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Applying Problem-Based Language Learning in an Online Class: Designing a PBL Unit

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This paper aims to propose that Problem-Based Learning (PBL) is a method that can help meet the conditions in language learning and instruction. PBL was first used in medical education, where learners engaged in problem-solving activities that reflect the demands of real-life professional practice, thus promoting critical thinking in the content domain. The paper proposes that by applying PBL in language learning and creating situations in which learners work collaboratively on problems, the learners benefit in two respects: (i) they have the opportunity to practise the kind of thinking skills and problem-solving strategies needed in real life, and (ii) they engage in purposeful language activity with others through discussion and negotiation. The paper first provides a theoretical rationale for the use of PBL in language learning and suggests attendant changes in the role of a language instructor in a PBL context. The paper then presents an outline of the stages and components needed in designing an online PBL Unit for use in an undergraduate language class.

[Problem-Based Learning, problem-solving activities, critical thinking, discussion and negotiation, online PBL Unit: 문제바탕학습, 문제해결 활동, 비판적 사고, 토의와 협상, 온라인 PBL 단위]

I. INTRODUCTION

As online environments become an increasingly explored resource for language instruction, there is a concurrent and continuing paradigm shift in the approach to language learning. This paradigm shift is based on changes in our assumptions about how language should be learnt and taught. Current views propose that language is best learnt through natural, contextualized use (Short, Harste & Burke, 1996), that is, when it is utilized to perform authentic tasks. Constructivist theorists emphasize a need to change the language learning and instruction process from one in which a teacher transmits knowledge to learners, to an approach in which learners become actively involved in the construction of knowledge (e.g., Scardamalia & Bereiter, 1996; Brooks & Brooks, 1993). A basic assumption of the constructivist position is that learners cannot learn to engage in effective knowledge construction activities simply by being told new information, but by being given repeated opportunities to engage in in-depth exploration, assessment and revision of their ideas over extended periods of time. In addition, instruction should be anchored or 'situated' in the context of authentic problems or tasks that allow learners to make use of the kinds of strategies they would use in real life (Brown, Collins, & Duguid, 1989).

Furthermore, it is assumed that the construction of knowledge is a social activity. This assumption suggests that language development in individual learners takes place when they interact with other language users in the target language.

Online environments can be designed to support these basic conditions for a constructivist language learning approach. Online classes can be easily designed to support interaction among learners, at least in the written form, via conference boards. However, for the classes to also support contextualized language use, the approach must include the use of authentic tasks so that the language activity in the classroom simulates language activity in real-life. One approach that can help achieve this objective is to set up asynchronous online conferences in which language learners can engage in collaborative problem-solving activities, using a Problem-Based Learning Approach.

This paper explores the use of a PBL-based approach in an online class in the following manner: Section II briefly describes the historical and philosophical background of PBL, provides a theoretical rationale for using it as an approach to language learning and instruction, and discusses the role that instructors have to

play in a PBL context. Section III outlines the structure of and procedures involved in a Problem-Based Language Learning (PBL) unit being designed for inclusion in an undergraduate language course on language development using Information Technology. Section IV concludes the paper with a look at some of the issues involved in the use of PBL, and proposes that an exploratory study could offer pointers on what needs to be done to address the challenges.

II. THEORETICAL BACKGROUND

1. Problem-Based Learning

Problem-Based Learning (PBL) belongs in the educational philosophy of Constructivism, a theory of education that proposes that knowledge is the construction of understanding resulting from individual experiences.

Ironically, traditional constructivism has its historical roots in the Socratic method of dialectics, in which the Socratic teacher controls the process of learning by formulating and posing a series of questions to help the student search for a predetermined 'truth' through the use of reasoning. The Socratic teacher designs 'dead ends' and 'blind alleys' as rhetorical devices to enhance the persuasiveness of what the student is eventually led to believe. Thus, this method assumes that learning is a search for verifiable and objective information.

