Improving Students’ Ability to Solve the Social Problem: Application of Problem Based Learning in Higher Education

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**Introduction**
Learning activities in Higher Education have not been considered optimal. This is due to the ineffective learning activities, namely (1) the teachers’ poor performance in applying the current and more effective teaching techniques, (2) the teachers’ inept in looking at the learning process, and (3) learners using learning concepts that are less relevant with the development of instructional technologies. This situation can be seen from the trouble learning process which is caused by two things, namely (1) the learning process is informative, meanwhile an active learner is directed to a process for building their own knowledge, and (2) teacher-centered learning activity has not been directed to student-centered learning.

Xaviery (2004) finds that the learning process currently holds less appeal, which can be break down due to two main things; first, the study designed by the faculty can spur curiosity of students to dissect issues around social environment as well as to form a personal opinion on the matter. Second, positioning themselves as a private lecturer patronizing the students not portray themselves as facilitators.

By looking at the causes as described above, it is reasonable if the results are not optimal. It was discovered by Gaspersz (2007) that graduate students have lack ability to solve problems. He said there has been a gap between the performance needed from alumni services—which generally is the work field in many aspects of the field at the working place-performing graduates in Indonesia.

From the weakness of the process and learning outcomes described above, the author believes that one of the possible solutions is to improve the learning system. Improving the learning system in the instructional technology
perspective begins with problem solving-oriented students using the system and learning resources in a broader sense, so that the learning process can be implemented optimally. The assumption is the more optimal learning process, the better learning outcomes would be.

Reigeluth and Merrill (2003) state that an improved learning system must be based on the theory of learning. The learning theory can be viewed as descriptive and prescriptive. Learning theory is a descriptive that detail the results by placing the variable method and conditions as independent variables, and outcome variables as the dependent variable. The theory is a prescriptive by putting the outcome variable and condition as the independent variable, and the variable method as the dependent variable.

The characteristics of optimal learning system is the involvement of students as a subject of study. Thought is needed to be a starting point to find answers to the question "what is to be done by the technologist learning so that students are encouraged to engage in the learning event." The answer to that question will have implications for the design, implementation, and assessment of learning, because they contained a renewal of thinking about how to treat the student as a subject of learning objects and what should be provided to learn the events happening inside him. Learning system must be designed so that students can solve real-life problems of today (Boud & Feletti, 1991). Learning system must be designed so that students are able to think critically, solve problems, and independent (Barrows & Kelson, 2004).

Study of the theory and implementation

1. Concept

PBL (Problem-Based Learning) was first applied in University of McMaster, School of Medicine, Canada in 1969 (Rideout, 2001). Since then, PBL spread throughout the world, particularly in the medical / nursing education and other sciences at the University; for example, Architecture, Mathematics, Occupational Therapy, Physiotherapy and other pure sciences (Jaramillo, 1999; Kang, 1999). Three years later, it was used in three other medical schools; namely, the University of Limburg in Maastricht Netherlands, the University of Newcastle in Australia, and the University of New Mexico, United States (Camp, 1996). In PBL, the student is seen as a "whole" person that has prior knowledge in learning.

At the moment, PBL has developed widely with various kind of adaptation. Most medical schools in the United States and virtually every country in the world, has implemented PBL in their curriculm. The use of these models also have spread in the group of Health Sciences, such as;
Nursing, Dentistry, Pharmacy, Veterinary, and Public Health. Moreover, the institution of Architecture, Business, Law, Engineering, Forestry Science, Security, Social Sciences, Education and many other professional fields have also adopted Problem-Based Learning model (Camp, 1996).

PBL now has attracted attention by promoting in the internet, newsletters, and in various organizations as an innovation that gain "success" in education. In addition, Problem-Based Learning admired by many people, especially the findings on "how to learn" is designed and developed.

There are many definitions of PBL that is summarized from the web. First, PBL is a learning model that requires students to think critically, solve problems, learn independently, and requires skill to participate in the team. The process of problem solving is done in collaboration and adapted to real life that would later become the challenges in life and the students' career (Barrows & Kelson, 2004).

