

## **The Interpretation of Problem Based Learning: A Case Study**

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### **ABSTRACT**

*Currently, there are a large number of higher education institutions transforming their traditional educational approaches to PBL. In order to address the challenges for PBL implementation for a university, it is quite necessary to investigate how the managers and staff members interpret PBL in practice. Through the exploration of a university which is in the process of transforming its traditional educational paradigm to PBL, we note that there is a lack of unified understanding of what PBL is at the university. Several different PBL interpretations emerge and some of them are quite inconsistent with, or even contradictory to each other, which further pose significant challenges to the university when implementing PBL. It should be acknowledged that the diversification of PBL interpretation is unlikely to avoid at a university. The diversity of PBL interpretation would create large tensions at a university, but it also points out new possibilities for the university.*

### **INTRODUCTION**

Since the inception of the late 1960s, the PBL (Problem Based Learning) approach has a history of over four decades. Gradually, the value of PBL has been recognized and documented in a number of researches (e.g. Dolmans and Schmidt, 1996; Dochy, Segers, Bossche, and Gijbels, 2000; Bowe, and Cowan, 2004; Strobel and van Barneveld, 2009). PBL seems to surpass traditional education approaches in terms of promoting students' skill development (e.g. communication skills, problem solving skills, critical thinking), motivating students to learn, as well as fostering students' lifelong learning attitude, etc. Therefore, PBL has been adopted by an increasing number of higher education institutions worldwide. As the effectiveness of PBL has been widely recognized and documented, Strobel and Barneveld

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(2009) suggest that the focus of the researches regarding PBL should be shifted towards the challenges of PBL implementation, which implies that the research field is to some extent lacking the knowledge regarding the challenges for PBL implementation. Likewise, Savin-Baden (2000) notes that current PBL researches are primarily concerned with providing guidance in and examples of PBL implementation and they are thus paying little attention to dealing with the difficulties and complexities of PBL implementation.

The challenges for PBL implementation has been documented in some studies (e.g. Little and Sauer, 1997; de Graaff & Cowdroy, 1997; Lonka, 2001; Ward & Lee, 2002; Tai, Huang, Bian et al., 2008; Kolmos, 2008), and it is noted that various factors could be responsible for hampering PBL implementation, such as resource limitation, influence of tradition, inappropriate change strategy, etc. Among these factors staff opposition against PBL has been recognized as detrimental for PBL implementation (de Graaff & Cowdroy, 1997; Lonka, 2001; Kolmos, 2008). In general, resistance against PBL is viewed as a result of the conflict between traditional educational paradigm (such as lectured based learning) and PBL. The argument could be put in this way: since teachers are quite accustomed to traditional way of giving students lectures, they tend to doubt the value of PBL and become quite reluctant to participate in PBL activities. However, this is only part of the story.

Apart from the conflict between traditional educational thoughts and PBL, it is equally worth noting that educational theorists and practitioners' fragmented understandings of PBL also bring challenges for PBL implementation. By fragmented, we are arguing that since there is a lack of consensus on the definition of PBL, the interpretations and the uses of PBL in practice are quite diverse (Barrow, 1986; Savin-Baden & Major, 2004; Moesby, 2004). In several cases, different understandings of PBL are significantly inconsistent with, or even contradicted to each other. Though PBL theorists have relatively reached the agreement that different PBL interpretations could lead to different PBL approaches addressing different educational needs, the diversity of PBL interpretation as well as its implication for a university in practice has not received sufficient research attention. Therefore, the research question in this study is formulated as: What will happen if there are several different or even inconsistent interpretations of PBL in a single higher education institution, and how should we understand this phenomenon?