In the 20th century, however, with the writings of Dewey, Vygotsky, and Kuhn, constructivism became a theory of education based on the argument that knowledge is the construction of understanding resulting from individual experiences, instead of the discovery of verifiable and objective facts (von Glasersfeld, 1991). This new understanding of knowledge represents a serious break from the traditional positivistic view that dominated research education through the extensive use of the scientific method (Lincoln & Guba, 1985).

This change in focus represents what Kuhn (1970) called a radical paradigm shift in the understanding of knowledge building. Knowledge is no longer seen as lineal, cumulative, and definitive. No longer should learners be expected to learn by memorizing lists of facts, but rather by becoming actively involved in the subject domain. Learning occurs from the active interaction of the learner with the "world's richness" (Brooks & Brooks, 1993). Seely Brown, Collins & Duguid (1989) refer to

this world-embedded learning activity as a "cognitive apprenticeship" where the student comes in contact with the domain culture of the "expert" instructor in an authentic activity. By entering the culture of the target subject domain, the student participates in a culture-specific activity that allows him or her to participate in the "distributed cognition" (Salomon, 1993) of that content community. The student in fact becomes an integral part of the learning community.

One educational method that actively involves learners in the subject domain is Problem-Based-Learning. In the early 1970s, PBL was created as an alternative instructional method to prepare medical students for the real-world problems of medicine by giving them authentic medical problems to solve rather than making them learn through traditional lectures on the basic sciences and on the different organ systems which were taught out of context. These problems were based on real-life medical cases and, therefore, were more clinically applicable and immediate. The students were divided into teams and presented with authentic medical problems to solve. They were not left to work completely alone, but rather they were assigned a medical practitioner who would act as facilitator. It was argued that this method of having the students tackle puzzling situations would better encourage them to become more independent and creative in their own learning (Barrows, 1986). This follows John Dewey's (1938) argument that schooling should be an active endeavor that has as its goal creating independent, life-long learners.

Duffy and Cunningham (1997, p. 190) believe that since PBL is an approach "founded on the goal of engaging and supporting the learner in activities that reflect the demands of professional practice" by promoting critical thinking in the content domain, it need not be restricted to medical education. Rather, PBL can and should be used in other domains, including language learning.

2. Theoretical Basis for PBL in Language Learning and Instruction

Behaviorist approaches to learning assume that there is a distinction between knowing something and knowing how to do it, and that knowing is independent of the situations in which knowledge is learned and used. Education is therefore primarily concerned with transferring substance to the learner, with the activity being "ancillary" or "neutral" (Brown et al., 1989). Language instruction approaches that are consistent with this view tend to present language in a structured, linear fashion, resulting in language items being learnt discretely and out of context.

Behavioristic approaches, as Driscoll (1994) points out, thus define desired learning goals independently of learners and then proceed to arrange reinforcement contingencies that are assumed to vary according to the individual.

In contrast, the constructivist paradigm recognizes that the learning situation and learning activities through which learners come to know something shape their understanding about how to use that knowledge. Applied to language learning, these assumptions suggest that decontextualized learning leads to decontextualized knowing, and that learners end up learning about the language but not how to use it (Goodman, 1986; Short et al, 1996). Learners do not really learn rules of language by being told about them but by using language so that they make connections resembling rule-based performance. The PBL approach can embed language learning in contexts that let learners make those connections. The constructivist approach thus shifts the emphasis from lists of things learners must 'know' to the development of language within context. By requiring learners to resolve problems through the effective use of language, PBL offers a contextualized inquiry process. The inquiry involved in PBL posits it within the constructivist framework, which views learners as active organisms who seek meaning by forming hypotheses, developing them and testing them till a viable solution emerges (von Glasersfeld, 1991; Perkins in Driscoll, 1994). Drawing upon propositions made by various other researchers, Forester and Chau (1999) argue that PBL context facilitates language acquisition by allowing the latter to be:

- a developmental process,
- a process of negotiation,
- a decision-making process,
- a meaning-focused activity, and
- a non-linear process.