Duch (1995) states that Problem-Based Learning is a learning model that exposes students to the challenges of "learning to learn". Active learners work together in groups to seek solutions to real world problems. This problem is a framework for learners to formulate, analyze and solve. He further stated that the model is intended to develop students' critical thinking, analytical, and to find and use appropriate resources for learning.

Furthermore, PBL is defined as a learning model that can be built around a real and complex problem that naturally requires inspection, information guide, and reflection, while proving the hypothesis, and formulated to look for the truth or solution.

Referring to the various definitions above, it can be concluded that PBL is an instructional model designed and developed to develop problem-solving skills. Problem solving is done by collaborating patterns. Solving problems with this collaboration patterns, using high-level thinking skills and the ability to analyze, synthesize, and evaluate in problem-oriented situations. In this study, the role of the faculty is to pose real problems, encourage, motivate and provide teaching materials, as well as facilitate what is needed by the students. Besides providing support for the faculty in an effort to improve the discovery and intellectual development of students.

PBL has a number of advantages, including: (1) students are able to learn, remember, apply, and to resume or continue learning, and to become more independent, (2) the principles of "membelajarkan" as this can not be served through "Traditional Learning ", (3) the traditional teaching provide students to memorize that failed to apply / do something breaking or integrate knowledge and reply to further study and (4) helps to foster a positive attitude
to learning on student self (Camp, 1996)

Another thing that drives success of PBL as an innovation is the attempt to learn how to make an adult learner as a person, students' autonomy, based on previous knowledge and experience, students are likely to implement it all in terms of ease of learning. To optimize the quality of the process and outcomes of problem-based learning.

Arends (2004) identifies six PBL's advantages; (1) students has better understand in on the concepts being taught because they themselves discover the concept, (2) students involves actively solving problems that require higher thinking skills, (3) embedded knowledge based schemata is owned by students so that learning is more meaningful, (4) students can feel the benefit of learning because the problems were resolved directly integrated with real life, this can increase the learner's motivation and interest in the material being studied, (5) PBL makes students more independent and more mature, able to give aspiration and accept the opinion of others, instilling positive social attitudes, and (6) situating the students in study groups that enable interaction between the professors and their peers so that mastery of learning will be achieved.

2. Characteristics

Characteristics of PBL can be seen from the description of the model as described in the above description. From some of the posts about the PBL, the authors identifies a number of characteristics

First, the main idea behind PBL is that "the starting point of learning should be a problem", a question or a puzzle to be solved by the students. In this case, Ross (1991) comparing PBL with traditional approaches, the model has changed the learning model used in college. In the ordinary learning, it is assumed that the student must have the necessary knowledge to recognize a problem before they can begin to solve it, in PBL, the knowledge gained from the problem-solving activities. Second, student-centered is the nature of the PBL, which emphasizes self-directed learning (SDL). Indications of independent learning can be implemented by: (1) presenting problem that contains a number of concepts and issues, (2) providing enough authority and responsibility for their choices on the issues to be studied, (3) identifying learning required by students as an individual, (4) selecting sources to be used, (5) synthesizing activity and presenting the results of research or investigation in front of their peers, and (6) participating in the self-evaluation, which is another expected behaviour developed by utilizing PBL. Student-centered learning, if compared with the model of teacher-centered learning, is to "learn how to learn" so that learners can meet the necessary skills for life to adapt to
the knowledge, challenges, and contemporary issues that they will encounter in the future (Glasgow, 1997).

Third, although PBL has been adapted for use in a large group (Allen et al., 1996), it was originally intended for small groups and remains a model of choice in most programs. In this scheme, students are usually put in group of 5 to 10 people, most often attended by teachers. The teacher’s role is to review the issues presented. The nature of face-to-face process encourages students to develop learning and the ability to work in groups.

According to Rideout (2001), the essential characteristics of PBL, among others: (1) a curriculum that is based on problems relevant to the expected learning outcomes, not by topic or field of science and (2) the provision of conditions that can facilitate group work is an Independent and or collaboration, using critical thinking, and develop a passion for lifelong learning. Whereas, Arends (2004) identifies four characteristics of problem-based learning, namely: (1) submission of the problem, (2) the relationship between disciplines, (3) authentic investigation, and (4) collaborative work.

