

## **Problem-Based Learning in Accountancy: An Empirical Study**

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**Abstract:** *Changes have occurred in the market expectations of accountancy graduates, demanding not only specific knowledge of accounting techniques from these students, but also multiple competences and a holistic view of the business world. The problem-based learning (PBL) method proposes to stimulate critical thinking and problem-solving skills and also to encourage students to learn concepts in their area. The use of PBL in the accounting area, however, is still incipient. This research aims to verify the effectiveness of the PBL method in the accountancy programs in higher education institutions. The statistical results found through factor analysis, Cronbach's alpha, and regression showed that when accountancy students adhere to the method, they gain knowledge in the area, acquire problem-solving skills, improve their communication skills, and become more self-confident. These results are consistent with Kanet and Barut's (2003) work, and also corroborate the goal analysis carried out in the medical area by Norman and Schmidt (2000) and Albanese and Mitchell (1993).*

**Keywords:** *Accounting, PBL, Teaching-Learning Method, empirical*

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### **I. Introduction**

Based on the framework developed by The American Institute of Certified Public Accountants (AICPA, 1999) and the analysis by the Institute of Management Accountants (IMA, 1999), market expectations of accountancy graduates have shifted the locus toward simulating and developing practical expertise during formal education. The main idea is to anticipate the experiences that are traditionally gained in real life after graduation such as the ability to take a broad business perspective and to cope with a variety of possible real life situations. This quest requires the development of a different set of knowledge and skills. These expectations demand not only specific knowledge of accounting techniques from students, but also multiple competencies such as functional, personal, and a holistic view of the business world (Ashbaugh et al., 2002; Petrides et al., 2004; Springer and Borthick, 2007). Students are expected to understand solutions to business problems and be able to instantaneously contribute to an implementation of solutions (Paquette, 2011). As a result, higher education institutions, using pedagogical methods and resources, attempt to attend to the anxieties of this new student generation as well as to the laws and resolutions regulating existing courses. Such repositioning is believed to present life-long appreciation, value, learning, and successful career opportunities (Barsky, et al., 2003). This also serves as a gateway to improve opportunities and relevancy in accounting education experience as part of the national strategy for the next generation of accountants charted by Behn et al (2012).

One way to achieve the outcomes of such orientation is to practice pedagogical methods different from what is normally used, moving away from the traditional approach whereby the teacher plays an active role and the student takes a passive position, towards a more student-centric and problem-based learning approach in which students play a more active part. Moreover, the focus should shift to a pedagogy that is more based on andragogy (Cavalcanti, 1999). Andragogy is an art and science of helping adults gain independency in learning, i.e. an experience of how to learn without being taught, regardless of content, thus making it applicable to any learning subject (Knowles, Holton and Swanson, 1998, p.2).

In the traditional teaching method, the teacher is the center of the process and lectures are the most frequent form of class activity; it assumes mastering the contents is sufficient for self-motivated students to learn. This straightforward approach is well and alive in many institutions (Gil, 2005). The focus is on pedagogy where the student depends on instructors on what is taught, how they are evaluated, and how much experience is delivered to them.

When problem based learning (PBL) first emerged at the end of the 1960s at McMaster University Medical School in Canada, special attention, however, was given to a more andragogical approach in teaching whereby students are treated as self-directed, self-responsible, self-confident, self-actualized independent adults

who learn from each other. Andragogy suggests that students, as adults, expect independence in defining their goals, and choose a strategy for their own learning that suits their quality of life style (Donaldson, Flannery, and Ross-Gordon 1993, p. 148). PBL is student-centric and begins with a real or simulated problem that attempts to stimulate students to solve the problem through the development of positive skills and attitudes as well as critical thinking, and to look for more consistent and long-lasting knowledge on the research theme (Barrows and Tamblyn, 1980). Thus, one learns how to learn by becoming accountable for one's own learning. The recent widespread usage and dissemination of the PBL approach in other fields have been attributed to the degree of coherence to andragogy, i.e. adult learning strategies (Camp, 1996).

