



**A STUDY ON THE EFFECTIVENESS OF USING PROBLEM
BASED LEARNING (PBL) IN WEB BASED COMPONENTS OF
WIRELESS NETWORK SUBJECT**

NOR AZAHANA BINTI ABDUL RAHIM

**MASTER OF COMPUTER SCIENCE
(MULTIMEDIA COMPUTING)**

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Faculty of Information and Communication Technology

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**A project submitted
in fulfillment of the requirements for the degree of Master of Computer Science
(Multimedia Computing)**

Faculty of Information and Communication Technology

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2016

DECLARATION

I declare that this project entitled “A study in the effectiveness of using Problem Based Learning (PBL) in web based components of Wireless Network subject” is the result of my own research except as cited in the references. The project has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : Nor Azahana Binti Abdul Rahim

Date :

APPROVAL

I hereby declare that I have read this project and in my opinion this project is sufficient in term of scope and quality for the award of Master of Computer Science in Multimedia Computing.

Signature :

Supervisor Name : Mr Ibrahim Bin Ahmad

Date :

DEDICATION

Alhamdulillah

To my beloved Husband

To my beloved Mother and Father

To my beloved Son and Daughter

To my beloved Supervisors

To my beloved Lecturrs

To my beloved Friends

ABSTRACT

In teaching and learning approaches used by lecturers are varied to suit the lecturers, students and environment. Problem-based learning (PBL) is one student-centred learning in which students are given a problem to be solved in groups with diversify the search information. PBL is expected to enhance soft skills as it involves among the elements of communication skills, critical thinking, problem solving and teamwork. Existing methods of the present study places students in a passive state and not an active role, where it somehow prevents learning takes place smoothly. It also promotes only a means of communication, therefore lecturers should strive to understand the problems of students and students' understanding of the content of verbal learning without feedback. The study is done to evaluate the effectiveness of PBL through a website for a learning process for lecturers and students in Kolej Poly-Tech Mara Batu Pahat for a Wireless Network subject. The study uses an experimental designs, which are pre-test-post-test design to compare and measure the degree of changes occurring as a result of the effectiveness of students' problem solving skills, students' respond about the PBL implementation and lecturers' opinion about the PBL approach in teaching and learning process through a website. The result that are obtained after applying PBL approach shows that all the measurement were increased drastically compared before applying a PBL approach for this subject.

ABSTRAK

Dalam pendekatan pengajaran dan pembelajaran yang digunakan oleh pensyarah yang berbeza-beza untuk disesuaikan dengan pensyarah, pelajar dan persekitaran. pembelajaran berasaskan masalah (PBL) adalah salah satu pembelajaran berpusatkan pelajar di mana pelajar diberi masalah untuk diselesaikan dalam kumpulan dengan mempelbagaikan maklumat carian. PBL dijangka meningkatkan kemahiran lembut kerana ia melibatkan antara elemen kemahiran komunikasi, pemikiran kritis, penyelesaian masalah dan kerja berpasukan. Kaedah kajian sedia ada ini meletakkan pelajar dalam keadaan pasif dan tidak berperanan aktif, di mana ia menghalang pembelajaran berlaku dengan lancar. Ia juga menggalakkan hanya satu cara komunikasi, oleh itu pensyarah perlu berusaha untuk memahami masalah pelajar dan pemahaman pelajar terhadap kandungan pembelajaran lisan tanpa maklum balas. Kajian ini dilakukan untuk menilai keberkesanan PBL melalui laman web untuk proses pembelajaran untuk pensyarah dan pelajar di Kolej Poly-Tech Mara Batu Pahat bagi subjek Wireless Network. Kajian ini menggunakan reka bentuk eksperimen, iaitu ujian pra-pasca dan ujian pasca untuk membuat perbandingan dan mengukur tahap perubahan yang berlaku hasil daripada keberkesanan kemahiran pelajar dalam menyelesaikan masalah, tindak balas pelajar tentang pelaksanaan PBL dan pendapat pensyarah tentang pendekatan PBL dalam proses pengajaran dan pembelajaran melalui laman web. Hasil yang diperolehi selepas menggunakan pendekatan PBL menunjukkan bahawa semua ukuran telah meningkat secara drastik berbanding sebelum mengaplikasikan pendekatan PBL untuk subjek ini.