3. Learning Design and Implementation Procedures

Based on library research on many studies conducted in PBL, the researcher concludes on a number of procedures or stages of PBL; (1) the design stage of learning, (2) the implementation stage of learning, and (3) learning assessment stage.

a. Designing Learning

1) Formulation of learning objectives

First, specifying on how learning is planned to achieve these goals, such as intellectual and investigating skills, understanding the role of adults, and help students to be more independent. Learning is directed to achieve all of these goals simultaneously. However, other possible developers will give emphasis on one or two specific objectives. For example, a developer plans a study on the issue of social problems. Instead of asking students to simulate an adult roles or seeking solutions to social problems, teachers will ask students to search on the topic related online, in order to develop an investigation skills. It does not consider whether a lesson focused on one goal or many goals. What important is to first set goals, so that they can be clearly communicated to students.

2) Designing a relevant issue

Learning is based on the basic assumption that the situation of the puzzle on issues that are not strictly defined is to stimulate the curiosity of
students by engaging them in inquiry activities (Arênds, 2004). Designing an appropriate problem situations, or planned ways to provide ease of the planning process, is an important planning tasks. Learning developers believe that students have flexibility in defining the problem to be studied, because the process will foster a sense of ownership over the issue (Krajcik, 1994). Meanwhile, in other situations teachers may inform students on the problems first selected from the curriculum.

Problem situations that are selected using four criteria; (1) authentic, (2) it is not strictly defined and should expose a sense of mystery or jigsaw puzzle, (3) meaningful to the student and in accordance with the level of their intellectual development, (4) quite broad (Arends, 2004). The problem is rooted in a more authentic experience than the students real world which is rooted in the principles of a particular discipline. How to cope with "the chaos of street vendors" in the city of Surabaya is an example of real life problems. Learn about the effects of the eviction of the street vendors along the Kalimas river in Surabaya, is also an example of authentic problems in Sociology study program.

In relation to the criteria, the problem is not strictly defined and contains a mystery or jigsaw puzzle. The problem which is not defined strictly prevent a simple answer, and requires alternative solutions, each of which has its strengths and weaknesses. Most situations that contain a puzzle, need to investigate the relationship of cause and effect in a specific topic or ask a question "why" or "what if." The number of situations to trigger students' curiosity should not be limited to certain field. Other criteria, the issue is broad enough to allow teachers to achieve the learning objectives and create a learning feasibility in time, space, and resources.

Another consideration in choosing a developer using problem situations are: (1) the situation raises questions that need clarification through the analysis of cause and effect or give the student opportunity to hypothesize and speculate, (2) ensure that certain problem situations naturally attractive to particular group with whom they work, (3) the situation was appropriate for the level of intellectual development of students, (4) considering that the students can present situation so that the problem can be understood by students and underscores the puzzle aspect of the problem, and (5) coordinate the students can perform a useful investigation in a certain time and resource available to them (Arends, 1997)

3) Excursion Study.

Some schools in the U.S. have tried a Problem-Based Learning project called Excursion Study (Rugen & Hart, 1994). In Indonesia, which
rely on teaching quantum super camp (De Porter, 1999) has attracted many academics and practitioners learning. Expeditionary learning developed in this study enable students to engage in excursion study which purpose is to investigate an interesting problem and find a solution through inquiry and fieldwork. This PBL project can be completed in 3-4 weeks, while others in a few months. In the excursion study, themes or topics are presented in a less strictly manner and defined which include various kind of background study. For example, presented topic, such as, social conflict between street vendors in the terminal Purabaya with the members of the municipal police of Surabaya. From the following topic, sample questions can be elicited, such as (1) how social conflict could happen?, (2) whether the complex factors that influence the occurrence of social conflict?, (3) how social conflict occur?, (4) who need to be involved to solve the problem of social conflict?