In order to address this question, we are primarily concerned with how managers and staff members interpret PBL in higher education institutions. The intention of including the conceptions of managers and staff members in this article is basically due to that, firstly, in general, the conceptions of organizational members produce a significant impact on organizational process (Henriksen, et al., 2004). Regarding education and PBL, teachers' conceptions of teaching and learning determine which instructional approaches they are going to employ (Trigwell and Prosser, 1996; Trigwell, Prosser and Waterhouse, 1999). For example, teachers are more likely to maintain the use of lecture if they think that learning is to

obtain knowledge content from external authorities, whereas they are more willing to encourage students to engage in learning activities if they hold that learning is a process in which students construct their own knowledge. Further, although the definitions and designs of PBL has been widely addressed in literature (e.g. Barrows and Tamblyn, 1980; Boud, 1985; de Graaff and Kolmos, 2003), on the whole, the voices of staff members are largely missing from the studies on PBL (Savin-Baden, 2000, p.9), which further implies that little has been studied on the conceptions of staff members regarding PBL. Therefore, it is quite necessary to explore how staff members interpret PBL in practice during the PBL implementation process.

We will start with a brief review of what PBL is. It could be found that in general, the consensus on the understanding of PBL has been reached yet. Afterwards, the empirical part is largely replied upon a university which is in the process of implementing PBL. Particularly, the focus will be concentrated on how the managers, the staff members, and other actors at the university interpret PBL in practice. Further, we will explore the impacts of the diversity of PBL interpretation on PBL implementation at the university, and how we should understand the phenomenon of the existence of different PBL interpretations at a university.

### **THE UNDERSTANDING OF PBL**

There are a large number of definitions and principles of PBL. Barrows and Tamblyn (1980) identify five characteristics of PBL: complex and real world situations, teamwork, students gaining new information through self-directed learning, teachers' role as facilitator and problems leading to clinical capacity development. Walton and Matthews (1989) propose that PBL could be recognized from three dimensions: firstly, there are some essential characteristics which distinguish PBL from other educational approaches, such as that curricula are organized around problems rather than disciplines, an integrated curriculum and an emphasis on cognitive skills; secondly, some conditions such as small groups, tutorial instruction and active learning should be established so as to facilitate PBL learning; thirdly, PBL should produce some special learning outcomes in terms of skills, motivations, as well as the abilities to become lifelong learners. Kolmos (2008) categorizes three major dimensions of PBL: learning perspective in terms of problem based learning, content perspective in terms of inter-disciplinary learning, as well as social learning such as group work. Although these researchers agree on some general PBL principles, such as problem centered, teamwork, they did not fully reach a consensus on what elements PBL should contain.

In practice, various uses of PBL are developed in order to address different educational objectives. We may see these examples in the works such as Barrow's (1986) PBL taxonomy, Savin-Baden and Major's curriculum model (2004, p.35-45), Moesby's PBL approach (2004). They exemplify different uses of PBL in practice, which further points to different PBL interpretations with different assumptions of educational objectives and learning. For

example, when PBL is implemented at the individual level, only a small proportion of the learning material in a single course is delivered in PBL. In this sense, although there are some PBL elements in a course, the whole curriculum is still lecture based. Another example is, the curriculum may have a common large project to make connections between different subjects; however, whether the curriculum is based on PBL is largely dependent on whether curriculum design starts from a problem (Moesby, 2004). In other words, the existence of a common large project does not necessarily mean that the curriculum is quite PBL based. These PBL approaches, although all termed as PBL and having some PBL elements, are not quite consistent with each other. Some of them may even be contradictory to each other. For example, a curriculum system, which contains a common PBL project coordinating different subjects, can either be problem based or lecture based.

Further, it is discussed whether PBL should be seen as an instructional approach (e.g. Savery and Duffy, 1994), or an educational philosophy (e.g. Margetson, 1991). In practice, when PBL is only seen as an instructional method in an educational institution, the entire organizational culture still sticks to its traditional values and no change happens to educational objectives and assessment methods. In some cases, PBL may even serve as means to promote students' knowledge retention. On the contrary, when PBL is treated as a general educational philosophy in an educational institution, PBL may be seen as "*a conception of knowledge, understanding, and education profoundly different from the more usual conception underlying subject-based learning*" (Margetson, 1991, p.43). The educational objective, the teaching and learning method, the assessment method, the design of the curricula and the courses, the organizational system as well as the organizational culture are restructured as a whole in accordance with the value of PBL.

