

Problem-based Learning Materials Design for a Medical English Course

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Abstract—This paper aims to apply Problem-based Learning (PBL) approach to integrate medical English materials design. As a language teacher, the researchers documented how to design PBL medical English materials and prompted these materials to facilitate students with their speaking ability in group discussion. The material design process consisted of two stages: analyzing the context; and designing the PBL materials. In addition, the explorations of the difficulties the researcher encountered in designing were described in details, and the solutions of these difficulties were stated elaborately. The researcher's journal was the instrument used in the design; it documented the nature of the design of PBL materials, which provided data of the materials design preparation, proceeding and completion. The information from researcher's journal was analyzed by content analysis, which revealed that the complicated process of the materials design required the researcher's collective knowledge and experience, in mastering its complexity. Furthermore, the language teachers need to supply comprehensive knowledge and relative background of the medical content, to gain aids from the content-teacher as the designer to work together, and then the production process could be fulfilled. Finally, suggestions for further research were also proposed.

Index Terms—Problem-based Learning (PBL), PBL materials design, difficulties and solutions, content analysis

I. INTRODUCTION

English teachers in the universities should help students to develop their English proficiency within the period of university study. However, it remains a serious problem, which challenges the teachers at all times as to implement what teaching materials to satisfy the students' needs in English learning and to enable the students to acquire English in English for Foreign Learners (EFL) context. Although the majority of English teachers hold the view that the materials with learner-centered and task-based learning focusing on communication will be of most benefit for students, the prevailing materials of teaching medical English course is still dominated by a teacher-centered approach and with mechanic patterns of medical vocabulary learning (Zhang, 2002). At present some teachers who teach English for Special Purposes (ESP) lack the necessary content knowledge in specialized areas, so it is hard for them to use the appropriate materials in class teaching (Zhao, 2008).

ESP teaching, of which the medical English course is a compulsory course for medical students in their university learning. Medical English has developed quickly over the past few years (Zhang & Wang, 2006). This course provides students with sufficient medical vocabulary to help them to develop the communication skills necessary for conversing with English-speaking doctors and patients, and to acquire important academic information for their future careers. However, the students have almost no time and no chance to practice speaking in class, because of the teaching materials lacking the speaking practice and exercises. One striking challenge of this issue is that what materials in medical course can be used to emphasizes the development of communicative competence and gives priority to the learning of spoken English in medical English course. To solve this problem, the present study endeavors to apply a PBL approach to integrate the design of materials in medical English course. Since PBL has been developed and implemented in an increasing number of many subject-matter domains, rather than just in medical teaching (Barrows, 1992). Kanet and Barut (2003) believe that PBL can be applied in other subject-matter domains, such as language teaching. It is new for the researcher and related practitioners to design such materials, the difficulties are unavoidable to be encountered, and how the researcher solves these difficulties and problems, this study tries to answer the research question as: "What are the difficulties encountered by an EFL teacher who designs PBL materials for medical English courses?"

II. LITERATURE REVIEW

A. PBL as the Condition for Second Language Acquisition

The origin of PBL can be traced back to John Dewey in 1919. Dewey believed that students should have experiential, hands-on, direct learning. It is generally accepted that students learn best by doing and thinking through problems. According to Barrows (1992), the educational goal of PBL is the development of students' thinking or reasoning skills (problem-solving, meta-cognition, and critical-thinking). PBL helps students to be independent and self-directed learners.

Research on second language acquisition has long recognized that language is best learnt through natural, contextualized use, that is, when it is utilized to perform authentic tasks. Students are given the opportunity to learn the target language by using it, rather than being presented with predetermined language structures and then practicing them (e.g., Alan & Stoller, 2005; Garner & Borg, 2005; Rodgers, 2006). Second language acquisition is the process by which people learn a new language other than their native language(s) inside or outside the classroom. Meanwhile, language learners must be involved in purposeful interaction. The PBL could be integrated in such learning context to supply a setting for students' language learning.