Learning is designed to motivate students to work with a variety of materials and equipments, some of which are done in the classroom, while others are done in the library or computer laboratory. This can also be done outside the classroom or in the community. During the learning progresses, the learner can facilitate students to acquire learning resources and provide a wider range of sources of information to be used by students. In some ways, reading materials are not only listed in the curricular. Campus may include materials and equipment needed to support student learning. Learners can access online (directly) to the database and CD-ROM. Materials needed are available, students can facilitate such materials and provide materials for students. Normally, this requires cooperation with librarians and technicians at learning resources center.

Another alternative for learning process, students need to do an investigation activity outside the classroom. Learners involved in solving social conflicts are encouraged to collect data in the community and presented the plans to the local authorities. Sometimes, it may require an interview with the head of the local police, community leaders and others. Lecturer, in this case, facilitates planning in detail how the investigation is conducted, choosing the desired location, how should students behave during the activity outside the classroom, etc. Lectures also equip learners on how to make observations, interviews, and maybe take a picture of the people in their daily activities.

**b. Lesson Plan**

1) Providing Orientation of the Problem

Lecturer starts to communicate learning goals, develops positive attitudes toward learning, and specifies expected outcome. Because some of
the learners may have never been involved in learning, the lecturer also give an explanation of the learning process or the procedure in detail
a) The purpose of learning
The purpose of learning is not to learn some new information, but rather to learn how to investigate important issues and how to be an independent learner. For learners who are just learning to use this learning model, this concept may be described as a separate subject in which they are asked to reveal something in their own opinion.

b) Question or problem
Questions or problems which were investigated did not have an absolute ‘right’ answer, but rather a complex problem and has many solution, as well as the possibility which often contradictory.

c) Inquiry or investigation stage
During the investigation stage of the lesson, the students are encouraged to ask questions and to seek information. Lecturers act as a facilitator to the students trying to work autonomously or with friends.

d) Analysis phase
During the analysis and explanation of the lesson, students are encouraged to express ideas, openly and freely. None of the ideas will be ridiculed by the Professor or their classmates. All students are given the opportunity to contribute to the inquiry and put forward their ideas.

Lecturer presents the problem carefully or with clear procedures for involving students in problem identification. Situation problems presented to students as attractive and as accurately as possible. Usually gives learners the opportunity to see, feel, and touch something that can bring excitement and trigger inquiry. Lecturer uses events, unexpected events (a situation where the results are beyond expectations and surprising) in an attempt to arise students' interest. For example, a video recording of the event of interest or situations that illustrate real-life problems such as riots among the Football fans. Supporters of Persebaya Surabaya and Arema Malang in the Tambaksari Stadium, Surabaya is an effective motivator. The important point here is the orientation to the situation of the problem which determines the stage for further investigation. Therefore, the presentation should attract learners and arouse curiosity.

2) Organizing collaborative learning patterns
PBL requires collaboration skills among students and help them to investigate the matter together. Therefore, they also need help to plan their investigation and reporting tasks.

a) Work/ study with the collaborative patterns
Collaborative learning patterns is formed to represent different levels of ability, diversity, race, ethnicity and gender. Lecturer, later, grouped students according to similar interests or allow learners to form groups based on friendships that have been established. Meanwhile, the investigation team can be formed voluntarily. Lecturers can deliver information to students about the importance of learning in group.

b) Planning the collaboration patterns

After the orientation on the situations, faculty and students time to set-subtopic which specify on inquiry tasks in a scheduled time. For some projects, the main planning tasks is to divide the problem into more general situation and appropriate subtopic. Then, help students to determine where the subtopics will be investigated. At this stage the teacher seeks to have all students to actively involved in a number of investigation activities and that the sum of all the subtopics investigation would produce solution to the common problem situations. For other problems, especially large and complex projects, an important task during the learning phase is to help students to connect the investigation tasks and activities with time schedule.

3) Facilitating the investigation of learners with learning patterns of collaboration

Investigation, whether conducted independently, in pairs, or in team, includes activities such as data collection, hypothesize and data presentation and others.

a) Investigation phase.