From the above discussion, it can be noticed that the interpretation of PBL is quite diverse. As for current PBL studies, researchers have already noted the value of these different PBL understandings for curriculum design which could address different educational needs. However, they have not paid sufficient attention to the implication of these understandings for a higher education institution which is in the process of transform its traditional educational approach to PBL. In the following section, we will see that the existence of different interpretations of PBL in a single university produce significant impact on the process of PBL implementation.

## METHOD

In order to address what will happen if there are several different PBL interpretations in a single university, this article is particularly concerned with university X in Australia which in recently years made initiatives to transform its traditional educational paradigm to PBL. Case study (Yin, 1994; Flyvbjerg, 2006) is chosen as our research method because it allows an in-depth exploration of a particular organizational phenomenon which, in this study, mainly

refers to how PBL is implemented at the university and how PBL is interpreted by managers, staff members, and other actors who involve in PBL implementation. The empirical data includes 16 in-depth interviews (managers, research and teaching staff, technical staff, external consultant), internal documents from the university (such as policy statement and curriculum plan), and staff's publications regarding PBL implementation.

### **A BRIEF STORY OF PBL IMPLEMENTATION AT UNIVERSITY X**

Since 2005, the top manager at university X initiated a change plan to introduce PBL into two of its engineering programs: School of Electric and Electronic Engineering (EE), and School of Architecture, Civil and Mechanical Engineering (ACME). They transformed their curriculum in different manners, and eventually formulated two different PBL approaches. The program of ACME (see figure 1) consisted of four units: Physics, Math, Experimentation and Computing, and Engineering Profession. For each unit, a particular component was delivered in the form of PBL (e.g. a project), serving as a complementary entity for the subject. On the whole, a total amount of half of the course content was delivered in a PBL approach (Mills and Treagust, 2003). EE introduced a holistic approach (see figure 2), which led to a radical change, involving the process of redesigning the whole curriculum system. Prior to the change, the EE program had four segmented subjects: Math, Physics, Circuit Theory and Electronics, and Computer Engineering. All of them were focusing on knowledge acquisition. After the redesign process, these four subjects were restructured into two subjects: Electrical Fundamentals, and Enabling Science. They remained lectured based, aiming to offer students fundamental knowledge of engineering and scaffolding the project unit. PBL and Engineering Practice was newly developed as the PBL component, embodying in the form of a big common project coordinating four subjects, allowing students to work on a common project in groups, draw the knowledge from the lectures to solve the problem, and connect what they learned in the lecture to real problems and practical situations. The ratio of subject units to PBL component was 1:1. In addition, the university established a new way to assess students' learning outcome, rather than just evaluating students merely by a final individual written exam. This included the portfolio, project evaluation, group report and presentation, and individual performance. Meanwhile, in order to create an appropriate and comfortable learning environment, the university invested a large amount of financial resource in improving its basic infrastructure, such as building PBL studios and group rooms, providing facilities, as well as offering new equipment.

In 2008, the two schools merged together as the School of Engineering and Science. After the organizational restructuring, the new school decided to replace two distinct PBL approaches with a common PBL model. In 2010, the common PBL model was introduced to replace the two separate education models (see figure 3).

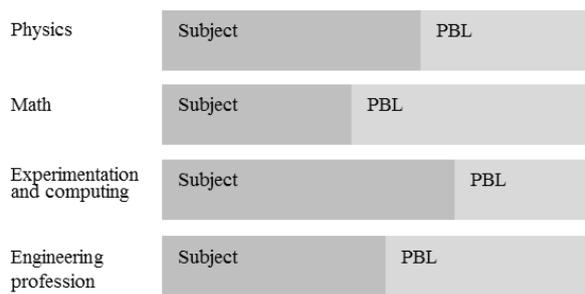
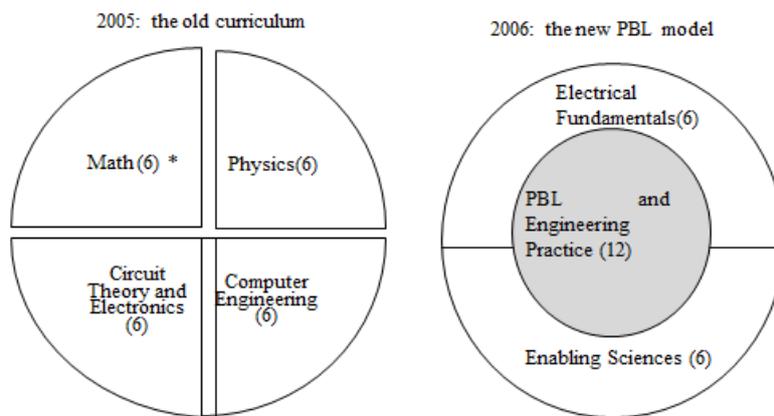