Given this background, this research aims to examine the efficacy of PBL deployment in the accountancy field at higher education institutions. What follows is a concise background or literature review on PBL. Next, the research model is introduced followed by the discussion of the results. We conclude with the some final considerations.

### **Prior Research in PBL**

Problem based learning is all about how to improve student learning. PBL intends to create a snowballing effect in deepening students' knowledge and understanding (Camp, 1996) by stimulating critical thinking, problem solving skills and self-learning strategies (Schmidt et al., 2006) via open-ended but integral cases which precede theory (Ribeiro and Mizukami, 2005). According to Hadgraft and Holecek (1995), PBL is not about teaching a bunch of concepts, methodologies, or techniques but about offering changes in attributes such as developing problem solving skills in irregular situations, stimulating critical and creative thinking, embracing a holistic approach, being able to identify strong and weak points, having the traits to perform in teams, and constantly committing to continuous improvement in learning. PBL forces the students to activate what they had previously learned and elaborate on it through team discussions and restructure it in a way to adapt it for the new case problem at hand (Schmidt, 1983). Students are expected to utilize the knowledge previously acquired to make inferences. Via thought process of reasoning, intuition or perception, students as active agents with intrinsic motivation are also responsible for what they need to learn (relevance of subject), how to obtain it, and how to apply it to the problem (Hansen, 2006). Ribeiro and Mizukami (2005) discuss how important the degree of case structure is and relay that the less structured the problem the greater the value in achieving objectives of PBL. Among the asserted common objectives are improved knowledge retention, better reasoning process, and self-centric learning (Hmelo-Silver and Barrows, 2006).

Problem-based learning also demands radical changes in the roles of instructors as well. Instructors become knowledgeable mentors with facilitating skills, and secondary sources of information. Menninet al. (2003) discuss the major activity of mentors as providing "help" in setting up standards or structure for flow of discussions in order to acquire more knowledge, in challenging students to develop reasoning skills, in creating a right environment for team meetings to encourage communications and thus improve communication skills, in becoming a model to simulate professional attitudes and behaviors. Having students take turns as team leaders and secretaries in team meetings must be practiced for success (Kanet and Barut, 2003).

After its first inception in medical school at McMaster University in Canada (Spaulding, 1969), successful implementations let PBL gain widespread use across the globe in medical schools (Lai et al., 1999; Norman and Schmidt, 2000; and Prince et al., 2003), and increasing its roster with application in other fields and disciplines across K-16 and higher educational institutions including engineering (Woods, 1996) and business schools (Kanet and Barut, 2003; Stöblein and Kanet, 2008). Along with Milne and McConnel (2001), Debessay (2003) urges accountant educators to consider and practice PBL. Breton's (1999) experience reveals that student under PBL curriculum outperform students under traditional teaching and learning method. Meta analysis of over 43 institutions by Dochy et al. (2003) indicates robust positive student experience through PBL deployment. Van Den Brink et al. (2003) suggest use of PBL type curricula as a tactical tool to change the perception that accounting students are number crunchers. As Johnstone and Biggs (1998), Boshuizen and Schmidt (1992), and Libby and Luft (1993) argue, the accounting field could benefit greatly by applying the lessons learned from the application of PBL in the field of medical education. The basic technical knowledge including facts on financial accounting, cost and management accounting, and auditing acquired by students can be coupled with PBL experience using realistic cases with group work facilitation. With economies of scale and scope effect, i.e. practice of large number of realistic cases across different accounting courses, students are expected to develop condensed knowledge base. Nevertheless, problem based learning efforts in accounting practices is in incipient stage.

Watson et al. (2007) argue that research articles dealing with pedagogy are mostly descriptive focusing on short term studies with no empirical evidence of effectiveness. Mixed results from Phillips and Vaidyanathan (2003) and Johnstone and Biggs (1998) warrant and suggest more empirical studies to be conducted in accounting.