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TABLE OF CONTENTS

	PAGE
DECLARATION	
APPROVAL	
DEDICATION	
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF APPENDICES	viii
CHAPTER	
1. INTRODUCTION	1
1.1 Introduction	1
1.2 Research Background	3
1.3 Problem Statement	5
1.4 Objectives of the Study	6
1.5 Research Questions	7
1.6 Scope and Limitation	7
1.7 Conclusion	10
2. LITERATURE REVIEW	11
2.1 Problem Based Learning	11
2.2 Disadvantages of Using Traditional Method of Learning	12
2.3 Characteristics of Problem Based Learning	13
2.4 Advantages of Implementation Problem Based Learning	18
2.5 Problem Based Learning Through Web Based Learning	24
3. METHODOLOGY	27
3.1 Introduction	27
3.2 Research Methodology	27
3.3 Research Design	29
3.4 Research Instrument	31
3.5 Research Analysis	32
3.6 Technique of Collecting Data	33
3.7 Technique of Data Analysis	34
3.8 Research Scheme	35
4. FINDING AND ANALYSIS	36
4.1 Findings	36
4.1.1 Homepage	36
4.1.2 Action Page	37
4.1.3 FAQ Page	44
4.2 Analysis	47
4.2.1 Pre-test Questions vs. Post-Test Questions	47
4.2.2 Problem Solving Skills Questionnaire	49

4.2.3	Students' Respond	52
4.2.4	Lecturer Informal Interview	54
5.	DISCUSSION AND LIMITATION	56
6.	CONCLUSIONS	59
	REFERENCES	62
	APPENDICES	67

LIST OF TABLES

TABLE	TITLE	PAGE
3.1	Post-test and Pre-test Design	30
4.1	Pre-test vs. Post-test	47
4.2	List of Problem Solving Skills Questionnaire	50
4.3	Percentage of Students' Respond	53

LIST OF FIGURES

FIGURES	TITLE	PAGE
3.1	Research Scheme	35
4.1	Homepage	37
4.2	Action Page	38
4.3	Notes Page	39
4.4	Web and Network Page	40
4.5	Community Page	41
4.6	Books Page	42
4.7	Lecturers Slide Page	43
4.8	Video Page	44
4.9	FAQ Page	44
4.10	FAQ (Wireless Networking) Page	45
4.11	FAQ (Firewall) Page	46
4.12	Comparison Score between Pre-Test vs. Post-Test	48
4.13	Enhancement Score	48
4.14	Problem Solving Skills Rating	51
4.15	Overall Percentage	51
4.16	Comparison Scale Percentage	52
4.17	Comparison between PBL Respond	53
4.18	Comparison between YES vs. NO respond	54

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Pre-test Questions	67
B	Post-Test Questions	69
C	Problem Solving Skills Questionnaire	70
D	Students' Respond Questions	72

CHAPTER 1

INTRODUCTION

1.1 Introduction

Problem-based learning is an instructional approach used based on the solution of problems will be provided by lecturer to students. The problem will be given to applicants will be designed and planned in advance so that every strategy taken by students to solve these problems will be able to cover the entire existing curriculum. Problem-based learning is supported by the concept of learning independently in order to facilitate the lecturers and students through the learning process more effective and ensure its effectiveness. Problem-based learning include a challenge to the state of the real problems related to the topics discussed, involving the use of mind and thoughts are critically and fully, Skill solve problem related, needs and working discipline or duties, learning self-movement of teamwork and skills communication, and responsible and persistent in solving any problem related.

As is well known, the education system in Malaysia is oriented exam which students must sit for public examinations such as UPSR, PMR, SPM and STPM. Teaching and learning methods that are commonly used are studying methods of teacher centred learning. The results of the study of teaching methods for college are still weakness in producing graduates who master the skills of even generic best academic achievement (Hasyamudin and Rahifa, 2005). According to Higher Education Minister Datuk Mustapa Mohamed said in a press release, stating that he wanted to see a change in the pattern of

education to produce students who are brave, have the skills and knowledge (Hasyamudin and Rahifa, 2005).

Therefore, educators must move to repair and improve the teaching and learning process (P & P) so as to keep pace with the latest technology and developments. It is the responsibility of educators to use and diversify methods of teaching in order to produce quality students. Among the methods of teaching used is the Problem Based Learning (PBL), which is one good example of the process of learning experience and student centred approach. Where in the PBL, students will strive to find information and solve problems on their own. The process will encourage students to think critically and creatively (KUiTTHO, 2005). Reinforced when Lynda Wee (2004) states that PBL is a student centred approach is an effective approach to improving the quality of learning, to encourage the active participation, cooperation, quick response to the learning process, understanding of the subject and refer the suitability of student learning through self-study.

Research Osman and Kaur (2014) also showed that the highest score obtained by PBL integrated with ICT compared with the control group and the PBL. This happens because in learning, students increased their chances to find relevant information through website and also easier to communicate and discuss solutions through peers online. These differences greatly affect memory material through the integration of PBL and ICT. Strategy Problem Based Learning (PBL) based ICT were discussed in 2006 in an international research seminar "Problem Based Learning Innovation through ICT " at Aalborg University in Denmark (Dirckinck-Holmfeld, 2009). According DirckinckHolmfeld (2009), should be adapted to PBL local conditions, educational goals and cultural traditions to overcome the constraints of human resources the use of ICT. Though strategy ICT-based PBL done correctly will be able to support the learning success

(Yassin et al., 2010), as well as contribute the achievement of the desired learning outcomes (Fong Ma et al., 2008).