a. Main Characteristics of PBL

The application of PBL and materials design should follow some characteristics of PBL, first is the problem in the PBL approach. The problem is crucial to its implementation. Problems should be adapted to the knowledge level of the students. They should engage students' interests, motivate them to search for more knowledge independently, and allow them to relate the new concepts being introduced to previous knowledge (Suh, 2004). Firstly, problem should be ill-structured, be ambiguous, incomplete, confusing or conflicting, and additional information will be needed. There is usually a prescribed way to proceed in solving the problem (Wee, 2004). The second is group work in PBL, it is assumed to be a cooperative learning experience and it has positive effects on learning (Willis & Jones, 2002). Group work helps to distribute the cognitive load among the members of a group and allows the group as a whole to tackle problems that necessitate access to knowledge beyond that possessed by any individual group member (Salomon & Perkins, 1998). It encourages individuals to coordinate different points of view, to enhance reasoning and improve high order thinking skills, all of which can promote shared knowledge construction (Goldman & Hasselbring, 1997).

B. Integration of Language and Content

This PBL medical English materials design should integrate the English language and medical content. According to Swain (1996), a successful integration of language and content in a classroom should explicitly integrate language goals and content goals and provide opportunities for both language development and content learning. It is believed that language proficiency and content knowledge should be developed simultaneously. The focus of the second language classroom should be on meaningful input, such as academic content. The modification of the target language facilitates language acquisition and makes academic content accessible to second language learners. Integrated language and content teaching offers a means by which students can continue their academic or cognitive development, while they are also developing their language proficiency.

C. Teaching Materials Design

A language course design is composed of several parts, including the objectives, the teaching materials and methods, the instruments and criteria of assessment and evaluation, and the methods of data collection and analysis. Graves (2000) provides a framework for the processes of course development in her book, which is illustrated in Figure 2.1:

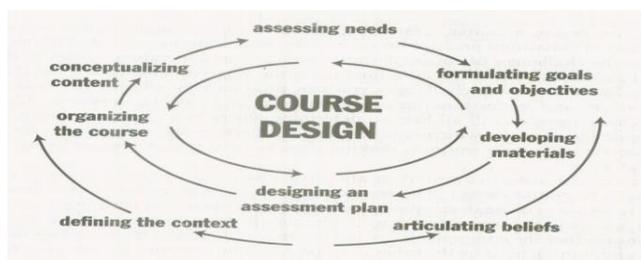


Figure 2.1 A Framework of Course Design Processes (Graves, 2000, p. 3)

PBL materials design in the present study, the researcher begins with formulating goals and objectives, then moves onto the development of materials, and ends with organizing the course. With regard to PBL material design, the essence is that it should incorporate real-world problems, so it should supply authentic problems and related materials. Cunningsworth (1995) suggests that teachers on ESP course can produce their own materials based on certain specialized texts. Because ESP has real target language usage, it requires a diversity of resources for its information. A variety of resources, such as the internet, newspapers, and magazines can be used for obtaining ESP teaching materials.

III. RESEARCH METHOD

For this study, the research design was a qualitative one.

In general, the researcher documented stages of the design of PBL materials as an EFL teacher and a PBL teaching material designer. EFL teachers quite often encountered some problems in designing ESP teaching materials because of their unfamiliarity with the contents. It was crucial to document every challenge that she encountered and the experiences that she had during the process of designing. The researcher designed the teaching materials based on PBL problems, followed the framework of course design processes made by Graves (2000), and observed the two PBL materials design principles of Merchant (1995): (i) designing from scratch and converting existing “case problems” into PBL lessons; and (ii) guiding or consulting practitioners in designing. The researcher reviewed the course syllabus first and determined the medical problems with a medium amount of medical content with the help of a content teacher, then the related reading and listening materials concerning the problems.

In details, the design of PBL materials included two main stages: 1) analyzing the context; 2) designing PBL materials. The researcher’s journal was the major source of data to answer this research question. The two stages of designing PBL medical English materials were described. The researcher’s reflections extracted from the journal were kept to illustrate the discussion, which enriched the facts concerning the difficulties during the PBL materials designing. Further, the reflections of the difficulties and solutions which the researcher encountered through the whole process were reported.

The following Figure 3.1 indicated the two stages of the design procedure. Each stage consisted of some steps to display the complexity of flows as below.