At this stage, the lecturer encourages students to collect data and conduct real investigations until they truly understand the dimensions of the problem. The goal is that students gather enough information to create and develop their own ideas. Learning at this stage is more than just reading about the problems in the books. The learning activities facilitate students to gather information from various sources, and ask questions to make students think about the problem and about the types of information needed to come with a solution. Students may need information on how to become an active investigator and how to use appropriate methods to the problems they have learned, for example: interviewing, making an observation, measuring, following the rules, or making note. Students are also equipped with the ethics of conducting research.

b) Formulate a hypothesis, explain, and provide solutions.

Once the learner collect enough data that relevant to the problem, they are expected to make a hypotheses, explanations, and solutions. At this
stage of the lesson, the teacher encourages all ideas and fully accepted them all. As with the previous stage, the lecturer continued to ask questions that make learners think about the feasibility of hypotheses and solving them, and about the quality of information they have gathered. Lecturer continuously facilitate the exchange of ideas freely and encourages students to dig deeper into the problem, if it is needed. The question at this stage can include "what would you need to know so that you feel confident that it is the best solution?" or "What can you do to test the feasibility?" or "What other solution can you propose?"

During the investigation phase, teachers provide necessary assistance needed without interfering. To one or more students, this mentoring activity is to students to help them find the materials and warned of the tasks that must be completed. For other projects, and other students, professors may simply observe from a distance and let students follow their own direction and initiative.

4) Develop and present works

The work will be more than a written report. The work includes a variety of works such as videotapes showing the situation of the problem and the proposed solution, or a model that consists of a physical manifestation of a situation or solve a problem, or perhaps in the form of power point presentation of computer programs and multimedia. By itself, the sophistication of the work depends on the ability of students.

Once the work is developed, the next lecture is to organize a presentation/exhibition to publicize the work of the student. This exhibition could involve learners, community and so on. The exhibition may be the result of the student exhibition in which each learner showcase their work to be observed or assessed by others. The presentation can be in the form of verbal/visual, with the hope of an exchange of ideas, and feedback. This exhibition is also a way to improve relations with the community college. In the exhibition, learners can also listen to students demonstrating the process or topic being exhibit. In PBL, the exhibition is meant to show off the students' work, which is the end result of PBL.

5) Analysis and evaluation of the problem solving process

At this stage, the teacher asks students to reconstruct their thinking and reflect on activities. For instance, when they first gain a clear understanding of the problem situation? when they feel confident in a particular solution? Why they can receive some explanation earlier than others? Why did they reject some explanations? Why did they adopt their final solution? Do they have to change his thinking about the problem situation when the investigation took
place? What causes the change? Are they going to do differently in the future?

c. Assessment of learning

In a study based on the constructivist approach, these steps are performed in assessment; performance, portfolio, project, product, attitude and self-assessment

1) Written Test

Learning can be developed in a written tests. Written test is a test where questions and answers are given to students in written form. In answering the questions students do not always respond in the form of writing an answer, but may also in other forms; such as, marking, painting, drawing, and so forth.

The tests were developed in this study is in the form of descriptions. The written test is a form of description of assessment tool that requires students to remember, understand, and organize ideas or things that have been learned. Learners express ideas in the form of written descriptions using his own words. This tool can assess the different types of competencies; such as, expression, logical thinking, and conclusion.

The written test serves to pre-test and post-test. Pre-test is used to measure students’ knowledge and understanding of social issues before they follow the teaching or treatment. Post-test is used to measure student knowledge and understanding of social conflict after following the model of learning by using the product's research and development.

2). Performance Appraisal

Performance appraisals are conducted by asking learners to demonstrate specific tasks, such as writing reports on the investigation in order to search for and find solutions to problems of social conflict, commit an act of problem solving, interpreting the results of the work in the form of pictures, power point, video, charft or others.

3) Portfolio Assessment

Portfolio assessment is a continuous assessment based on the collection of information that shows the development of students' ability in a specific period. Such information may include the students’ best work, test results (not marked) or any other information related to specific competencies in the field of study.

Portfolio assessment is essentially assessing students’ works individually or in groups in one period. At the end of a period, work is collected and assessed by faculty and the students themselves. Based on the information development, faculty and their peers can assess the students’ progress through the work exhibit and their effort to make improvements. Thus, the portfolio
can demonstrate learning progress of students through the development of his work, among others: the results of problem solving, drawings, photographs, paintings, book, literary work, research reports, synopsis, etc.