Figure 1: ACME PBL model



\* indicates the number of the credit points

Figure 2: EE PBL for the first year program

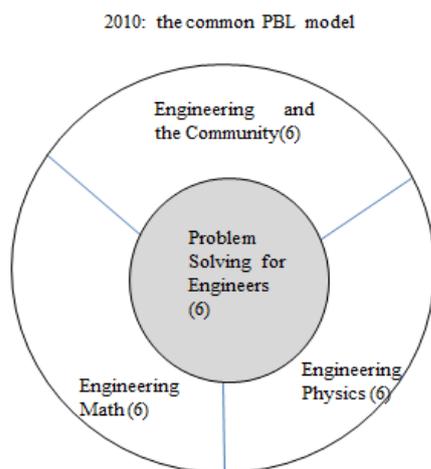


Figure 3: The common PBL model in 2010

### DIFFERENT PBL INTERPRETATIONS

Based upon our empirical work, we notice that a diversity of PBL interpretation has emerged. At the systematic level, EE and ACME implemented different PBL approaches; at the

individual level, some staff members may agree with either EE PBL or ACME approach, while other staff members have their own conceptions of PBL which are inconsistent with both EE PBL and ACME PBL approach. They could be further specified as following:

### **THE 1<sup>ST</sup> INTERPRETATION OF PBL: EE PBL**

EE staff referred to PBL as a curriculum approach which consisted of several traditional subjects, which were aimed at presenting the fundamental knowledge to students, and a common project unit, which was utilized to coordinate and making connection among the subjects. It could be regarded as a holistic curriculum approach as it coordinated different subjects through working on a common project. As a systematic approach, the assessment method was also adjusted in accordance with the learning objectives. According to many managers and staff members, this approach could be recognized as a high quality PBL approach since it shows great strength in cognitive value. Since a large project is designed to coordinate different subjects, therefore it could assist students to break traditional disciplinary boundaries and recognize the connection between different disciplines by encouraging students to draw on theories and methods from different subjects to work on the project. In this sense, interdisciplinary learning is largely manifested. Further, it is also beneficial to coordinate the behaviors of the staff by designing a systematic educational schedule and encouraging teamwork among staff members. The recognition of the value of EE PBL may explain that when the School of Engineering and Science decided to implement a common PBL model to replace both EE PBL and ACME approach in 2008, EE PBL became a prototype (although with some revision) to design the new PBL model.

### **THE 2<sup>ND</sup> INTERPRETATION OF PBL: ACME PBL**

ACME PBL referred to a PBL approach which was composed of four PBL subjects, each of which consisting of a lecture component and a project unit. The project component was only aiming at coordinating the knowledge content in one course. Some staff members argued that ACME PBL was more suited for ACME program where there was a “*strong individual culture*”. In this sense, a radical change was more likely to cause large tensions in ACME program, since such a change would large interrupt staff members’ schedule and thus led to their resistance. Therefore, a gentle change, which allowed staff members to experiment PBL in their own course, seemed more feasible to reduce staff’s opposition if the university wished to see a “*smooth*” change.