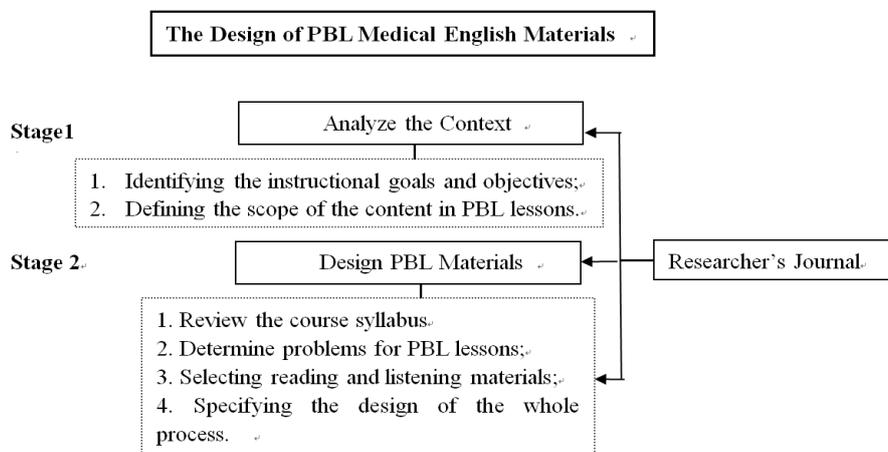


Figure 3.1 Design PBL Medical English Materials

IV. DESIGN PROCEDURE

Stage 1: Analyzing the Context

To analyze the context of the PBL lessons, many factors needed to be considered, for instance, the information about ultimate goal of instruction, course objectives, and students’ pre-requisite background.

1. Identifying the Instructional Goals and Objectives

The medical English course at the university was offered for the third-year medical students in the third academic year. The objectives and goals of PBL medical English lessons were described as follows.

Course descriptions:

An emphasis on medical vocabulary usage for specific professional speaking context, and a range of types of reading and listening as required for various professions.

Course objectives:

- To be able to use the medical vocabulary and expressions to elicit and depend on the information, and convey instructions for specific discussions and class-activities, verbally.
- To understand information in texts, the reading and listening materials and demonstrating the understanding by using this information to complete specific professional reports and discussions.
- To determine the self-directed learning and cooperative learning ideas, promote critical thinking disposition, and apply professional skills for self-improvement.

These learning objectives and goals gave a sense of direction for the design materials. The reflections from researcher’s journal were:

“There were no difficulties for me to determine the objectives of this PBL medical English course because the current learning goals of medical English course were available and clearly stated, I should adopt them to shape the scope of content of the course. The goals also guided me in selecting materials in the design stage...” (Researcher’s journal No.1)

Meanwhile, the researcher took considerations of the third-year medical students of their English level and medical background knowledge level, which could be gathered through their English tests' marks and information from medical teacher.

2. Defining the Scope of the Content in PBL Lessons

Based on the objectives of the course, the contents could be divided into two parts: medicine and English. After analyzing the objectives of the course, the researcher considered the next stage of scoping down the topics and contents of the PBL lessons. The students' existing background knowledge in medicine, their existing language ability, and the goals of the course were concerned.

In order to achieve the goals of the course, the first difficulty was that the regular teaching plan of medical English had to be adjusted. This was the main one the researcher needed to take into consideration. In addition, the approval from the Dean was required in order to implement PBL lessons in such class. Besides, the second difficulty was that several factors concerning students, teachers and contextual variables should be taken into consideration. The key factors included a. students: the students' language proficiency and medical knowledge; b. teacher: the medical knowledge; c. problems (medical cases): the sufficient quality of the PBL problems; d. the supplementary materials: the listening and reading texts which can affect the nature, process and the characteristics of PBL approach. Among all factors, to design the materials at the right level of both students' existing knowledge in medicine and English was to be dealt with by the researcher who was an English teacher. So she needed to get suggestions from the professional content teacher (a medical expert).