The theory of situated learning further postulates that learning occurs not in the "heads of individual speakers" but in the fields of social interaction (Lave & Wenger, 1991; Cole & Engestrom, 1993). The individual child, social partners and socio-cultural milieu are inseparable contributors to the learning process, as they determine what and how someone learns (Rogoff, 1990; Salomon, 1993). The collaborative nature of problem-solving in PBL supports this social view of learning. Working on the authentic, real-life problems in PBL situates language learning in the real world, addressing the need to bridge the gap between language

use in the real world and the "fake" world of school (Dyson, 1993). According to Englander (2002), 'real-life' problem-solving activities give students the opportunity to collaborate and generate dialogue. She argues that students need to talk in order to get information they want, reach a decision or solve a problem. By engaging in real life communication, students 'forge a connection' between whatever they were talking in class and what went on their lives thus minimizing students' anxiety and maximizing students' motivation and interest in a collaborative learning situation.

The ill-structured problems designed for PBL also meet the need for learners to acquire cognitive flexibility in language learning (Spiro et al, 1991). The emphasis on reflection in the PBL process further addresses the need to foster critical thinking through reflection (Cunningham, 1987).

PBL thus supports the learning conditions necessary to bring about (i) reasoning, critical thinking and active, and (ii) contextualized use of language which emphasize the process rather than merely the product of language learning. These conditions include:

- a. Setting up complex, ill-structured tasks that do not have clear-cut, absolute answers (Spiro et al, 1991).
- b. Setting up authentic tasks, that is, tasks which incorporate authentic cognitive activity (Duffy & Savery, 1994; Berlak et al, 1992) and communication with actual audiences (Dyson, 1993) and practitioners.
- c. Encouraging reflective behavior (Cunningham, 1987) through the use of running records such as writing journals.
- d. Providing opportunities for social negotiation (Dyson, 1993; Short & Burke, 1991; Short et al, 1996) so that learners can test the viability of their answers.
- e. Allowing assessment of language performance through the use of multiple sign systems and modes of presentation, such as exhibitions, demonstrations, or coherent pieces of discourse, instead of restricting assessment to paper-and-pencil testing of decontextualized answers (Mabry, 1992; Archbald & Newmann, 1992; Wiggins, 1993).

A shift to a constructivist learning paradigm involves changes in the way we approach teaching, so that instruction becomes more student-centered. It is important to note, however, that the teacher's role in a constructivist teaching environment such as PBL does not diminish. There is nevertheless a need to re-examine that role.

3. Role of Instructor in a PBL Situation

In a PBL setting, the instructor decenters his or her role as the source of knowledge and becomes instead a facilitator and cognitive coach who aids and provides scaffolding for the learners (Duffy & Cunningham, 1997). As a cognitive coach, the teacher becomes more of a model who supports the students' learning process. This role is twofold in purpose: (a) to model higher order thinking skills by asking the students probing questions, and (b) to challenge their thinking (Barrows, 1992) at the same time, so that the learners eventually think through problems themselves. The best way to accomplish this is by asking the students questions that make them reflect on the learning process itself, such as: "Why?", "What do you mean?", and "How do you know that is true?" (Duffy & Savery, 1994, p. 12). In contrast, content-laden questions focus only on the product. The purpose of process-focused questions is to challenge the students' reasoning and help them to consider very carefully each step they take in their inquiry. Throughout the inquiry process, the facilitator models the critical thinking questions the students should be asking themselves with the ultimate purpose of stepping back and letting the students begin to ask themselves and their peers those same types of questions.

In addition to acting as cognitive coaches, facilitators must also learn to design ill-structured problems that meet both curricular demands and learners' needs. Teachers then develop a flow of instruction which anticipates the learning needs of the students, and provide for the availability of resources required for their students' inquiry activities. There has to be a conscious effort on the teachers' part to refrain from acting as content experts and sources of information in PBL sessions, encouraging learners to identify and explore other resources instead. This is because the focus has to shift from an effort to get at 'correct' answers to the inquiry process which involves critical thinking, questioning and thoughtful reflection on possible viable solutions.

