



ANALYSIS OF THE PROBLEM-BASED LEARNING IMPLEMENTATIONS: STUDENTS' AND TUTORS' PERCEPTIONS AND ACTIONS¹

(PROBLEME DAYALI ÖĞRENME UYGULAMALARININ İNCELENMESİ:
ÖĞRENCİ VE AKADEMİSYENLERİN ALGILARI VE ROLLERİ)

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ABSTRACT

This study aims to analyze the implementation of problem-based learning (PBL) in engineering education regarding perceptions and actions of tutors and students. A case study design was employed in this study. To this end, four tutors, their five PBL modules, and fourteen students were selected. Observations and interviews were used to collect qualitative data. The results indicated that there was a difference between participants' perception of PBL and their actions during tutorials. Participants' level of adaptation to PBL and problems they faced were indicated as the reasons of this difference. Analyzing the implementation of PBL and taking the ideas of students and tutors who are the basic components of it seems to be of fundamental importance to contribute future implementations.

Keywords: Problem-based learning, active learning, tutors' perceptions, students' perceptions.

ÖZET

Bu çalışmanın amacı mühendislik eğitiminde uygulanan probleme dayalı öğretimin öğrenci ve akademisyenlerin algılarına ve uygulamalarına yönelik olarak incelenmesidir. Çalışmada, örnek olay çalışması yöntemi kullanılmıştır. Bunun için, bir mühendislik bölümünde görev yapmakta olan 4 akademisyen, bu akademisyenlerin yönettiği beş probleme dayalı öğrenme modülü ve bu bölümde öğrenim görmekte olan 14 öğrenci seçilmiştir. Nitel veriler görüşme ve gözlem yöntemleriyle toplanmıştır. Çalışmanın sonucunda, katılımcıların probleme dayalı öğrenme ile ilgili algıları ve uygulamalar sırasındaki rolleri arasında farklılıklar olduğu ortaya çıkmıştır. Katılımcıların probleme dayalı öğrenmeye yönelik adaptasyon seviyeleri ve uygulamalar sırasında karşılaştıkları problemler bu farklılıkların sebebi olarak belirtilmiştir. Probleme dayalı öğrenme uygulamalarının incelenmesi ve bu uygulamaların temel ögesi olan akademisyen ve öğrencilerin görüşlerinin alınması gelecekte yapılacak çalışmalar ve uygulamalar açısından önem taşımaktadır.

Anahtar Kelimeler: Probleme dayalı öğrenme, aktif eğitim, akademisyen algıları, öğrenci algıları.

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INTRODUCTION

Problem-based learning (PBL) has been defined in various ways in literature. (Albanese & Mitchell, 1993; An, 2006; Arambula-Greenfield, 1996; Barrows 1986; Savery & Duffy 1995; Vernon & Blake, 1993). More clearly, it can be defined as a learner-centered instructional format requiring students to participate actively in their own learning by researching and working through a series of real-life problems which are used as a motivational context to drive learning and as a stimulus for authentic activity (Arambula-Greenfield 1996; Barrows 1986; Savery & Duffy 1995).

PBL was firstly designed for medical students based on the gaps of conventional medical training and began with the Faculty of Medicine at McMaster University in Canada in the mid 1960's. However in time, some other medical schools around the world began to adapt PBL (Barrows, 1986). Today, most medical schools especially in US are implementing or planning to implement PBL in their curricula to a greater or lesser extent. Therefore, in literature, there are lots of studies related with the effectiveness of PBL in medical education (Barrows, 1986; Camp, 1996). For instance, there are systematic reviews or meta-analyses (Albanese & Mitchell, 1993; Berkson, 1993; Colliver, 2000; Dochy, Segers, Van den Bossche, & Gijbels, 2003; Gijbels, Dochy, Van den Bossche, & Segers, 2005; Prince 2004; Smits, Verbeek, & Buissonje, 2002; Vernon & Blake, 1993) related with the effectiveness or outcomes of PBL compared with the conventional instruction in medical education from different points of view. Summarizing those reviews or meta analyses shows that PBL does not show large differences in favor of PBL students as compared with their counterparts in conventional instruction on knowledge assessed through conventional measures but it has positive effects on students' skills, satisfaction, (Albanese & Mitchell, 1993; Dochy et al., 2003; Vernon & Blake, 1993), and attitudes (Prince, 2004) etc.