However, many staff members maintained that ACME PBL was flawed since first, from a cognitive sense, it was single discipline based and it failed to assist students to recognize the relationship between different disciplines and thus the principle of interdisciplinary learning was not well addressed (as an external consultant commented); second, there was lack of coordination between different staff members, as one technical staff member commented,

*“PBL requires students to work in a group, but we staff members do not work as a team.”* ACME PBL approach seems weaker in formulating a coherent schedule to coordinate the staff, since each staff member is only responsible for designing his/her own course schedule and thus need not to considerate what other staff members are doing. In some occasions, the lack of coordination may cause that sometimes, students are overwhelmed by huge academic burden when several projects are bumping together, while at other times, students may have no PBL work at all.

### **THE 3<sup>RD</sup> INTERPRETATION OF PBL: COMMON PBL MODEL**

The Common PBL model was a result of the organizational restructuring between EE and ACME. It could be viewed as a new version of EE PBL model since there were a lot of commonalities between them. The new model continued to use large projects to coordinate different subjects. However, one major difference of the new model from EE PBL model was that the new PBL consolidated and strengthened the status of lecture based learning in the curriculum system. The proportion of the subjects increases from 25 percent in EE PBL to 50 percent in the new model. The fundamental impetus to increase the proportion of lecture was to highlight the importance of the acquisition of the basic knowledge content. The argument for the reduction of PBL proportion was that, since many students were lacking PBL experience before entering university, they needed more time to get adapted to PBL environment.

### **THE 4<sup>TH</sup> INTERPRETATION OF PBL: MEDICAL PBL**

Some staff members, due to their own working experience, regarded PBL as synonymous to the one that was widely used in the medical field where students worked together on a medical case. A senior staff member who had accumulated many years' experience of staff training, recalled that,

*“I worked in medical field before I came here. That was where I introduced PBL. But I chose to use PBL when I was teaching. ... That was a PBL that was based on 2 week cycle. I present to them with typical higher education, tertiary education, teaching problem. And we met face to face in groups, facilitating groups, so it is more like the medical PBL in Aalborg, project based, identifying basic issues, and allocating tasks in the first meeting. And we did not meet again for two weeks, and they located the resources and post them on the website coming on to them. And then we came back together. We spend the first half of the meeting, pulling over that together, finishing that problem, and start next one. That was much more like a medical type of PBL with relatively short cycle.”*

The staff member tended to link PBL to medical PBL approach (Barrow, 1986) where students worked on a medical case in the form of groups. Indeed, PBL originated from the medical field and the medical PBL has so far become one of the most representative PBL models in PBL domain. Nevertheless, the managers at university X, though agreeing upon the notion of PBL within the medical field, emphasized that there was a distinct difference between the medical PBL and the engineering PBL,

“Other schools (at this university) don’t have PBL in the same way as an engineer does. The nurse works very much on case studies, in a very highly simulated environment. So we have very high technology, digital human being that has blood and blood pressure. So they do some of their work there, and they do other work in clinical settings. For nurses they have to do about 900 hours in hospital and community based setting, as well as simulated learning activities... You might say that that is problem based learning as well. But when you come to talk to us about problem based learning, we are going to focus on the engineering because we say that it is a whole curriculum approach.”

The managers tended to view medical PBL as simulated learning activities and work in hospital. From the viewpoint of the managers, the medical PBL, though having been justified in the medical domain, could not be used as an official PBL at engineering programs at university X, where PBL was solely referring to an engineering PBL approach.

### **THE 5<sup>TH</sup> INTERPRETATION OF PBL: PBL AS PROBLEM SOLVING LEARNING**

Some staff members regarded PBL as a general cognitive process, which was pervasive in the educational domain. In this regard, PBL was not special but serves as a basic feature of education. A senior staff member who had worked in industry for years argued,

“(University X) was for a further long time involved in, perhaps many other universities, were involved in delivering part of the content through PBL. Of course it is not called PBL. You cannot teach engineering without bringing in problems from the outside. I think the same applies to law, to accountancy, to marketing...”

Another young staff member with an art background reached a similar but complementary argument,

“When I did my degree, because I did an art degree, we did problem based learning in art, which was that you were given a problem or a project, then you were going to work on it, so PBL has been taught in arts for a very long time. Like drawing a chair...”