"I must talk to a content teacher and a real doctor, to get the suggestions about the scope of the PBL lessons before its development, for I could not determine the students' medical background, which is a main difficulty for me...it is urgent for me to talk with them and get more background information of the students' medical information level." (Researcher's journal No.2)

In addition, since the materials were important to be used to assist the students in the PBL learning process. Therefore, the third difficulty was that too many sources of information needed to be reviewed. It could be textbooks, workbooks, audio-videos, photocopied handouts or anything that contain the target language. Also, another difficulty accompanied with the third one was the researcher needed assistance from the medical teacher, because of lacking the medical knowledge to select the content from these sources. In order to deal with this difficulty in the content's scope, it was essential to consult with the content teacher and the clinical doctor. Further, the fourth difficulty was related to how to encompass the incorporation of the language and content learning. The researcher consulted with other the senior medical teaching teacher and got the suggestions to deal with it.

Stage 2: Designing PBL Materials

After the objective of the medical English course was determined and the scope of the content of PBL lessons was defined, the next was to design the PBL materials. In the designing process, four main steps were included as the existing course syllabus should be considered; the problems should be determined; and the listening and reading materials should be conceptualized; finally the activities and design should be specified.

1. Reviewing the Course Syllabus

For the medical English lessons were given two hours a week with a total of 36 hours (18 weeks) in one semester. The present PBL medical English materials, with the consideration of medical English course objectives, it aims to help the students to acquire vocabulary and terminology in medical English. Further, the materials highlight the reading and listening comprehension, which facilitated students' speaking input. The materials were designed to train the medical students to gain input from PBL reading and listening passages to discuss in groups effectively.

"In relation to medical English course syllabus, some parts can be used in the present PBL lessons as three parts of (1) medical English reading ability, (2) English listening and speaking for medical purpose, (3) medical vocabulary. For the writing part, PBL lessons can include but the writing is not the focus in PBL lessons. Because the research question aimed to investigate the speaking ability changes in PBL lessons ... in this stage, I have too many factors to be taken into consideration, which is my difficulty in designing course syllabus. I asked this question to my advisor, she is an expert of materials design. She suggested me to use this teaching syllabus if it was suitable to the practical teaching and the research. It was important to me that my research should focus the nature of the students' speaking changes in group discussion with PBL lessons, and I can use the existing course syllabus." (Researcher's journal No. 3)

2. Determining Problems for PBL Lessons

An effective problem is essential for PBL course; problem was a framework for discussions that allowed students to recall what they had already known, to quickly identify the shortage of their knowledge, and to formulate questions to exchange the ideas in group. The researcher had three main difficulties in problem determination: (1) time allocation for problems; (2) problems selection and (3) lacking of medical content knowledge.

The problem determination in PBL medical English materials design should be limited within the course schedule and with the consideration of the characteristics of problem. Therefore, the first difficulty for the researcher was how to match the course schedule and these characteristics. The course requirement of the medical English course was one semester, 18 weeks with two hours for one week. Regarding the principle from Merchant (1995), he considered that one PBL required 6 to 21 hours of inside and / or outside class hours. So a total of 36 hours for the whole PBL lessons could

be feasible for both the students and teacher with three problems. Therefore 10 hours were allocated for the completion of solving each problem.

For the second difficulty, the problem from the other sources except the current medical English textbook would be irrelevant and inconvenient for their medical English learning. So it was beneficial for the students to learn PBL lessons with developing the extra problems based on their textbook, it also easier for the researcher to arrange the medical English class teaching and learning. The researcher consulted to the medical teacher, with the regarding of students' present medical subjects, and the factors of resourceful for collocation and useful for communication within group discussion. The medical teacher decided that the three units from the textbook could be used as the basic input of the three problems.

For the third one, owing to have little knowledge on medical content, the researcher had a considerable delay of the problem design. Although the researcher spend a great amount of time on reviewing the content from the sources, and had to search related information of the target problems through the internet, learned about the issues of the problems from medical teacher, all could assist the researcher to continue the designing. However, all the content of the problem should be confirmed by the medical teacher, which directly led to delay of the design. As the statements from researcher's journal as below:

"...although I had read a lot about PBL principles and materials design, I never have any experience in determining PBL problem. So I had to elicit and change the language taken from established PBL programs and tried to clarify the concepts of these problems based on the same topic of the selected units from the textbook. The purpose was to make the three problems as a focus for language learning, which was designed to foster the students' particular skills, for example, vocabulary learning, speaking ability in group discussion, self-learning that were identified as objectives of PBL lessons. The problems should match the logistic realities of the medical case, as a language teacher, I definitely needed help from medical teacher so that the medical content was not beyond the students' existing medical knowledge, which was a considerate delay of the problem design." (Researcher's journal No.4)

3. Selecting Reading and Listening Materials

When deciding on reading and listening materials related to the specific problems, the researcher selected of input must be based upon the students' existing medical knowledge and their language level in order to define what kind of language that would be most suitable for the students.