In literature, there are also some studies aiming to define PBL interventions and investigate components of PBL environment in terms of students' and tutors' opinions or perceptions. The main purposes for some of those studies are given as follows: investigating attitudes and opinions of tutors in PBL curriculum (Vernon, 1995; Vernon & Hosokawa 1996) investigating tutors' opinions about the relative benefits of PBL and tutors' level of satisfaction and the difficulties the tutors face with (Kaufman & Holmes, 1996); analyzing teachers' experience of the planning and implementation of PBL (Dahlgren, Castensson, & Dahlgren, 1998); comparing attitudes of a sample of students attending PBL courses and students attending conventional courses (Kaufman & Mann, 1996); investigating perceptions of students' abilities to be self-directed learners changing over time (Ryan, 1993); assessing the level of interest, enthusiasm and personal satisfaction of the students experiencing PBL (Barman, Jaafar, & Naing, 2006); investigating students' perceptions of PBL process (Hollinshed, 2004); investigating opinions of students and tutors about the effectiveness of PBL (Musal, Taskiran, & Kelson, 2003); and

evaluating problem-based instructional approach (Ribeiro & Mizukami, 2005). The vast majority of those studies are also investigated in medical education.

In the past few decades, in addition to medical education, PBL has been implemented in secondary and higher education. As PBL began to be popular within various disciplines such as nursing, economics, pharmacy, dentistry, physiotherapy, architecture, business, law, engineering, social work, and science towards PBL, it became possible to see different implementations of it in literature. For instance, some institutions adopted the approach as a partial strategy, such as hybrid PBL, course-by-course models, etc. (Major & Palmer, 2001).

In higher education, engineering is one of the popular disciplines that PBL has been used as a teaching strategy based on the gaps of conventional engineering instruction (Denayer, Thael, Vander Sloten, & Gobin 2003; Guzelis, 2006; Hadgraft, 1999; Perrenet, Boutuijs, & Smits, 2000; Polanco, Calderon, & Delgado, 2004; Ribeiro & Mizukami 2005; Said, Adikan, Mekhilef, & Abd Rahim, 2005) and it has been observed that seven different forms of PBL curricula that are varied across both disciplines and cultures in terms of length and design are implemented in the content of engineering education (Savin-Baden, 2008).

Researchers (Charlin, Mann, & Hansen, 1998; Dolmans 2003; Lee, 2004) claimed that there are some weaknesses in most of the prior studies such as lots of different implementations of PBL, neglecting investigation of the actual learning process, not clearly reporting the implementation and learning environment, and mostly focusing on quantitative experimental designs. Therefore, researchers emphasize the need for detailed and rich descriptions about how PBL is implemented, what factors affect the implementation of PBL in institutions, and what are the outcomes of PBL implementations in certain settings and conditions not only in medical education but also in other disciplines. While supplying these needs, since the students and tutors have a central role in PBL, it is also important to take their opinions or perceptions related with the implementations.

Aim of the Research

The main purpose of this study is to analyze the implementation of PBL in engineering education identifying students' and tutors' perceptions about PBL and its implementation. The study also aims to identify the practical problems experienced by tutors and students during implementations.

METHODOLOGY

Research Design

According to Yin (2003: 1) "case study is used in many situations to contribute to our knowledge of individual, group, organizational, social, political, and related phenomena". Merriam (1998) stated that qualitative research based on the case

study design is an appropriate way to provide a “holistic description and analysis of a single instance, phenomenon, or social unit” (p.27). Therefore, this study employs a case study design since it is aimed to identify and analyze problem-based instruction in its natural setting and provide detailed and rich descriptions through the perceptions of students and tutors related with understanding of PBL and its implementation.

Participants of the Study

The engineering department which was implementing PBL for approximately 6-7 years at the time of this study conducted was considered to be a natural setting for tutors and students. There were 22 tutors and 284 undergraduate students in this department in that academic year. The sample for the study was originated from this population. Out of those participants, four tutors and fourteen students were selected to make interviews and five PBL modules were selected to make observations. To provide anonymity, neither the program nor the participants are named in this study.