They regarded PBL as being prevalent in educational settings since learning always involved dealing with problems. Whether it is an industrial problem, or an artistic one, they all shared

the similarity of dealing with problems. As long as the learning process involved a problem, it could be called as PBL. However, a senior staff member, though acknowledging many engineers' experiences in problem solving, refuted their attempts to transplant their industrial experience to the university setting, thus making PBL equivalent to problem solving in industry,

“Engineers, they know about problems, I think they know about problem solving, when you talk about problem based learning or project based learning, they think it as the same as problem solving. So they think that if you give a series of lectures or something, then you get the students to apply to a problem, that is, problem based learning. So we have lots of arguments, but one of the key characteristics of problem based learning is that it starts with a problem.”

From this quotation it can be noted that the key trait distinguishing PBL from industrial problem solving was that PBL set the problem as the departure for learning whereas the industrial setting viewed the problem as an area to examine the already-acquired knowledge. The managers viewed PBL as a particular kind of curriculum approach in which curriculum design and learning process should start with a problem.

If we refer to literature, whether problem solving learning and PBL could be regarded as synonymous is still controversial and confusing (Savin-Baden, 2003). Savin-Baden (2003) insists that although they both involve dealing with problems, problem solving in the industry cannot readily be regarded as being synonymous to PBL since it only involves the elements of problem solving, that is, the application of knowledge to a specific problem setting. The focal point of problem solving learning is the acquisition of knowledge rather than the learning process. The knowledge within problem solving learning environment is always given beforehand, and problem solving components only serves as a means to facilitate and test the students' understanding of knowledge from the lecture. However, PBL requires that problems should serve as the learning departure and then dominate the whole learning process. The knowledge acquisition progresses as students deal with the problem.

### **THE 6<sup>TH</sup> INTERPRETATION OF PBL: PBL AS MANAGERIAL BEHAVIOR**

Mostly, PBL was addressed by staff members as an educational matter at university X. However, some staff members tended to interpret PBL as a managerial attempt. Although PBL was officially introduced into the university for the first time, it was not totally alien to some staff members working at the university. For example, for the staff members who equated PBL to problem solving learning, they tended to think that they were already implementing PBL since they believed problem solving learning to be a certain form of PBL. For these staff members who had their own thoughts of and experience with PBL, the official

PBL became a managerial practice to normalize their own behavior. As a senior staff member commented,

“(This university) was for a further long time involved in, perhaps many other universities, were involved in delivering part of the content through PBL. Of course it is not called PBL. ...I guess what happened two years ago was that the university wanted to formalize this and make sure that we do it correctly.”

It can be inferred from the quotation that PBL implementation at the university was not about introducing something new; rather, it was a matter of managerial intention to ensure the correctness of organizational behavior. In this process, the old practice of PBL, which was not consistent with the managerial interpretation, would be corrected, replaced, or even eliminated, which implies further tensions in the organization.

To sum up, there are many different PBL interpretations in university X. The first three PBL interpretations are associated with the *managerial intention* since they are the officially defined PBL and they often determine how PBL will be implemented throughout the entire organization. The other three interpretations can be termed as *individual interpretations* of PBL since they refer to how the individual staff member understands PBL in practice. Although there is quite little systematic record of the individual interpretation of PBL in the previous literature, the individual understanding of PBL is crucial for PBL implementation, since it is the individual who translate PBL into real practice and execute actual impact on the student.

These PBL interpretations are not always consistent with each other; rather, they are differing from each other in their perceptions of educational objectives, how to organize PBL curriculum, and how to conduct PBL with the confined amount of resources. The managerial interpretations of PBL have not reached an agreement on the size of the problem and how to coordinate different subjects. For example, ACME program tends to use several isolated subjects, each of which containing a certain amount of PBL elements, whereas EE staff favor to use a large common project to coordinate different subjects. Some individual staff members may agree with a particular kind of managerial intention, while other others hold their own perceptions of PBL, inconsistent with neither of the managerial interpretations. For example, the staff members, who equate problem solving learning to PBL, tend to insist that PBL is not something new or special but a general cognitive process already prevailing in educational field. Following this, they further maintain that the university is already carrying out PBL activities even prior to the introduction of PBL and therefore the introduction of PBL is more like a managerial action rather than an educational matter.

