia, and absence of 'hard-evidence' on learning outcomes. Given the research design and unique characteristics of this particular setting, generalizations of findings to other institutions in Asia, or elsewhere, must be made with caution.

Nonetheless, the case study method offered in-depth description of program implementation (Yin, 2008). In addition, application of inferential growth modeling with a large longitudinal data enabled us to go beyond simple description of the implementation process (Davies, 1994). Employed in tandem, these methods provided a robust picture of the challenges, strategies and effects of implementing a PBL curriculum track in East Asia.

The findings clearly indicate that *the Asian students in this setting* responded positively to 'pedagogies of engagement' (see also Hallinger, 2010; Hallinger & Lu, 2010). This conclusion was supported by data on Course and Instructor Effectiveness for *both* the PBL and Other Courses offered in the college. GSB's implementation of PBL was only one of several strategic initiatives aimed at creating a more active, practice-oriented learning environment in the college. Judging from student responses on the CEQ, these change initiatives appear to have been successful. Moreover, results from growth modeling tests indicated consistently stronger performance on Course Effectiveness, Action-Directed Learning, Student Engagement and Assessment and Feedback for courses in the PBL track. This finding from a strong longitudinal analysis bolsters the belief that

PBL offers specific advantages for creating an active learning environment that engages students productively.

Another quantitative indicator of the positive response to PBL by these Asian graduate students is suggested by student enrollment in the three capstone options (i.e., PBL, IS, Thesis). By the third year of PBL implementation, the proportion of the annual student intake that elected the PBL capstone option consistently ranged from 90% to 95% (not tabled). Students were 'voting with their feet' further suggesting that PBL was realizing its potential.

Students were not, however, choosing the PBL option due to either easier grading or a lighter workload. Due in part to pressure to perform resulting from the 'guerilla implementation' strategy, faculty members in the *Consulting Practice* track treated assessment with particular seriousness. Moreover, since there was a grading option of Retake[x] in the *Consulting Practice* track, module instructors felt no pressure to award a Pass for sub-standard work. In the early years of implementation, a Retake rate of 10% to 15% in a PBL module was quite common as instructors sought to establish a high quality standard and gain legitimacy for the PBL capstone option.

Moreover, the workload in each 1.5 credit PBL module equaled or exceeded the workload for a typical 3 credit, trimester-long course. Even so, student qualitative feedback consistently confirmed the utility of the module products and performance-based assessments. For example, a formative assessment instrument used routinely in combination with the summative CEQ at the end of each PBL module asked, "Would you recommend that any feature of this module be revised or eliminated?" Suggestions for reduction of the workload (e.g., products) only surfaced when the instructors had failed to provide sufficient feedback to students on the performance assessments. In such cases, however, student response could be fierce. This pattern of response suggested that students accepted the heavy workload as long as they viewed the products as useful *and* instructors fulfilled their role in offering useful feedback. We note that this interpretation is supported by the quantitative data presented above whereby PBL courses obtained consistently higher results on the Assessment and Feedback dimension of the CEQ.

In closing, we observe that this study supports an interpretation of organizational change as a "long-term process, not an event" (Hall & Hord, 2002). The longitudinal nature of the data set made it possible to see this feature of implementation with a clarity that would have been impossible with cross-sectional data, or even in a case study of a whole year's duration. The data revealed that GSB's *adoption* of PBL as a capstone option was only the first step in a long implementation process. Design and revision of the PBL modules, gaining mastery over a new method of teaching in the classroom, learning to use performance-based assessment, and managing multiple sections of multiple modules with multiple instructors at a high quality standard required a collective effort sustained over a long period of time. It also required persistence by GSB managers and faculty members in the face of competing pressures for research productivity), turnover of the GSB Director, move to a new campus, and merger of the International program with a separate Thai language division of GSB.