Participants in this research were chosen using the purposeful sampling technique. In purposeful technique, the researcher purposefully selects participants to maximize information (Patton, 2002). In order to maximize the possibility of analyzing the research questions, two types of purposeful sampling were used for selecting cases in this study. Criterion sampling involves the “cases that meet some predetermined criterion of importance” (Patton 2002: 238). The researchers used this sampling to select tutors that meet some criteria such as:

- The tutor should have an experience in conducting PBL tutorials from the beginning of PBL implementation.
- The tutor should be willing to take part in the study.
- The tutor should accept the researcher as an observer in his/her PBL module.

Four tutors (Tutor ‘A’, Tutor ‘B’, Tutor ‘C’, and Tutor ‘D’) that met those criteria were selected. Interviews were conducted with those tutors and freshman modules of the two tutors, sophomore module of the one and senior module of the other were selected to observe.

Intensity sampling involves selecting cases that are information-rich manifesting “the phenomena of interest intensely but not extremely” (Patton 2002: 234). Moreover, 14 students (5 freshmen, 3 sophomore, 2 junior, 4 senior) having high, low or medium cumulative grade points and volunteer to interview about the instructional method from each grade level were selected to participate in interviews. Patton (2002: 244) states that “There are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of

the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available time and resources”.

Context

The mentioned engineering department implementing PBL in all curriculum and grade levels is the context of this study. Freshman, sophomore, junior, and senior curriculum of this department consist eleven, twelve, thirteen, and seven PBL modules respectively. A PBL module consists PBL tutorial sessions, presentations, laboratories, scientific consultation, and module discussion hours. A typical PBL tutorial consists of 8–9 students meeting with a tutor to discuss a problem. It takes place in the PBL rooms and includes 3–4 sessions during a two or three week period. As a central part of the educational system, PBL sessions take 2–4 hours providing a learning environment where students attempt to define and then solve a real life problem introduced with a motivating scenario (Guzelis, 2006). During presentation hours, students are given presentations conventionally about the topical outline determined before for each module. Moreover, for every module, there is two hour long consultation hours every week in which students can ask any question about the modules (presentations, scenarios etc.) to the tutors who guide them during the PBL sessions. Besides, students participate in laboratories related with physics, computer, electronics, programming etc. At the last week of the module, students take module exam and then participate into discussion hours to discuss and evaluate the scenario/module as a whole.

The tutors in this department have different area of specialization. They participate in the modules as a facilitator. Although it changes as the number of the students change in freshman, sophomore, junior and senior modules, students are mostly divided into 10, 6, 9 and 4 groups respectively meaning that much of tutors are needed to guide those groups. Therefore, since there is not much tutors in the department, tutors may guide the modules the topic of which is not directly related with his/her area of specialization.

The specific stages about implementation of PBL during tutorials in the mentioned department can be summarized as follows (Ateş & Eryılmaz, 2010):

Students;

- read the problem in turns, each one reading a part
- try to identify the main points of the problem
- discuss the terms in the problem
- brainstorm and try to make links with their previous knowledge or what they saw at the lab or presentations in order to find the answers of the questions

- share results, try to explain one another, make calculations, draw or graph the related parts on the writing board or the related parts of the session papers
- share the roles such as director for explaining the problem or secretary for writing on the board/solving problem

Tutors:

- ask some questions to direct students toward unclear or unraised parts of the problem. They do this either to supplement students' understanding, or to focus their attention to the related part
- encourage students to explore possibilities, find alternative solutions, and collaborate with other students.
- check the tutor copy of the handout given for the scenario while students are reading or discussing the problem.
- check whether the learning objectives were reached or not. At the end of the session, students list those learning objectives. Those parts that are not raised by students are given as homework.

During the PBL Sessions:

- “student copy” of the scenarios are delivered to each student
- students are expected to work individually or as a group to search the unclear parts raised in the first session to reach specified learning objectives on using various resources (library, books, internet etc.)
- students read the stages of the scenario; they try to apply the result of their research to the problem and try to explain the points raised during the first session
- students are expected to discuss more in the second or next sessions since they had time to search and discuss the objectives after the first session

Data Sources

Observations: In this study, five PBL modules -ranging from six to ten hours and belong to different grade levels- of the four selected tutors were observed. During observations, notes were taken related with the participants' actions/interactions and the PBL process. Moreover, an observation checklist (see Appendix) was filled for each module which was developed as a guide in order to better report how frequent some PBL characteristics occurred during tutorials.