## HOW DO WE UNDERSTAND THE DIVERSITY OF PBL INTERPRETATIONS?

### What are the consequences of the diversity of PBL interpretations?

As there is a diversity of PBL interpretations at university X, given our research question, it is necessary to address the impact of the diversity of PBL interpretations on PBL implementation at the university. As noted above, since the manager of the university was implementing a holistic PBL approach throughout the university, the diversity of the interpretations of PBL was likely to produce large tensions between the staff members who held the same PBL conception as the management level did, and the staff members who stuck to traditional educational approach, or had their own thoughts about what PBL was, which was not consistent with the managerial attempts. Many staff noted the ongoing pedagogical debate on the value of PBL, which fractured the staff's attitude towards PBL implementation. Some staff members remained doubted about the knowledge coverage of PBL and they insisted that PBL was unable to guarantee that students could learn sufficient knowledge content, and therefore PBL would be detrimental to students' future development. On the contrary, PBL proponents challenged this argument and maintained that PBL was not about teaching detail but to foster students' skill development.

Apart from the pedagogical debates between the staff supporting traditional educational approach, and PBL proponents, the diversity of PBL interpretations added to complexity of tensions at the university, since the staff members hold quite different values about PBL even if they claimed to advocate the same term. For example, the staff members who supported ACME PBL preferred a course level PBL since they thought it fitted the disciplinary context of ACME. However, from the viewpoints of EE PBL proponents, ACME PBL was flawed in at least two aspects: firstly, ACME PBL failed to coordinate different subjects, since each individual teacher was only concerned with his/her own subject and failed to pay attention to the connection between his/her own subject and other subjects. Further, ACME was likely to create huge academic burden for the students when several staff members implemented PBL in their own courses simultaneously.

Moreover, the tensions can be noticed in practice. In decision making process, it was quite challenge to make all staff members accept the idea of PBL. Eventually, as commented by a senior staff member, staff members were somehow forced to do so due to the pressure from the management level. Even so, a considerable number of teachers were quite reluctant to participate in the staff development programs regarding PBL. As noticed by some staff members, some teachers "*rarely show up in staff training programs*" and they tended to find all kinds of excuses for not participating in PBL related activities. They might be involved in teaching, or other activities and they seemed to be not having time to engage in PBL training. Further, many staff members were sticking to the traditional way of teaching regardless of PBL implementation. Some staff members even ran extracurricular lectures so as to secure the knowledge coverage for students even if they were not getting paid for it. Tensions between

EE and ACME PBL proponents can easily be noted. When EE and ACME PBL approaches were running in parallel, they were not clash with each other. However, when the university decided to abolish ACME PBL approach and transformed it to common PBL model, tensions between ACME PBL advocators and common PBL model proponents became quite significant. As a senior staff member recalled, it was quite difficult to convince the ACME staff to accept the use of large project,

“We had series of weekly meetings at least with course coordinators... to work a way through this...it takes months and months and months of negotiation,... finally they accepted, but still it was imposed really against the will of the coordinator.”

As for the staff members who had their own thoughts of PBL, although they claimed to support the idea of PBL, they were more likely to retain their own conceptions of PBL, such as problem solving learning, which were not consistent with the managerial attempts. A staff member expressed his concern about the teachers, who claimed to do PBL but doing something else,

“I am not afraid of those staff who say they don’t like PBL and keep away, I am afraid of those who say ‘they are in’, but in reality they are not.”