No less significant, implementation involved 'swimming upstream' against an organizational culture that valued faculty autonomy and satisfaction above results for students, a strong cultural norm of Thai universities. In retrospect the decision to require a common approach to teaching among instructors of a PBL module, was an ambitious gamble that paid off McLaughlin's (1990) observation that, "You can't mandate what matters to people, but what you mandate matters," applies to the implementation strategy employed at GSB. Not every faculty member was willing to

accept a reduction in autonomy when teaching in the PBL track, and this did result in high turnover at the initial stage of implementation. However, this policy mandate created a structure for faculty collaboration that became a college norm over time both for faculty and students.

Seven years after initiation of the College's quality improvement effort, the data suggest changes in the core values of the GSB culture. Despite a heavier workload and increased interdependence among instructors, levels of faculty turnover in the PBL track were very low. Mirroring trends in student satisfaction (i.e., choice of the PBL capstone option) and faculty performance (i.e., student perceptions of instructor effectiveness), faculty job satisfaction also appeared to increase significantly over time among those who taught in the PBL track. Thus, we conclude that both students and instructors came to value the benefits of increased use of pedagogies of engagement in higher education.

References

Abbott, J. (1994). Guerilla quality management. *Education, 114*, 12-19.

Aleamoni, L. (1999). Student ratings myths versus research facts from 1924 to 1998. *Journal of Personnel Evaluation in Education, 13*(2), 153-166.

Altbach, P., & Umakoshi, T. (2004). Asian universities: Historical perspectives and contemporary challenges. Baltimore, Maryland: John Hopkins University Press.

Astin, A. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 40*(5), 518-529.

Barrows, H., & Tamblyn, R. (1980). *Problem-based learning: An approach to medical education.* New York: Springer.

Bok, D. (1989). Needed: A new way to train doctors. In H. Schmidt (Ed.), *New directions for medical education* (pp. 17-38). New York: Springer Verlag.

Boud, D., & Feletti, G. (1991). *The challenge of problem-based learning*. New York: St. Martin's Press.

Bridges, E., & Hallinger, P. (1995). *Implementing problem-based learning in leadership education.* Eugene, OR: ERIC Clearinghouse for Educational Management.

Bridges, E. & Hallinger, P. (1993). Problem-based learning in medical and managerial education. In P. Hallinger, K. Leithwood, and J. Murphy (Eds.), *Cognitive perspectives on educational leadership* (pp. 253-267). New York: Teachers College Press.

Brownell, J., & Jameson, D. (2004). Problem-based learning in graduate management education: An integrative model and interdisciplinary application. *Journal of Management Education, 28*(5), 558-577.

Cheng, Y.C. (2010, January). *Building capacity for school leadership research and development in the Asia-Pacific region.* Paper presented at the Asia Leadership Roundtable 2010, Hong Kong Institute of Education, Hong Kong.

Christensen, C. (1995). *Teaching and the case method: Text, cases and readings*. Boston: Harvard Business School.

Colliver, J. (2000). The effectiveness of problem-based learning curricula: Research and Theory. *Academic Medicine, 75*, 259-266.

Creswell, J. (2007). *Designing and conducting mixed methods research.* Thousand Oaks, CA: Sage.

Davies, R. (1994). From cross-sectional to longitudinal analysis. In R. Davies and A. Dale (Eds.), *Analyzing social & political change: A casebook of methods* (pp. 20-40). Newbury Park, CA: Sage.

Dochy, F., Segers, M., Van den Bossche, P., Gijbels, D. (2003). Effects of problem-based learning: A meta-analysis. *Learning and Instruction, 13*, 533–568.

Edgerton, R. (2001). *Education white paper*. Report prepared for the Pew Charitable Trusts, Pew Forum on Undergraduate Learning. Washington, DC.

Ehrlich, T. (2009, January). The business of business education is more than business. *Carnegie perspectives: A different way to think about teaching and learning.* Retrieved June 30, 2009 from http://www.carnegiefoundation.org/ perspectives/ business-business-education-more-business.