Since interactions play an important role in collaborative language-learning activity, not only do facilitators have to guide the students' efforts in searching for information, they also face the challenge of maintaining a dynamic two-way communication between the students in each group and helping them share their knowledge with one another. In short, the PBL acts as a mediator whose role is to help students achieve a satisfying group result (Wiersema, 2000) through language and thinking activity.

III. DESIGN FOR A PBL UNIT

An exploratory attempt at using a Problem-Based Language Learning (PBLL) approach is being designed for a group of undergraduates enrolled in a Bachelor's programme in English Language Studies in a Malaysian university. A proposed four-week unit is based on the Problem-Based Learning (PBL) method and will constitute part of a course on language development using Information Technology. The purpose of the unit is to engage the students in online collaboration as they worked on a given problem, thus allowing them to anchor their language use in a task-based activity.

All the materials will be presented online in a discussion board, and students may log on and participate asynchronously. There will be no limit to the number of postings they can make.

The unit consists of several stages:

Stage 1:

(i) Setting up the session: introducing ground rules

The instructor or facilitator first presents the ground rules for the session. One of the rules to be observed in a Problem-Based Learning session is that participants must take responsibility for learning and ask questions if something is not understood. This is a necessary and important stage as it helps set up the group dynamics by getting participants to feel comfortable about challenging each other's thinking in a constructive manner. Establishing this collaborative learning atmosphere is crucial to helping group members work as a team and focus on sharing and extending their knowledge in working on the problem.

(ii) Presenting the problem: bringing it home

An example of an ill-structured problem that may be used for the PBL session is as follows:

The university has imposed a dress code on students that many students are unhappy with. You too have expressed dissatisfaction with some of the rules, finding them impractical and unnecessary. What can you do?

First, the problem needs to be presented to learners. In the context of the given

problem, one possible way of presenting it is to direct the students' attention to posters describing the required dress code for male and female students (available at various places in the university). Students are asked to respond to these rules on the online discussion board. Next, the problem is 'brought home' to learners so they see the relevance of the issue. The facilitator may be achieved by asking the learners questions such as: *What assumptions do you think administrators make about attire and behaviour that prompted the dress code? Do you agree with these assumptions? What impact do these rules have on your movements as a student? What other aspects of student life could the rules impact?*

The given problem is considered ill-structured for the following reasons: it is real and relates directly to the students' current concerns and perturbations (based on their reactions expressed online); it sets up the need and the context for using problem solving and collaborative learning skills; there is a specificity of task outcome and its "resolution" is open to multiple alternatives. We therefore have an ill-structured problem that the learners perceive as real and as one that has personal relevance (Savery & Duffy, 1996). Hence, the participants establish the credibility of the problem and claim ownership of it as well as of the problem-solving (PS) process.

Among the resolutions students might consider are: writing a petition, sending a representative to speak to the relevant authorities, publishing a letter in the newspapers to garner public support, or drawing up an alternative dress code to be presented to the authorities - all of which require substantial language activity (research, discussion and negotiation) to construct.

(iii) Setting up learning goals

Learning goals refer to the kinds of learning that can be realized out of working on the given problem within the participants' domain, that is, language learning. One of the goals planned for the unit is challenging participants' thinking and inquiry within the problem presented. Another goal is for the learners to become more familiar with online resources for checking writing styles and grammar.

Although there are predetermined learning goals, language instructors have to be sensitive toward language learners' needs as the needs emerge. One of the affordances of asynchronous online conferences is that it allows instructors to document and monitor the written interactions in order to identify language needs as they crop up. Part of a facilitator's responsibility is to help learners address their needs by pointing them to appropriate on- or off-line resources.