Since there were so many different interpretations of PBL at a university, it was quite challenging for the managers to coordinate the staff members to work together. As a staff member commented, “*we require the students to work together, but we cannot work as a whole.*”

### **Is the diversity of PBL interpretation avoidable?**

The *normative-re-educative strategy* (Chin & Benne, 1985) was widely used to facilitate the staff’s conceptual change. During the PBL implementation process, the university organized a lot of staff development programs to assist the staff members to recognize the value of PBL, to know what PBL was, and to know how to design a PBL curriculum and facilitate students’ group work. However, there were a great many staff members who either doubted the value of PBL or had their own PBL conceptions, which were not consistent with the official attempts. The organizational members’ interpretations of a particular phenomenon are significantly conditioned by their “*fore-structure*” (Gallagher, 1992; Gadamer, 1995), which largely relies upon the tradition and the personal experience instead of the technical means. As this research shows, the diversity of PBL interpretations can be partially accounted by the difference of the organizational members’ working and educational experience. The staff’s interpretation of PBL as synonymous to problem solving can be linked to the staff member’s working experience, as what we noted before. Further, as a senior manager commented,

“This institution was a teaching institute, so there was very little research yet, it was just teaching in pretty much the traditional way of teaching. So the staffs in our faculty are here from that type of background, they are not researchers. If you are a researcher, if you got experience in research...you are not frightened of leading a project where you have to answer all sorts of crazy questions...because you are not showing them what the answer is and teaching it point by point... (old staff) don't have wide experience in research...feel a little insecure because they are afraid of students, be frightened of discover because they might be not able to answer the question.”

Since most staff members at the university had little experience of researching, they were more likely to see teaching as a process of delivering the prescribed body of knowledge content, rather than a process of encouraging students to explore the unknown. This tradition may somehow explain that some staff members tended to interpret PBL in a traditional way. Since no staff member can escape from his or her own tradition, when a staff interprets PBL, he or she will bring his own tradition to the present, and thus creates his or her own understanding of PBL. Therefore, the diversity of PBL interpretation cannot be completely avoided.

### **Can a diversity of PBL interpretation be constructive?**

When a university is implementing PBL, in general, the manager tends to use a normative approach to guarantee that the managerial intention can be realized. In this sense, the diversity of PBL interpretations at a university seems to be frustrating, since it sometimes leads up to huge tensions at the university, as we noted previously. However, the existence of the diversity of PBL interpretations, which were not quite consistent with the official attempts, should not be simply seen as a destructive force for PBL implementation at the university. Rather, they disclosed the problems and values of the staff members at the university because the interpretations of PBL were largely influenced by the tradition of the university, the disciplinary traits, as well as the staff members' personal working and learning experience. Further, it may also assist the managers and the staff members to constantly clarify their thoughts and make reflections on what they have done. As one staff member commented from a constructive perspective, “*(the pedagogical debates) actually lead us to having more understanding of PBL, and the staff who were not in agreement, and also where to change.*” The understanding behavior, whether what it is, is always productive because it constantly enables one to make relevance to one's current situation, and eventually renew him or herself, and the tradition in which he or she resides (Gallagher, 1992).

## **CONCLUSION**

Interpretations of PBL in practice, especially the individual interpretations of PBL, are crucial for PBL implementation at a university, since it is the individual staff member who define

how PBL actually performs in reality. The implementation of PBL is much more important than the design process.

We should admit the diversity of PBL interpretations at a university. It is quite difficult to have a unified and coherent PBL interpretation among all staff members at a university. Rather, since staff members have their own *fore-structures* for understanding, their interpretations of PBL become quite diversified, and some of them are inconsistent with, or even contradictory to each other.

The diversity of PBL interpretations should not be simply viewed as a destructive force for PBL implementation; rather, it could be viewed from both destructive and constructive manners. On one side, the existence of different PBL interpretations would produce large tensions between different groups of people if a normative approach is adopted by a university to implement PBL. On the other side, it will help the staff members make reflections on their own thoughts and practices and thus bring new possibilities to a university.

Therefore, the management level should address the different interpretations of PBL when the managers want to implement PBL at the university. It is quite obvious that the managers should convince the staff members why PBL is more advantageously than traditional educational approach. More importantly, since there are various interpretations of PBL, they also need to convince the staff members why the university is going to use a particular type of PBL approach and why a particular PBL interpretation is more advantageous or appropriate than other PBL interpretations.

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