Engel, C. (1991). Not just a method, but a way of learning. In D. Boud & G. Feletti (Eds.), *The challenge of problem-based learning* (pp. 23-33), New York: St. Martin's Press.

Garvin, D. A. (2003, Sept.-Oct.). Making the case: Professional education for the world of practice. *Harvard Magazine.*

Gragg, C. (1941, October 19). Because wisdom can't be told. *Harvard Alumni Bulletin*. Reprinted by Harvard Business School, HBS Case #451-005.

GSB. (2000). *Academic quality audit report*. Unpublished report presented to the Board of Trustees. Bangkok, Thailand: School of Business.

GSB. (2004). *Report on assessment methods used in the Graduate School of Business*. Unpublished report to the Director. Bangkok, Thailand: School of Business.

Hall, G. & Hord, S. (2002). *Implementing change: Patterns, principles, and potholes.* Needham Heights, MA: Allyn and Bacon.

Hallinger, P. (2010). Design and evaluation of performance-based faculty evaluation in higher education in Thailand. *Educational Assessment, Evaluation and Accountability, 22,* 253-274.

Hallinger, P., & Bridges, E. (2007). *Problem-based management education: Developing "managers for action."* Dordrecht, Netherlands: Springer.

Hallinger, P., & Lu, J. F. (in press). Assessing the instructional effectiveness of problem-based management education in Thailand: A longitudinal evaluation. *Management Learning*.

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2010). *Multilevel and longitudinal modeling with IBM SPSS.* New York: Routledge Academic.

Heskett, J. (2005, July 4). How can business schools be made more relevant? *Harvard Business School Working Knowledge for Business Leaders*, http://hbswk.hbs.edu/item/4886.html.

Kimber, D. (1996). Collaborative Learning in management education: Issues, benefits, problems and solutions: A literature review. *Ultibase Articles*. http://ultibase.rmit.edu.au/ Articles/june96/kimbe1.htm.

Levine, A. (2005). *Educating school leaders*. The Education Schools Project.

Lyon, P., & Hendry, G. (2002). The use of the course experience questionnaire as monitoring evaluation tool in a problem-based medical programme. *Assessment & Evaluation in Higher Education, 27*(4), 339-352.

McLaughlin, M. (1990). The Rand change agent study revisited. *Educational Researcher, 5*, 11-16.

Major, C., & Palmer, B. (2001). Assessing the effectiveness of problem-based learning in higher education: Lessons from the literature. *Academic Exchange, 5*(1), 1-2.

Margetson, D. (1991). Why is problem-based learning a challenge? In D. Boud & G. Feletti (Eds.), *The challenge of problem-based learning* (pp. 42-50). New York: St. Martin's Press.

Mintzberg, H. (2002). *Managers, not M.B.A.s*. San Francisco: Berrett-Kohler.

Murphy, J. (2006). *Preparing school leaders: An agenda for research and action*. Lanham, MD: Rowman & Littlefield.

Newman, M. (2001). How effective is problem-based learning? *Education for Health, 14(*2), 333-334.

Norman, G., & Schmidt, H. (2000). Effectiveness of problem-based learning curricula: Theory, practice, and paper darts. *Medical Education, 34*, 721-28.

Prawat, R. (1989). Promoting access to knowledge, strategies, and disposition in students: A research synthesis, *Review of Educational Research, 59*(1),1-41.

Salas, E., Wildman, J., & Piccolo, R. (2009). Using simulation-based training to enhance management education. *Academy of Management Learning & Education, 8*(4), 559–573.

Schutz, R. (1966). The control of "error" in educational experimentation. *The School Review, 74*(2), 150-158.

Scriven, M. (1988). The validity of student ratings. *Instructional Evaluation, 92*(2), 5-18.

Shaw, S.M. (1999, May, 31). It's true. Asians can't think. *Time*, 23.