The first difficulty was found that the ready-made materials videos, audios and internet based materials would not be easy. The researcher had to put more effort and time in finding and considering available materials carefully and work closely with the medical teacher. Secondly, the difficulty was that the materials should be concerned how to select appropriate vocabulary and to decide different content to match them. Finally, the medical teacher highlighted the medical terminology that should be used in discussion in each unit, and the researcher looked through the internet and provided the phonetic symbols and Chinese definition of these terminologies and other general vocabulary. In addition, for the listening materials, to provide transcriptions of each listening passages was another difficult point the researcher encountered. The researcher solved the problem through getting help from a native speaker with teaching college English experience. However, the native speaker had no confidence for the vocabulary accuracy for the shortage of the medical background. So the researcher contacted the clinical doctor to double-check the selected terminology and contents. The researcher wrote in the journal as follows:

"...I was so frustrated when I had a talk with Kim. She was not sure about the accuracy of many medical terms used in the audio and video scripts. I understood that she had no medical knowledge background. It was necessary to get help from the medial doctor who worked in hospital. At the same time, accuracy was the urgent issue I should deal with in the listening materials, every terminology and expressions should be definitely correct." (Researcher's journal No.5)

4. Specifying the Design of the Whole PBL Process

Materials used should be able to link and relate to the students background knowledge as well as their language ability, and the language and content focused are drawn from the input could fulfill any tasks given to them. The four steps of the whole PBL lessons should be specified as follows: (1) introducing the problems; (2) activating relevant background knowledge; (3) searching for more information and (4) discussing in group.

The problem introduction was important in PBL materials design. The researcher followed the medical teacher's suggestion to select the unit topics, which related to real life, authentic reading and listening materials that reflected the target topics. This would help students who were weak in English language to at least comprehend the text in reading and listening materials because it was linked to their background knowledge. All the materials should be produced upon medical students' relevant background knowledge. The facilitating materials of the conceptualization of content were equaled to the completion materials by providing feedback, raising questions, suggesting possible resources and commenting on the various components of the problems as they proceed. The more searched information supplied by the researcher should be having equally level of the text exercises and the students' existing language ability. About the fourth one, the researcher was aware that the teaching aim was not to teach the content of medicine, but how to use the medical vocabulary so that they would be able to communicate in PBL group discussion. It was hoped that the selected PBL problems and materials could assist students to connect the language and medical content from different aspects, so that they could speak out in discussion with the amount of language input.

In stage 2, the researcher had to focus on matching of the needs of students as the comprehensive input as closely as possible. It was crucial that paying attention to content accuracy, and appropriateness (vocabulary appropriateness, proper length sentences, and sentence complexity), coverage comprehensiveness under the permission of the medical teacher and medical doctor, on the other hand, the language level appropriateness, progress group discussion records, and journal quality testing relied on a professional ESP materials designer and teacher should be noteworthy.

V. CONCLUSION

The design of PBL materials for medical English course provided a deeper understanding of the process of content materials design, which consists of defining the context, designing the PBL materials and some sub-steps. The design should attend the integration with language and content and urge students acquire the target language ability when they are solving the problems with content and complete the activities with the language. From the qualitative data, the researcher learned that this time-consuming process of design of PBL medical English materials for medical students is complex. It contains several steps that require the researcher's collective experiences, knowledge and skills. All of which include: the knowledge of English language teaching and learning, content knowledge of other academic disciplines, knowledge of the PBL approach, understanding available communication with content-teacher, and then integrating all to use. In the designing process, it is highly recommended to work closely with the content teacher.

To complete the design, teacher-designer should have adequate time to have a whole layout of carrying out this tough task with full efforts and concentration. Moreover, the materials designer needs to have an in-depth understanding of the nature of the target course, and be able to adopt and adapt the other materials to own teaching materials design.

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