(iv) Forming participant groups

Participants will work in groups of four or five, which can be pre-determined by the instructor or the learners themselves, according to the composition of the class as well as the practicalities of the situation. The small group setting fosters the development of a sense of a "learning community" (Collins, 1992) among participants who need to learn to work in a problem-solving capacity. The small group process also makes it easier for the facilitator to focus on individual participants, to allow for more opportunity for idea contributions, and to draw the more timid learners out in discussion. Each group will be given their own online space on the Board in which to conduct their own discussions.

Stage 2: Working on the Problem

The participants begin the problem 'cold'. By not knowing what the problem is until it is presented, the participants do not have the opportunity to bring in the expertise of authorities into the problem-solving process. Hence, they can now be thoroughly engaged in discussing, developing ideas, challenging each other's thinking and reasoning, testing their own understandings of learning issues against those of their peers, and in short, thinking through the problem—rather than attempting to come up with a quick solution to the problem posed.

The stages of problem-solving that participants go through are:

(i) *generating working hypotheses or ideas* based on activation of prior knowledge, clarifying each other's ideas, and identifying learning issues. All these will be recorded by one of the learners who is given the responsibility of collating ideas using a framework to help learners focus their discussion. Ideas generated from learners' discussion basically will fall into three categories:

- a) *Ideas or working hypotheses (What could we do?)* – this category refers to ideas generated by learners. As they arise, these ideas become working hypotheses that need to be evaluated for their viability and feasibility.
- b) *Factual knowledge (What do we know?)* – this category refers to learners' prior knowledge that may be applied to help evaluate the ideas generated. At this point, learners need to challenge any ideas or knowledge presented for accuracy and understanding.
- c) *Learning issues (What do we need to know?)* – this category refers to topics or issues that need further investigation to yield information that would help learners evaluate the ideas generated.

Learning issues are considered to be the most crucial component in the framework in promoting learner inquiry since investigation into these issues often requires the learners to do independent research to substantiate, modify or reject the ideas generated. Selecting the most appropriate language forms (such as vocabulary and sentence structure) may also be a learning issue.

At the closing of this session, learners jointly decide which learning issues to pursue, and subsequently which resources to utilize in order to obtain the necessary information. According to Duffy & Cunningham (1997, p. 191), the session is not complete until each learner has an opportunity to reflect verbally on his or her position in the problem, and to assume responsibility for some of the learning issues identified. Hence, ownership extends from buying into the problem to buying into the learning issues identified.

(ii) In the next stage, learners engage in self-directed learning where they address the learning issues identified. They are encouraged to use multiple resources for acquiring information that will help the group evaluate the working hypotheses. Resources include readings, databases, as well as consultations with relevant resource persons – that is, any resources that they would actually use if they were faced with a similar learning issue in the real world.

(iii) Learners get together again online to discuss their findings. They not only share their new knowledge but also discuss how this knowledge is used in evaluating their working hypotheses. In light of the new information, they re-examine the problem and its hypotheses afresh, listing new ideas and learning issues until the group is satisfied that it has gained sufficient information to understand the problem and arrive at some form of resolution. At this point, the group evaluates its activities, with learners summarizing and assessing what they have learned. Thus, steps (b) and (c) may follow a cyclical process, till the learners are satisfied with the information they have gathered.

(iv) Learners synthesise the information gathered and construct a proposed resolution to the problem. In the unit being planned, learners will be required to post their solution online so that the whole class can observe and learn from each other's work.

Throughout this PBL process, the facilitators constantly monitor how the group is addressing the desired objectives of inquiry and developing critical thinking skills. The facilitator acts as a learning coach in guiding participants' thinking and

modeling critical thinking for them. As a metacognitive coach, the facilitator's role involves questioning, probing, encouraging, critically appraising, balancing perspectives, promoting interaction, promoting intentional cognition, and generally prompting learners to become aware of the reasoning and higher order thinking skills they are using (Gallagher, Stypien & Rosenthal, 1992). The facilitator asks questions and at the same time encourages group participants to ask similar questions of themselves and each other that challenge both their thinking and their use of language. Examples of questions that challenge thinking are: *What do you mean? Why do you think/say so? Why is that important in this instance? What would happen if that were to take place?* Questions that prompt reflection on language use include: *Is that the best way of expressing your intentions? What effect would (particular words) have on the listener or reader? Would (particular words) be convincing enough? Do (particular expressions) convey a mature argument? Would the listener/reader misunderstand (a particular sentence)?*