Interviews: The interviews were based on a person-to-person semi-structured protocol one for students and one for tutors. The interviews lasting from 40-60 minutes were conducted once with each participant and they were audio-recorded.

Data Analysis

In this study, coding schemes were used in order to gain a detailed perspective about what was occurring based on the purpose of the study. These coding schemes help to analyze the transcripts of the participants.

Patton (2002: 560) states that investigator or analyst triangulation is one of the triangulation kinds using multiple analysts to independently analyze the same qualitative data “which helps to reduce the potential bias that comes from a single person”. A colleague who is familiar with the nature of this study and has an experience in PBL was involved in the study to achieve investigator triangulation. Tracy (2013: 237) states that “collaborators separate and, working independently, analyze the same subset (usually at 10 %)”. Therefore, the colleague coded some randomly selected transcripts (nearly 10%) independently due to time constraints and difficulty of dealing with the all data. The percentage of agreement (inter-coder reliability) was calculated as 93.65%. In order to reduce the potential bias and eliminate the disagreements, the transcripts were re-examined up to reach consensus on the conflicted codes.

FINDINGS

Perceptions of PBL and its Essential Components

Students’ Perceptions: Before mentioning their perceptions about PBL and its essential components, the participants were asked what their first impressions were. Although most of the students (86%) mentioned their positive impressions, they emphasized how their impressions have changed in time due to the problems they faced. When the students were asked what they understand from the term PBL and its essential components, they all stated that it was a student centered system and it promoted students to take responsibility for their own learning. Moreover, students mentioned how PBL tutorials process and what were the roles of students and tutors in PBL environment. They all stated that students should do research, be curious and eager to learn and be prepared for modules, whereas tutors should guide the discussions and lead students to the right way without intervening so much while finding solutions of the problems. To express the process of a PBL tutorial and the roles of a tutor, a fourth grade student stated:

For example, we come to the PBL room on Monday. We are given a problem in scenario. We do not know anything at first. We learn about the subject, do research, follow the scenario then we determine our own way and we learn through time. As far as I understand, the goal of PBL is to enable students find solutions for the problems by themselves through brain storming. The role of the tutor is to guide the discussion without intervening so much. When the students go far beyond the answers, the tutor guides them. She/he should lead them to the right way theoretically as well.

Tutors' Perceptions: Before mentioning their perceptions about PBL and its essential components, the tutors were asked such questions: how they were prepared to this new curriculum, whether they took trainings before it was started to be implemented, and how their first impressions were. The tutors stated that they had met once a week nearly a year before the PBL was started to be implemented in their department. During those meetings, they discussed about what is PBL and its theoretical background. Sometimes, experienced tutors who had been implementing PBL in their department participated to those discussions to give trainings and share their experiences. They took trainings for three days about how to prepare scenarios. During those trainings, they observed a sample PBL session that was being implemented for medical students. They told that they did not participate any other training after that time and they had no chance to apply a pilot study in their department.

When asked their first impressions about PBL, the tutors all mentioned their feelings of doubt about the applicability of the PBL in their department. Tutor 'B' stated that during the meetings, she questioned whether the system was applicable or not before PBL was started to be implemented in their department. She said that the most important reason of this was the inadequate number of tutors. However, she added that she adapted the system with high motivation and good impression despite these doubts.

When the tutors were asked what they understood from the term PBL and its essential components, firstly they mentioned the features that the students should have. As a common opinion, all tutors emphasized that students should be curious, eager to learn, take it serious, do search, and take responsibility for their own learning. For example, Tutor 'B' and Tutor 'D' expressed that the students should study hard with a high motivation, question the things they learn, study beforehand for the sessions, and even activate the tutor due to the fact that they want to learn. Tutors also mentioned the features that tutors should have. They all expressed that while guiding students, tutors have great roles in PBL. Those roles were stated as follows: tutors should be master of their subject, ask the right questions, keep the discussions alive, prevent the students from wandering away from the subject, and intervene discussions when necessary while reaching the learning objectives.

Implementation of PBL into Sessions

Tutors' Actions in PBL Sessions: The tutors generally acted as a coach/facilitator and guided students. They asked some questions to direct students toward unclear or unraised parts of the problem. By asking those questions they re-focused students' attention on the problem, checked their understanding, and encouraged them to explore possibilities and alternative solutions. The following are a few statements that the researcher took while observing the sessions.