Sherwood, A. (2004). Problem-based learning in management education: A framework for designing content. *Journal of Management Education, 28*(5), 536-557.

Smith, K., Sheppard, S., Johnson, D., & Johnson, R. (2005). Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education, 94*(1), 1-15.

Walker, A., Bridges, E., & Chan, B. (1996). Wisdom gained, wisdom given: Instituting PBL in a Chinese culture. *Journal of Educational Administration, 34*(5), 12-31.

Yin, R. (2008). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.

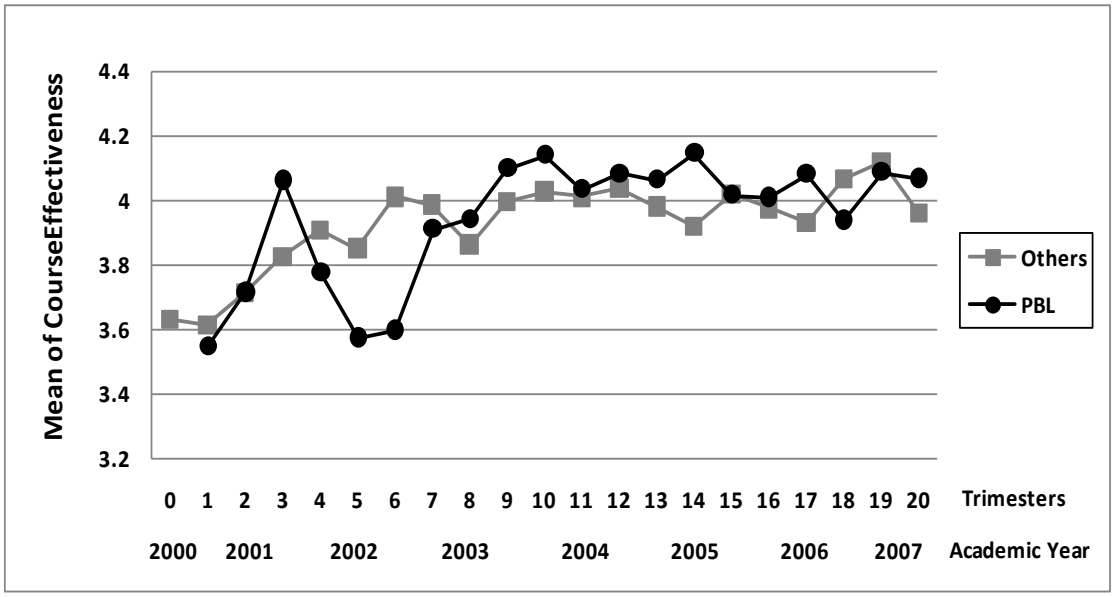

Figure 1. Mean Course Effectiveness Ratings: 2000-2007

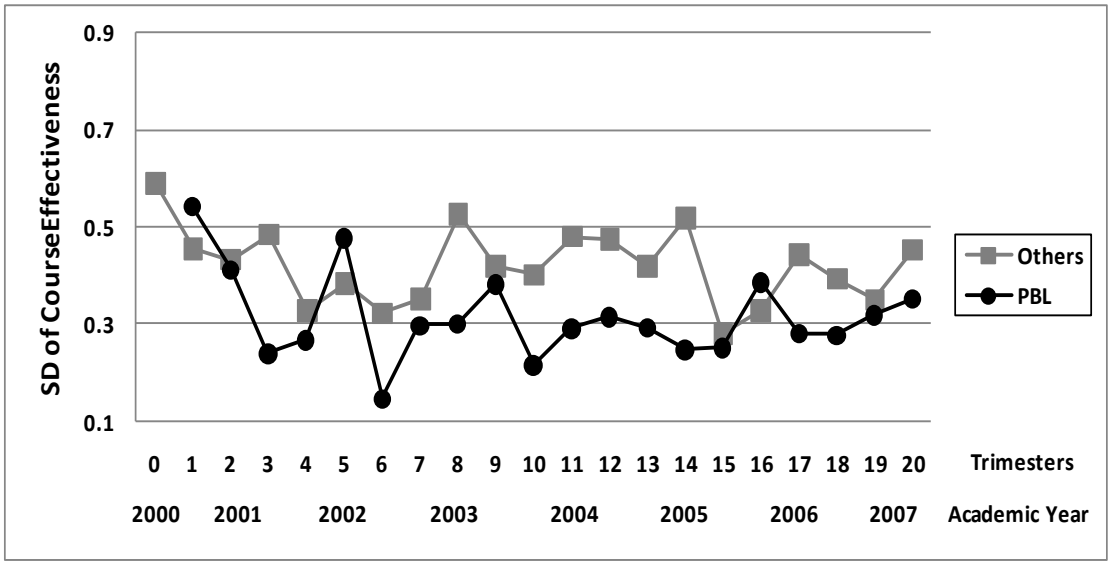

Figure 2. Standard Deviation of Course Effectiveness Ratings: 2000-2007

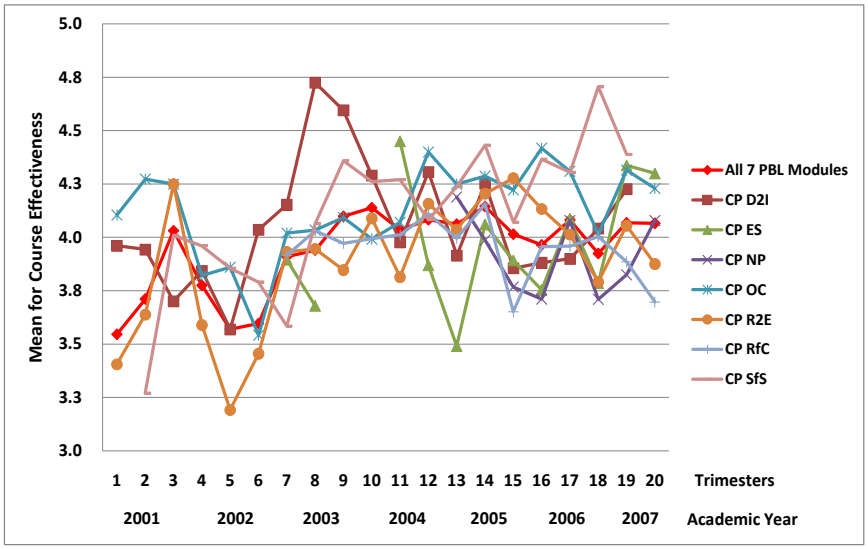

Figure 3. Mean Course Effectiveness for the 7 Most Commonly Taught PBL modules, 2001-2007