The facilitator could, if he or she wished, also pose questions that prompt metacognition, that is, reflection on the problem-solving strategies used. These questions are aimed at getting the learners to articulate their thoughts on the relevancy of certain critical thinking strategies used (for example, *How do you think thinking of things this way will help us in solving problems in other situations?*), and at raising the learners' cognitive awareness of their thinking processes (for example, *Okay, what we've done so far is to ... how did we arrive at this point of discussion?*). The facilitator's modeling and consistent efforts in putting participants through these intentional cognition activities will help develop that enhance their problem solving and critical thinking abilities.

Since this will be a language-learning experience as well, the facilitator will need to help identify pertinent weaknesses in the learners' language that might impede meaning, especially in the final draft of the text to be submitted. As with other aspects of the learning process, the facilitator needs to refrain from correcting mistakes; instead, the learners should be asked to re-examine particular parts of the text for criteria such as clarity, cohesion or grammar, and to attempt to improve on shortcomings.

Stage 3: Reflecting on the PBL Process

According to Grabinger (1996), learning arises from reflection on the 'doing'. Thus, having participants reflect on what they have experienced provides them an opportunity to gain insight into issues such as: What did they learn (or not learn)

and why? What were the difficulties in working on this particular problem, in working together, as well as in learning individually within a group? Where was their understanding weak, and why was that so?

Reflection is one way that learners could look back on their as well as others' performances and make constructive comments for improvement in how to approach thinking and learning. This uses the method of perceptual learning (Bransford et al., 1989), where the learners look back on someone's performance on a task and assess the strengths and flaws in the performance. Even in their roles as learners, they have to consciously attempt to understand the thinking behavior and thought processes demonstrated by the facilitators during the session. Guiding questions that can help them reflect are: *Why is defining concepts important to the problem-solving process?* and *Why begin with working hypotheses instead of what we already know?* In other words, participants begin to see during the PBL session what are normally invisible processes, and thus can begin to integrate what happens with why it happens (Collins, 1992).

IV. CONCLUSION

The language-learning domain would benefit from a constructivist pedagogical method such as PBL that views learning as the construction of knowledge via activity patterned on real-life experiences. However, although PBL has been successfully used in medical and other areas of study, it is still relatively under-used and under-explored as a method in language learning, especially in an online environment. The PBL unit described here represents an attempt at applying a method for integrating the development of thinking and language skills. Such a unit would take learners through the stages of thinking through a problem, identifying learning goals and issues, working on the problem itself, and finally, reflecting on the whole learning process. The use of PBL would also require language instructors to re-think their roles and the nature of their involvement in the language learning process. An exploratory study would shed light on the benefits and limitations of the method, and make us aware of unforeseen challenges that may be faced by facilitators and learners. For example, while many lessons can be gleaned from the previous use of PBL in other disciplines, facilitators of PBL face the additional challenge of having to integrate the learning of language with

the development of thinking skills. Thus, among the questions that need to be answered are: At which point of the collaborative activity would it be most judicious for a facilitator to intervene with suggestions or indicate language problems, without compromising the constructivist philosophy of developing independent learners? Should explicit language instruction be provided in complement to the inquiry process? A myriad of other issues need to be addressed, including the feasibility of the method with a large group of learners, whether attitudes toward learning affect the success of the approach, and how to obtain evidence of language development within the PBL experience. Clearly, the exploratory experience could help us begin to answer these questions. The data would provide insights into the nature of the language learning and teaching activity in a PBL context, upon which guidelines for future attempts with PBL may be drawn. If PBL can be used with some measure of success, it will serve to enrich our repertoire of pedagogical approaches.

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