4). Assessment Project

This assessment is used to assess the tasks completed during a certain time. The task in question is an investigation since collecting, organizing the evaluation, to the presentation of data. Thus, these sheets are used in the process and the final product of the task. Assessment is focused on the selection of topics, making diagrams on topics that will be investigated, manufacture details about the stages of labor, and monitoring of project work and many others.

In the assessment of students' projects, the faculty consider the three things: (1) management, the ability of students to choose a topic, search and manage time for data collection and report writing, (2) relevant, i.e., compliance with the course, with consider the stage of knowledge, understanding and skills in learning, and (3) authentic, the project of the student's original work.

5) Product Assessment

Product assessment is an assessment of the manufacturing process and the quality of a product. Product assessment includes assessing students' ability to make technology products and art, such as drawings, charts, graphs, films, written reports, and so on.

Product development includes three stages and each stage of the assessment shall be made, namely: (1) the preparation, this include: assessment of the ability of learners and to plan, explore, and develop ideas and design product, (2) product manufacturing, which include: assessment of student skills in selecting and using materials, tools, and techniques, and (3) the assessment phase products (appraisal), that include: assessment of the students' product which in line with the criteria.

6) Attitude Assessment

The attitude stems from feeling (like or dislike) associated with a tendency to respond to student activities and learning materials. Attitude is also an expression of values ??or worldview. It can be formed, resulting in the desired behavior or action.

Attitudes consist of three components, namely: affective, cognitive, and conative. Affective component is the feeling held by the learner or the assessment of learning something. Next, the cognitive component is the belief or beliefs about learning. While, the conative component is a tendency to behave or act in a certain way with respect to the learning activity. In the context of this study, which assessed the attitude, object in the learning process
is as follows:
(a) Attitude towards the subject matter.
   Students need to have a positive attitude toward the subject matter. With a positive attitude, students will grow and develop interest in learning. Therefore, it will be easier to motivate and absorb the subject matter being taught.
(b) Attitude towards Lecturer.
   Students who do not have a positive attitude towards lecturers / instructors will tend to ignore things that are taught. Thus, students who have a negative attitude towards lecturers will be unable to absorb the knowledge.
(c) Attitude towards the learning process.
   Students also need to have a positive attitude towards the learning process takes place. The learning process includes learning environment, strategies, methodologies and learning techniques used. The learning process will be interesting, comfortable and enjoyable which resulted in high motivation to learn, so as to achieve maximum learning outcomes.
(d) Attitudes related to values ??or norms related to the subject matter.
   For example, case or social conflict relating to Sociology. Learners also need to have the right attitude, which is based on the positive values ??of the specific cases of social conflict (attempt the creation of a peaceful society or perhaps because of social inequality). For example, learners have a positive attitude towards poverty eradication program.

PBL Testing Results

Some researches on PBL show that PBL can improve learning outcomes. This is consistent with learning theory proposed and advocated by PBL. Arnseth and Ludvigsen (2000) in their research on computer learning by using PBL produces findings that modern technology equipment (computers) affect thinking, problem solving, conceptual understanding, and application of problem solving strategies, and collaboration processes, compared with the use of equipment in an ancient civilization. He suggested that future studies examine how technology really offers social activities, and how people can ‘be more social’ by using modern technology, because there is an assumption that the ‘technological dehumanization’ or makes man more individual.

Problem-solving is a process to construct a frame of understanding the problem, clarifying the task to solve problems, improve social interaction skills, and develop an accountable work. It can be seen from several aspects, including: (1) achieve mastery of learning outcomes 82.3%, (2) learners are more excited to work / study, (3) productivity of learners in terms of learning
portfolios increase, (4) the tasks problem-solving projects can be implemented optimally, (5) learners have a positive attitude towards the learning process, materials, and norms associated with learning materials, (6) and, more learners have the skills to collaborate. Students can choose a destination to learn, construct knowledge, willingness to learn and collaborate. This shows that PBL is a model of student-centered learning

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