Students were confused on how to proceed. There were lots of questions and ideas of students being discussed. Tutor was attempting to guide the group in the right direction without saying how to proceed or telling the answer.” (from the observation session of Tutor ‘A’)

During the second PBL session of Tutor ‘A’, the students were allowed to have control over their own learning environment. Students went over their previous knowledge and learning objectives of the previous session, discussed the content of the problem, and came up with some learning objectives on their own. For example, the tutor asked the previous learning objectives and the students discussed the situations for the fatal effect of electric current. Since the topic of the scenario seemed interesting for the students and related with everyday life, the tutor asked some daily life questions to deepen reflection. For example, tutor quoted: “why man and woman differ while resisting to the electric current? How much parts of your body resist to the electric current?” He waited long enough to let students discuss freely. During the group discussion, there was a minimal interference from the tutor. He did not interrupt the students’ discussions and waited until the end of the group discussion. He gave the unclear parts as homework for the students to search until the last session.

The tutors, who were the content experts (especially Tutor ‘B’ and Tutor ‘C’) of the module being observed, usually asked very important questions to re-focus students’ discussions. However, they intervened the group discussions more frequently than the others. In fact, that much of intervene is not an expected PBL behavior. Sometimes Tutor ‘B’ gave the answer of the questions just after some students’ comments. Similarly, in her module I, Tutor ‘C’ did not hesitate to lecture the students if they were confused about an issue or deviate from the subject. While interviewing with her, Tutor ‘C’ confirmed this stating as follows:

The role of the tutors should be just to guide of group processes not to teach something; keep the discussion alive and prevent the students form wandering away from the subject. However, I am not sure whether we can do this or not. For my part, I never give this kind of guidance if I am content expert of the module I am guiding. I explain what students do not understand as a result of their requests. That is to say, I am not doing a work that is appropriate to its definition.

The same situation was observed during the module of Tutor ‘B’ too. Both students and tutor were pleased since the tutor was expert of the module subject. The followings are the statements of Tutor ‘B’ and two students that the researcher took while observing the sessions:

Student1: Both this group and you were fine during this module.

Tutor 'B': Yes, it is true but sometimes, I can not hold my tongue. I do what I should not do. I explain so many things. In fact, I should sit silently. This is basic problem of us.

Student2: This module was fine since you were our tutor. I believe that I learned the subject well thanks to you. We did not have difficulty due to your guidance.

Students' Actions in PBL Sessions: During the sessions, some students participated in the discussions freely and shared their results comfortably. The followings are the statements that the researcher took while observing the sessions.

When a student asks a question, some of the others try to answer this question. When a student is drawing something on the board, the others are making comments and helping each other. One of the students is explaining something to his friend sitting next to him and they are discussing the topic (observation notes from session of Tutor 'C').

However, not all the students participated in these processes. It was noted that certain students seemed to answer most of the thing or tried to put forward an idea, whereas others did not share their comments. Out of 8-10 students, generally 3-4 students were trying to participate in the discussions. Some students presented the results of their research and shared their ideas with others. Some students expressed the difficulty they had in understanding some parts. At those times, either peers gave some explanations or tutor gave some clues. However, remaining students did not participate in the discussions.

There was collaboration between some of the students. They were making effort to ensure that all are in the same page of the scenario and same issue. Some students were checking each other to make sure that they were on the right track. Generally, there was a consensus within the group. The followings are the statements that the researcher took while observing one of the sessions of Tutor 'D': "One of the group members is fifteen minutes late to the session but other group members especially the ones sitting next to him are explaining what he missed."

During the observations, it was obvious that some students discussed the problem and they had the control while continuing the scenario unless they have gone too far of subject. For example, while observing the module of Tutor 'A', the researcher noted that students completed a scenario page and then moved to the next one without receiving approval to continue or asking the tutor if there was anything else on that page they needed to emphasize.

In the second or third sessions, some students were well-prepared for the sessions and shared their ideas and knowledge, presented the results of their research but some were not. When the tutors asked them whether they reached the learning

objectives or not, it was obvious that some of the students have not checked those or even think about them.