### **Creating aPBL Environment**

Analogous to plant development in a garden, we need to create the right environment for successful implementation of PBL. For the seed to grow and blossom, the gardener aerates the soil, weeds out the area, fertilizes, supplies water, and makes sure it receives enough sunlight. Similarly, educators need to keep in mind such an environment for PBL delivery from planning to development to execution stages. What follows is a discussion of the key factors that requires close attention across the stages. The moderating impact of co-existence of different curricula for both traditional and PBL setting should not be underestimated especially during the planning and development stages (Menninget al., 2003). During the transition period, however, it is inevitable for schools to follow a hybrid type curriculum before fully integrating PBL.

### **Case or Problem Selection:**

Degree of relevancy to the Accounting II and the level of problem structure play a critical role (Ribeiro and Mizukami, 2005). Less structured problem with insufficient information is detrimental in developing problem solving skills. We pay attention that the problem used is covering various knowledge areas, with either real or simulated data. We are in support of Hansen (2006) that cases with high cognitive level will make better candidates for PBL problems. Hansen provides viewpoint on how to generate a case problem relevant to the objectives of PBL methodology. Haggly and Lehmann (2005) suggest use of interesting but short case problems. Problems should induce students' thinking about what evidence they will need and where to get it, and demand getting the knowledge and understanding followed by application and analysis. We choose problems that motivate the student to be active agents in learning and provide opportunity to develop critical-analytic reasoning capability that is necessary for accountancy graduates. It is suggested to choose real life problems as they reduce the need for assumptions (Kanet and Barut, 2003).

### **Deliverables and Assessment:**

The expected outcomes and their assessment need to be clearly outlined and conveyed. In our case, for each case assignment, over the course of six meeting periods, 100 minutes each, students are expected to provide a written report, accompanied with oral presentation. Team member's contribution assessment is factored into mentors' assessment towards their performance in group work. Each student was also required to take individual evaluation exercise from the case being discussed. Students' perception regarding improvements in their content knowledge and skills were obtained by completing a questionnaire, developed in the following research methods section, on the sixth meeting period.

### **Group Formation:**

While we do not have an intention to analyze the impact across different groups, we formally approached the team formation to create heterogeneity in order to max out the learning among the group members, as defended in the literature (Oakley et al, 2004). We assume that a group composed of students with different personality type will approach the problem solving process from different angles and contribute to total group learning. For this purpose, we utilize Hermann's (1990) four-quadrant brain model of thinking preferences. Referring the reader for the details to Lumsdaine and Lumsdaine (1995), this model classifies students into one of four categories: people-oriented, problem-oriented, results-oriented, and action-oriented. Kanet and Barut (2003) observe that students within the team do coach each other during the problem solving process, and a team composed of heterogeneous backgrounds and personalities do reinforce this behavior. To assess students' personality style we utilized a orientation questionnaire provided in Appendix A. Of the 40 students, fifteen were results-oriented, one action- oriented, eleven results-oriented, and thirteen people-oriented. One action-oriented student was added to results-oriented group. Our purpose was to about evenly assign students across groups as much as possible.

### **Mentoring Process:**

This process is the backbone of the PBL implementation. Our role towards students has been drastically shifted from teaching to coaching. The central theme is student learning. Instructor's new function in this process is to provide guidance and advice, to facilitate the thought process in outlining issues and tasks in a given problem, and to explain foremost concepts when requested by majority (Ribeiro and Mizukami, 2005). Our experience is that PBL demands much greater time involvement with students, individually or as a group. This burden forces us to make rationing decisions among the issues by capitalizing on student requests that we believe will generate the most benefit on learning; and is offset by the less time required to prepare for and give lectures. Students, however, are asked to take responsibility for their learning by utilizing teamwork dynamics and following the team meeting requirements described next. In doing so, we must abstain from direct response

to student questions and encourage students to challenge each other in justifying that the solution they have come up with is a feasible and very good one.