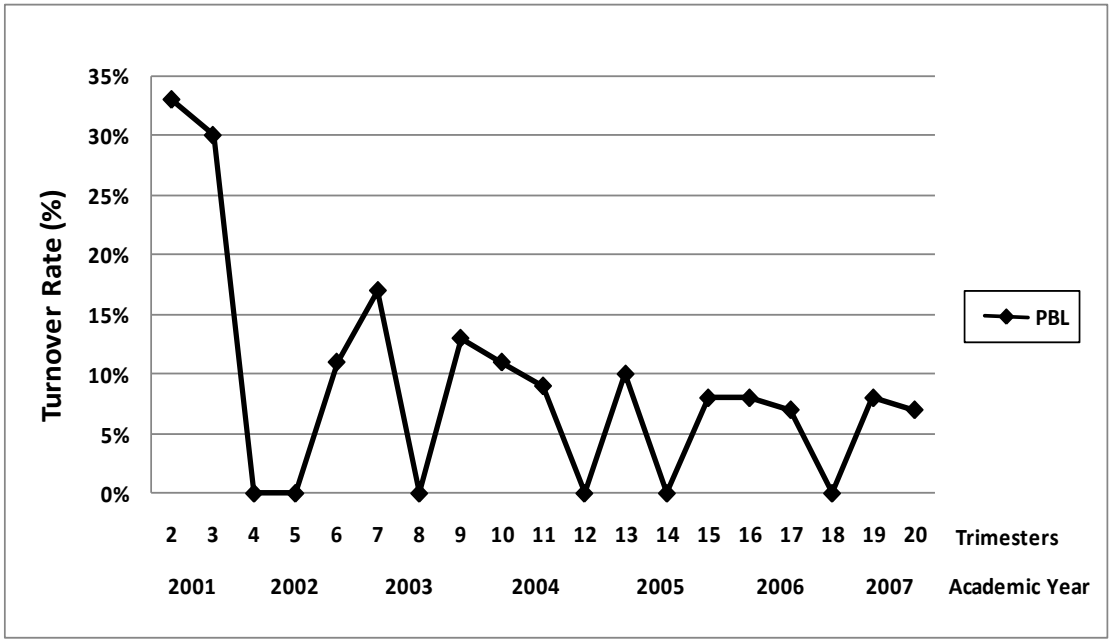

Figure 4. Turnover Rate for Instructors in the PBL Track: 2001-2007

Table 1. *Summary of Course, Instructor, Student Information: 2000-2007*

Students, Instructors and Classes	**PBL Courses** (2001-1 to 2007-1)	**Other Courses** (2000-3 to 2007-1)	**Total**
Number of Course Sections	395	1,344	1,739
Number of Instructors	44	189	233
Average Students per Class Section	23.32	24.82	24.47
Total Number of Students	9,213	31,473[a]	40,686
Total Returned Questionnaires	8,346	25,550 [a]	33,896
Response Rate	91%	81%	83%

Note:

a. The data for number of students and number of returned questionnaires in 2000 was absent.

Table 2. *Descriptive Statistics for the Five Instructional Effectiveness Dimensions: PBL and Other Courses*

Dimensions	N of items	Alpha	2000[a] M (SD)	2001[b] M (SD)	2002 M (SD)	2003 M (SD)	2004 M (SD)	2005 M (SD)	2006 M (SD)	2007[c] M (SD)	Total M (SD)	*t*	Sig.
1. Course Effectiveness	1	—											
PBL			—	3.72(.47)	3.65(.37)	3.96(.32)	4.08(.27)	4.09(.26)	4.01(.32)	4.08(.33)	3.94(.38)	1.51	*n.s.*
Other Courses			3.62(.59)	3.70(.46)	3.92(.35)	3.94(.45)	4.02(.45)	3.97(.43)	3.99(.40)	4.03(.42)	3.90(.45)		
2. Instructor Effectiveness	4	0.95											
PBL			—	3.89(.39)	3.87(.35)	4.13(.29)	4.28(.25)	4.28(.26)	4.23(.28)	4.29(.34)	4.13(.35)	.29	*n.s.*
Other Courses			3.84(.54)	3.91(.40)	4.13(.31)	4.16(.37)	4.21(.41)	4.21(.38)	4.23(.36)	4.26(.38)	4.12(.41)		
3. Action-Directed Learning	2	0.95											
PBL			—	3.75(.44)	3.71(.40)	4.03(.30)	4.17(.31)	4.20(.26)	4.08(.34)	4.16(.35)	4.01(.40)	2.58	*
Other Courses			3.65(.55)	3.71(.40)	3.96(.36)	3.99(.41)	4.08(.44)	4.05(.44)	4.01(.43)	4.06(.46)	3.95(.45)		
4. Student Engagement	2	0.95											
PBL			—	3.78(.40)	3.70(.40)	4.03(.30)	4.14(.28)	4.21(.28)	4.12(.29)	4.18(.30)	4.02(.37)	4.66	***
Other Courses			3.58(.54)	3.65(.40)	3.91(.34)	3.96(.40)	4.02(.45)	4.01(.41)	4.05(.39)	4.07(.39)	3.91(.44)		
5. Assessment & Feedback	2	0.90											
PBL			—	3.66(.34)	3.65(.35)	4.03(.32)	4.12(.26)	4.13(.25)	4.03(.30)	4.13(.29)	3.97(.36)	5.51	***
Other Courses			3.53(.47)	3.63(.38)	3.84(.35)	3.89(.38)	3.95(.42)	3.94(.37)	3.91(.40)	4.03(.36)	3.85(.41)		