DISCUSSION

In terms of perceptions of PBL and its essential components, participants' mentioned PBL characteristics were almost similar to those reported by the literature (Barrows 1986; Riberio & Mizukami 2005; Savery & Duffy 1995). However, some differences were observed between their perceptions and their actions during tutorials. During observations, it was noted that tutors gave necessary directions and some hints; asked questions; checked students' understanding and assessed students' performance. However, some tutors intervened the discussions more frequently and explained some topics more than the others especially if they were content experts of the modules they were guiding. Similarly, in their study, Silver and Wilkerson (1991) observed four PBL tutorials to examine student-tutor interactions. The authors found that tutors who rated themselves as content expert played a more directive role in their tutorials. They spoke more often and for longer periods, provided more direct answers to the students' questions and suggested more discussion topics.

Moreover, students' actions revealed that only less than half of them participated in the discussions, shared their ideas and knowledge, and presented the results in each module. Looking at the interview notes, it was clear that the participants were aware of this difference between their perceptions of PBL and their actions during PBL tutorials. They even confessed that some of the students and tutors do not act according to the necessities of PBL. When the interviewees were asked the reason of this difference, they mentioned that this difference occurred due to some weaknesses or the problems they faced during the implementation of PBL. For example, students' coming to sessions unprepared and not participating to tutorial sessions was reported as a barrier for the implementation of PBL. In fact, students' active participation to the learning process is one of the main aims of PBL. However, it seemed that some students could not internalize this role. During observations it was observed that while some of the students tended to answer all questions or tried to put forward an idea, some of them seemed disinterested about what is going on around. Some interviewees stated that this weakness occurred due to student's low level of adaptation to PBL. 9 students (64%) emphasized that most of the students had negative point of views toward PBL or could not adapt to the system. They emphasized that one reason of having difficulty to adapt to the system or having negative point of views might be being accustomed to conventional learning settings. For example, a second grade student stated that students started to be educated in PBL with reactive feelings and therefore had difficulty in adapting to the system. In his study, Khoo (2003) examined the implementation of PBL in Asian medical schools and students' perceptions about their PBL experience. He mentioned that if students behave according to some characteristics of the Asian culture (fear of confrontation with the authority figure of the teacher, low

participation in class discussions, lack of motivation to ask questions etc.) they may listen passively to the teacher which make PBL difficult to implement in Asian medical schools. There are some similarities between the mentioned characteristics of Asian students and our students. In Turkey, students entering the universities are familiar with the conventional teacher-centered curriculum. This may be one of the reasons of having difficulties while adapting to PBL in higher education curriculum.

Students' not enough theoretical background/prior knowledge may be another reason of having difficulties while adapting to PBL. Some students expressed that having limited or not enough prior/theoretical knowledge about the topic given in the problem is a limitation during sessions. Analyzing the interview notes, we can see a freshman and sophomore students' (both students repeated the class and their GPA is below the average) concern about the necessity of prior knowledge and preference of content expert tutors' lecturing. Observation results supported this idea since these students seemed to be more satisfied and also expressed their satisfaction when content expert tutors were giving direct instruction. This finding has similarity with the findings reported by Schmidt, van der Arend, Moust, Kokx, & Boon (1993) and Neville (1999). They stated that students (especially first grade students) were more dependent on their tutor's content expertise than advanced students. In fact, novice students attending PBL curriculum are unfamiliar with the PBL process and mostly have little prior content knowledge. Therefore, they need guidance and rely heavily on their content expert tutor. Similarly, tutors also preferred to be involved in modules related with their content expertise. Looking at the observation and analyzing the interview notes, it was clear that some tutors' purpose (especially the purpose of the Tutor 'B' and Tutor 'C') was not behaving according to the necessities of PBL. Their purpose was mostly being more useful for students' understandings and they think that this purpose can only be achieved if they give direct instruction when necessary.

Similar to the students, tutors' being accustomed to conventional learning settings may be the reason of having adaptation problems so the reason of the difference between their perceptions of PBL and their actions during PBL tutorials. For example, Tutor 'D' explained: "Since we are accustomed to conventional education so much, it becomes hard to depart from that system and adapt to PBL."