**Meeting Requirements:**

Teams were mandated to have a leader and a secretary by taking turns at each scheduled or unscheduled meeting. The purpose is to make sure that meetings are not social events. The leader’s role is to manage meetings, to have focused discussions, and to ensure equal opportunity in member participation. The responsibility of secretaries is to furnish detailed meeting minutes and make them available in group’s file exchange area or drop box. A meeting’s agenda is set by a to-do list for the next meeting. At the beginning of the time frame we explicitly describe the roles of leaders, secretaries, and members. By taking turns in responsibilities, each student experiences the role of being a leader, a secretary or a member. We provide them a thought process that will allow them to list in tabular format the hypotheses or assertions they make about the problem, followed by the facts they know about the problem, and the facts they need to acquire. Next, they question their knowledge about the subject and write down what the learning issues are and whether any member has the knowledge about it. Finally, group members may either learn from each other or assign a task to obtain the knowledge. With this thought process, we help students think through their performance and build self-confidence in what they are doing. At each group meeting, students replicate this assessing and reflecting behavior process which makes them active and alert, as asserted by Park and Ertmer (2008).

**II. Research Method**

In our study, both qualitative and quantitative analysis was performed. Qualitative research evaluation was adopted and performed through observation, interview, and documentary analysis. Quantitative evaluation was carried out through a structured questionnaire (given in Appendix B) with a Likert agreement scale. Both reliability (Cronbach’s alpha coefficients) and validity (factor analysis) were assessed, and regression analysis was performed. To analyze the statistical tests, the *Statistical Package for the Social Sciences* (SPSS® v.12) was used.

The platform for this research was the “Introduction to Accounting II” course at Ribeirão Preto school of Economics, Business Administration, and Accountancy. Introduction to Accounting II is critical for the accountancy program because learning various concepts must be long lasting and key to understanding future course subjects. While forty-eight students were enrolled, only forty participated in the research. Of the 40 respondents, 32.5 percent were female and 67.5 percent were male; 50 percent of the students worked, and 50 percent did not. As Table 1 reveals, a large majority of students (65 percent) were between 20 and 29 years old.

**Table 1 – Age**

Age Category	Frequency	Percent	Cumulative Percent
< 20 years	13	32.5	32.5
20 - 29 years	26	65.0	97.5
30 - 39 years	1	2.5	100.0
Total	40	100.0	

Source: Output of SPSS®

**III. Results and Discussion**

In our research, we specifically search for evidence on whether there exists a positive relation between four key constructs:

- F1: *knowledge on net equity problem solving*
- F2: *implementation skill development*
- F3: *adherence to the PBL method, and*
- F4: *student’s confidence and satisfaction,*

As classified in Table 2, and adapted from Kanet and Barut (2003)’s study in operations management. In order to measure the effectiveness of the PBL application, we also identified and listed relevant variables representing each construct. These variables serve the basis for the questionnaire items, and are labeled based on their position in the questionnaire. For example, variable B11 is represented by question #11 in section B of the questionnaire, provided in Appendix B.