Note: M = Mean; SD = Standard Deviation; n.s. = not significant; * = $p < .05$; ** = $p < .01$.

a. The statistics in the columns 2000 integrated the data of one trimester in 2000.

b. The statistics in the columns 2001 to 2006 integrated the data of three trimesters each year.

c. The statistics in the column of 2007 integrated data of two trimesters in 2007.

Table 3. *Estimates of Fixed Effects for Five Assessment Dimensions*

	Course Effectiveness			Instructor Effectiveness			Action-directed Learning			Student Engagement			Assessment and Feedback		
	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
Intercept	3.62	.03	***	3.84	.03	***	3.62	.03	***	3.60	.03	***	3.57	.03	n.s.
Time (Linear)	.01	.00	***	.01	.00	***	.01	.00	***	.02	.00	***	.02	.00	***
Instructional Approach (0= Others; 1=PBL)	.12	.06	†	.05	.06	n.s.	.12	.06	*	.16	.06	**	.15	.05	**

Note: SE = Standard Error; n.s. = not significant; † = p <.10; * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

[i] The authors wish to acknowledge the assistance of Usanee Phanchantraurai and her staff in the collection of the data included in this study, and Parinya Showanasai and Apichai Somboonpakorn in the initial preparation of the data, and Lydia Li Fang for assistance in data analysis.

[ii] For example, a faculty member who left the college due to her husband's job relocation was not counted as turnover for the purposes of this analysis which sought to highlight team solidarity.

[iii] For the baseline term (i.e., January 2001), data on the number of students in this term was missing from the CEQ data set.

[iv] This analysis covers 20 terms instead of 21 terms because the 'baseline' term of January 2001 did not include any PBL courses.

[v] We note that this requirement for a research project during the capstone phase of Master degree programs is standard in Master degree programs in virtually all Thai universities. Moreover, GSB's parent university, considered one of Thailand's few research-intensive universities, held this requirement as an especially high priority.

[vi] We note that the implementation of PBL was only one strategic initiative undertaken as part of the GSB broader quality improvement effort. In addition, it was only one of a number of teaching and learning strategies that were implemented.

[vii] The management team sought and obtained approval from the Board of Trustees and the University Council a year later, though not without opposition from the Dean of the GBS who objected on the grounds that it the PBL track did not contain a research project as mandated by the University's regulations. Notably, several years later the Dean of the GBS became the GSB Director. After seeing the operation of the PBL track, he subsequently turned into its strongest supporter.

[viii] This project was only used for short-term purposes since its content overlapped with other coursework.

[ix] Given experience in using this scale over time and weighing the evidence against alternative sources of information on teaching performance (e.g., analysis of instructors syllabi, assignments, lecture materials, grading and feedback), the GSB management came to view evaluations below 3.50 as falling in a 'yellow zone' requiring a discussion with the instructor. Part-time faculty whose evaluations fell below 3.25 more than once were seldom invited back to teach. Full-time faculty would be subject to other interventions.

[x] Although Retake was roughly equivalent to Revise and Resubmit, students who earned a Retake grade actually had to sign up and retake the PBL module a second time. If they failed to earn a Pass the second time, they had failed the PBL module and PBL track.