Lastly, tutors' complaints about their feeling of doubt before starting to implement PBL and their unpreparedness for this kind of an unconventional learning system may also be the reasons for this difference. For example, one tutor expressed that she later realized how they (as a department) were unprepared to implement PBL when they decided to implement it. Another tutor mentioned the deficiency of this transition since they didn't conduct a pilot study. The other two tutors emphasized the disorganization in their department about giving/taking training, planning schedules and discussions related with the implementation of PBL.

CONCLUSION AND SUGGESTIONS

According to this study, gap between theory and practice still continues in the implementation of PBL. Therefore, the reasons of this gap should be identified first and some suggestions should be given to eliminate this gap.

This study shows that tutors who are unfamiliar with this kind of an unconventional learning environment, who do not understand the underlying philosophy of PBL, and/or who have some complaints about the implementation of PBL, may not act according to the necessities of PBL and feel that PBL is uncertain. Similarly, students (especially novice ones) who are accustomed to conventional learning and/or who have some problems/concerns about the implementation of PBL may feel uncomfortable while fulfilling their roles, (doing research, collaboration with students etc.) be reactive to the operation of the curriculum, and have difficulty to adapt PBL. Therefore, both tutors and students should not be involved in PBL cursorily until they are familiarized with the philosophy of PBL, their roles, process, and the learning environment thoroughly. In order to do this, they should be trained carefully before and during the PBL implementation process. It is necessary to develop a detailed student training/orientation program addressing their roles. In a similar way, tutors training programs should be given more importance and tutors should be trained about their roles and responsibilities. Moreover, there should be regular/continued evaluation of PBL processes at institutions and faculty should discuss the program regularly by giving and receiving feedback.

Studies have shown that tutors' facilitative role is open to interpretation. Tutors' degrees of giving direction or the content knowledge they are expected to show are widely debated by researchers. The literature says that PBL is more than a simple teaching method. Its outcomes are often complex and difficult to measure. This study shows that different situations (students' level, theoretical background, adaptation level etc.) may require different tutor features while facilitating students' learning and improving group function. Moreover, there are lots of interrelated factors affecting the results of those features. For example, tutors should not always demonstrate their content expertise in tutorials to assist students' learning. They may be sometimes directive while guiding novice students but as students mature, they should balance their desire to be directive and act in a less structured way. Therefore, effective PBL tutorials should be investigated well, necessary features of tutors and the learning environments should be specified for all context and which sides of PBL are important for which particular outcomes should be pointed well. Moreover, problems or weaknesses of tutors and students should be considered and tried to be eliminated during all stages of PBL implementations.

Curriculum developers, administrators or faculty who are responsible for implementation of PBL curriculum should take into consider the gap between theory and practice while preparing their curriculum, implementing PBL, and evaluating/revising their curriculum in order to ensure successful implementation of

PBL. Careful/successful preparation and planning is needed before PBL starts to be implemented and it should be maintained after it is being implemented.

To sum up, this study may help curriculum developers or administrators to overview their weaknesses and fix those weaknesses to improve their performance and instructional practices. Therefore, analyzing the PBL and taking the ideas of students and tutors who are the basic components of it, seems to be of fundamental importance to contribute PBL implementations.

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APPENDIX

Observation Checklist

PBL Characteristics / Criteria	Rating of PBL Tutorials How Frequently Evidenced*				
	Module of Tutor 'A'	Module of Tutor 'B'	Module I of Tutor 'C'	Module II of Tutor 'C'	Module of Tutor 'D'
Students					
• Actively participate in group learning					
• Identify their learning needs/ what needs to be learned					
• Work collaborately with each other to solve the problem					
• Collect and analyze the information					
• Develop strategies to enable and direct own learning, critical thinking					
• Well-prepared for sessions					
• Take responsibility for own learning					
• Skillful in communicating with peers					
• Demonstrate effective group skills					
Tutors					
• Facilitate, coach, guide of group processes					
• Guide to additional resources					
• Learner, as well					
• Provide information about what is needed					
• Provide necessary resources					
• Intervene group process					
• Assess students' progress					
PBL Session					
• Is a student-centered process					
• Consists a learning group small in size (6-10)					
• Allows collaboration					
• Begins with the problem encounter					
• Allows students to identify what needs to be known to reach a better solution					
• Ends with analysis and reflection of what was learned					

* Always: A Frequently: F Sometimes: S Never: N