**Table 2 – List of Constructs and Corresponding Variables**

<p><b>Knowledge on Net Equity (F1)</b></p> <p>B1 Understanding of the problems associated with Net Equity (NE)</p> <p>B2 Gaining knowledge of applicable principles and theory of NE</p> <p>1. Learning a great deal about the following topics:</p> <p>C1 Accounting mechanism (bookkeeping)</p>	<p><b>Problem-Solving/ Communication/ Implementation Skills (F2)</b></p> <p>B3 Developing problem-solving skills in NE</p> <p>B4 Developing the ability to think analytically</p> <p>B5 Improving business-writing skills</p> <p>B6 Developing oral presentation skills</p>
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C2 NE concept C3 Social Capital concept C4 Concept of reserves C5 Distinguish between capital reserve and profit reserve C6 Different types of profit reserves C7 Statement of Retained Earnings and Losses (SREL) C8 Statements of Changes in Stockholders' Equity (SCSE) C9 Difference between equity value and market value of stock C10 Treasury stocks C11 Relation between NE and other balance sheet accounts	B7 Learning how and where to find the relevant knowledge B8 Learning from a set of facts and situations how to define problems B9 Learning how to apply knowledge B11 Developing skills in using information technology for basic business skills B12 Developing skills in learning how to work with other people in teams
<b>Adherence to PBL Method (F3)</b> B13 Using the PBL structure (ideas, facts, learning issues, action plan) B14 Encouraging teamwork during the net equity topic B15 Tutor guidance through the PBL process B16 Students' involvement in the PBL process B19 Tutor's providing information B22 Commitment of other team members to the PBL process B24 Having a leader at each meeting B25 Having a secretary at each meeting B26 Using the minutes from the last meeting	<b>Confidence/ Satisfaction (F4)</b> B10 Recognizing what knowledge is relevant B17 Being not overwhelmed B18 Not losing motivation B20 Being challenged to clarify own opinions B21 Taking responsibility for the PBL process B23 Becoming an independent learner

Once the data was collected we performed factor analysis to address complement validity measuring the extent to which the questionnaire measures what we think it is measuring, with a view to reduce the variables data for each factor into surrogate factor scores for future use in the regression. We use Cronbach's alpha, the most accepted measure for the internal consistency of each of the above mentioned constructs F1, F2, F3, and F4, to asses scale reliability. The summary results of factor analysis and Cronbach's alpha for the four factors is shown in Table 3.

**Table 3 – Summary of Factor Analysis and Cronbach's Alpha Applications**

	F1	F2	F3	F4
KMO	0.803	0.789	0.756	0.692
Bartlett test	0.000	0.000	0.000	0.000
MSA higher than	0.619	0.736	0.684	0.631
Explanation Variance	54.563%	45.996%	50.369%	65.192%
Cronbach's Alpha	0.925	0.832	0.871	0.819 <sup>a</sup>

<sup>a</sup>Removed variables: B17 and B18 from the list of construct F4 ( due to MSA under 0.50).

As to the data's degree of explanation based on the factors according to KMO (Kaiser-Meyer-Olkin), the following can be concluded: good (between 0.8 and 0.9) for F1, average (between 0.7 and 0.8) for F2 and F3, and reasonable (between 0.6 and 0.7) for F4. Bartlett's sphericity test demonstrates a significance level under 0.05 for all correlations in a correlation matrix for all factors, indicating that the variables are sufficiently related.

The measure of sampling adequacy (MSA), which can be found on the diagonal of the anti-image matrix for factors F1, F2, and F3, was initially higher than 0.50, as opposed to F4. For F4, two variables were removed to reach above-minimum scores, repeating factor analysis twice. MSA is an assessment to what extend the factor analysis was adequate. The percentage reached by the explanation of variance (54.6 percent for F1, 46 percent for F2, 50.4 percent for F3, and 65.2 percent for F4) can be considered satisfactory for social sciences as justified by Hair et al. (2009). Per Carmines and Zeller (1979), Cronbach's alphas suggest that reliability is very good (more than 0.9) for F1, good (between 0.8 and 0.9) for F2 and F3, and initially weak (between 0.6 and 0.7) for F4 but good reliability after the above mentioned two variables , B17 and B18, were removed.

Once the variables explaining each construct were identified and justified, the data was investigated for possible outliers, normality of each of the factors, correlations coefficients, as well as dispersion between F3 and the other factors (F1, F2, and F4). Among discrepant observations, case 25 appears in two factors (F2 and F4) and case 18 in only one factor (F3). In a more detailed inspection of these cases, it was judged that case 25 adhered the least and case 18 adhered the most to the method. As to normality, it was observed through the observation labels of the De-trended Normal Q-Q plot graphs that the observations distanced from normal distribution were the same outliers described earlier. The same results were found for normal distribution without data standardization. The dispersion diagram suggested a linear relation between variables F3-F1, F3-F2, and F3-F4. Table 4 presents the summary of the correlation.

Referring to Table 4, the correlation coefficients for all factors scored higher than their critical values, with significance values below 0.05. Thus, a positive correlation exists between F3-F1, F3-F2, and F3-F4. The results of the student's t-tests also offer statistical evidence that supports a positive relation between factors F3-F1, F3-F2, and F3-F4. In the three factor relations, the t-values were higher than the critical values in the table.

This result is also confirmed by the p-value, where all cases scored below 0.05, supporting the results found in the t-test for the three regressions are significant. Thus, the statistical results support the relationship between adherence to the problem-based learning method and the following: (a) knowledge on Net Equity; (b) problem-solving, communication, and implementation skills; and (c) confidence and satisfaction. These results are in line with the research by Kanet and Barut (2003), whereby students adhering to the method gain knowledge in the area, acquire problem-solving abilities, improve their communication, develop skills, and obtain confidence and satisfaction.

**Table 4 – Results Observed in Correlation and Regression**

Description	F3 – F1	F3 – F2	F3 – F4
<b>Correlation coefficient (r)</b>	<b>0.590</b>	<b>0.539</b>	<b>0.502</b>
Critical values of <i>r</i> with $\alpha = 0.05$ ; $n = 40$	0.312	0.312	0.312
<b>Sig. (2-tailed)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.001</b>
Significance level $\alpha = 0.05$	< 0.05	< 0.05	< 0.05
<b>Student's t-test (*)</b>	<b>4.5072</b>	<b>3.9469</b>	<b>3.5761</b>
Critical values of <i>t</i> with $\alpha = 0.05$ ; $gl = 38$	2.024	2.024	2.024
<b>P-value</b>	<b>0.0001</b>	<b>0.0003</b>	<b>0.0010</b>
Significance level $\alpha = 0.05$ for <i>P</i>	< 0.05	< 0.05	< 0.05
<b>Number of observations</b>	<b>40</b>	<b>40</b>	<b>40</b>

(\*)T-test results for the angular coefficient B only.

A qualitative analysis revealed in the students' comments below that some liked the experience while others did not. Some of the advantages and disadvantages could also be observed:

*"It is a good teaching method, as it makes each student attempt to know and solve the fact that raised a doubt in the group [...]" (Respondent 15)*

*"It is a different way of learning, interesting; but it demands many hours of extra-class study [...]" (Respondent 16)*

*"The group revealed to be very engaged in seeking solutions to the problem. We managed to respect one another and always attempted to help anyone with comprehension difficulties, although some group members did not participate, those students who took the work most seriously managed to reach the objectives, that is, understanding and concluding the research" (Respondent 36)*

*"[...] everyone collaborated in research about the themes. [...] As to my participation, I added something to the work (research), but that definitely wasn't what most concentrated on the focus" (Respondent 3)*

*"[...] as to R29 [...], his level of autonomy/dependence and his resistance to try out the new method definitely influenced his participation" (Respondent 28)*

*"Some students liked the practical method, but I prefer the teacher's explanation with her slides and lectures" (Respondent 29)*

*"The synergy created inside the group and the colleagues' pro-activeness facilitated the elaboration of the work" (Respondent 12)*

*"The group did not concentrate on the activity but lost time with parallel activities" (Respondent 17)*

Besides the advantages, disadvantages, and some of the students' considerations about the PBL method, some characteristics of andragogical learning mentioned by Cavalcanti (1999, p. 3), in which learning is more centered on the student, on independence, and self-management of learning, were also perceived; the student's experience is part of the discussion and of solving the problem as a team; learning is problem-based, demanding a wide range of knowledge to reach the solution; and, through the problem, a practical application for life is sought.

The teacher indicated that she liked the method but perceived during the presentations that some items, although considered very good, were not addressed, such as the technical part of accounting, for example (debit and credit). Hence, after the application of PBL, the teacher gave a complementing lecture. In general, the teacher was satisfied with the results that the students presented. The teacher also perceived that the students really focused on the problem.

#### IV. Conclusion

As mentioned at the start of this report, the external market is inevitably expecting changes in the way we educate our accountancy graduates, demanding in-depth understanding of a holistic view of the business world as well as the development of multiple concurrent competencies. This report was aimed at verifying the efficacy of the PBL method to effect such changes in university accountancy courses. The efficacy measure was based on the work by Kanet and Barut (2003), who defined an efficacy assessment model based on students' adherence to the method. Statistical results show that, based on the students' adherence to the method, they gain knowledge in the area, acquire problem-solving abilities, improve their communication, develop skills, and gain confidence. The qualitative analysis also shows that the groups and students who adhered to the method liked its application, interacted, were sincere in their self evaluation, and even proposed further extension of the method.

These results are in line with the research by Kanet and Barut (2003), who studied the efficacy of the PBL method in introductory MBA courses in production and operations management. The results here confirm that the students' understanding and adherence to the PBL method makes them gain knowledge in a subject area, develop communication skills, and increase their confidence. PBL guides the students' expectations by placing knowledge and learning in a real-world context allow them to act as professionals.

As pointed out by Jonassen and Hung (2008), all problems are not all equal. Problems suitable for business administration are those that provoke decision making and policy analysis. As deployment of PBL migrates to different disciplines within business administration, viable and legitimate research question would include studying the impact of problem sizes and the level of complexity on learning. Admittedly, this report is based on a small sample in a limited problem domain at one point in time. These limitations remain to be seen in other accounts of use of PBL in business schools, as they begin to appear in the literature. We envision future longitudinal studies and ones that would investigate the sensitivity of PBL to the level of problem complexity. Investigation of the moderator impact of demographic variables may also be a fruitful area of further research. Nevertheless, based on the results here, it is likely that the PBL method might well be effective in enhancing student learning in other fields of business administration such as marketing and economics. But of course this awaits confirmation.

Our results confirm those found by Ribeiro and Mizukami (2005, p. 142) who find the main advantages pointed out by students: "it was motivating; made the class livelier and stimulated the development of interpersonal and research skills." Our findings here confirm that students spend more hours per day studying than do conventionally-taught students due to the self-directed learning nature and greater pressure for participation that the PBL approach provides.

In spite of these encouraging results our experience shows that fear of change is probably one of the disadvantages of putting PBL in practice. Many pedagogues may hesitate to put PBL in practice in their classrooms because of the lack of experience, the ambiguous assessment, and the fear of changing their roles to facilitators. Gil (2005, p. 69) states that, sometimes, not only the teachers fear changes, "the students are so accustomed to lectures in the classical sense that they tend to reject innovative proposals by the teacher, maintaining an attitude of passiveness and disconnection." Given the mounting evidence of the benefits of PBL, the challenge now for educators is to find effective ways to mitigate such fears.

Benson (2012) points out a few detractors from an academic perspectives that needs to be cleared before integrating PBL into our curriculum. McDonald and Ogden-Barnes (2013) advocate success factors of time, resource, and infrastructure and offer recommendations. Moreover, Potter and Johnson (2006) discusses the role of careful planning and creativity for an interactive course if online is the medium for PBL delivery. Substituting PBL to traditional teaching should aim to enhance student learning which requires a great deal amount of supervision. The impact of student willingness in taking risks for their own learning (Wynn-Williams et al, 2008), institutional risks to retain students in the system (Yourstone and Tepper, 2014), and adverse effects of outcomes on instructors' professional career (McDoanald and Ogden-Barnes, 2013) need to be studied and not underestimated.

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