1.2 Research Background

Wireless network is an offered subject of a diploma program in computer science and networking in Kolej Poly Tech Mara Batu Pahat. In this subject, it contained a project assignment that ask a students how to configure a wireless network for single layer or a multiple layers inside a building. Students are asked to design a layout that consists of a network hardware and software required to configure a wireless network. Students are also asked to calculate a total costs required in respect of the installation network. There are problems at the end of the study because very few students are able to solve these problems and can produce the correct layout and also can show overall costs involved. This is because in the classroom, instructor only teaches the theory of the hardware involved in the installation of a wireless network and do not lead to practical how to install the network may be or how to draw layout using the software in question and cannot demonstrate to the students how the installation is made. Students also not disclosed the cost of the necessary hardware and software as network installation is made. This is because learning in the classroom is purely theoretical. Research is done is to examine whether the PBL with the help of a learning content that can help students in solving this problem successfully or not. Website provided it gives a guidance on which resources can be consulted by students to complete the assignment.

The content of the website is to be developed by the students will be given problems to solve. Student task is to identify a given problem and make the problem as a problem to be solved. Then, the students have to make findings based on objective issues and identify resources that should be used to obtain information that is true, relevant and

important to resolve the issue. In addition, students have pursued methods of early stage so that problems can be solved perfectly. According to Mohd Azhar Abdul Hamid (2003) stated, at first identified the problem in terms of the structure of matter and created the definition. The precise definition helps the understanding of the problems faced and choose the right solution option.

Students need to collect data and make analysing the information obtained. Azhar Abdul Hamid (2003) states that there are a variety of data collection techniques. For example, bone diagram (analysis: cause and effect), Pareto charts, pie charts, flow charts and others. The process of analysing this issue needed to develop thinking and consider all the possibilities. The objective of this stage is to find the cause of the problem is occurring. According to Kirby, Gary R, and Goodpaster, Jeffery. R (2002), a problem that cannot be resolved until the source of the problem is found. Some questions need to be asked what's up, where, when, who and how the problem occurred. The problem is analysed from various angles as well as the importance of the issue, the experience itself, the reaction of others, cost is a problem, where there was a problem, comparison with other problems and so on (Mohd Azhar Abdul Hamid, 2003). At this stage, students can validate the authenticity of the information obtained and is able to identify lecturers who can be consulted to resolve the issue. In addition, students are able to find the cause of the problem. Students also need to discuss and share information down with other group members and should ensure that sufficient information is collected or not.

Next, students have to make a choice right solution to the problem and make sure the solution made the best solution. In addition, students must have strong reasons to support the completion of its acquisition. The selection of this solution is generated by using a variety of methods to ensure the quality of ideas obtained. Mohd Azhar Abdul Hamid (2003) states that one method is brainstorming to find solutions. De Janasz et al

(2002) also states that this method invite many idea to solve the problem because this method is a technique in which a lot of people from one group to share ideas on a matter without being criticized. This is to avoid an open discussion within the group are encouraged to generate creative ideas. This method is suitable for the problem set.

Now, the idea of centralization needed for evaluating, comparing and run implement a solution (Mohd Azhar Abdul Hamid, 2003). At this stage, students have to plan how to solve the problem accordingly. This is because the most important factor in the assessment of the impact on the solution. This effect consists of positive and negative effects. Therefore, careful consideration is needed to ensure that the results have been the advantages and benefits to other group members. In addition, students should be able to make decisions that can expand or restrict the choice of problem solving and decision selected is the best alternative.

1.3 Problem Statement

Existing methods of the present study places students in a passive state and not an active role, where it somehow prevents learning takes place smoothly. It also promotes only a means of communication, therefore lecturers should strive to understand the problems of students and students' understanding of the content of verbal learning without feedback. In addition, it requires a huge amount of time students outside the classroom to enable understanding and long-term retention of content. On the other hand, interactive methods such as discussion, problem solving sessions allow lecturers to affect students when they are actively working with substance. Instructors have or to learn effective writing and speaking skills.

An instructor's session is generally one-size-fit-all. Not every undergraduate has the same speed of studying. While some students can follow the instructor's session with

comfort, most of the others require a chance to chew on the information that they are getting. Also, each undergraduate has a different studying style. If a visually impaired undergraduate gets worse qualities than a hearing undergraduate, it doesn't mean that the former is slowly or dull, it might simply mean that the educational setting strategies were designed for the hearing undergraduate only. Students will have lack of ability to keep speed with the teachers (slow learner). Inadequate qualities and lagging in educational setting performance is a major factor to a bad self-image and lack of confidence. In fact, the failing of many students to achieve what they are capable of achieving can be linked to the above aspects.

Therefore, the research was undertaken to determine whether PBL is a suitable instructional approach or not, that could help students in enhancing their problem solving skills. The following research significant were addressed of the research:

- a. Students' academic achievement and motivation will increase after the implementation of Problem Based Learning (PBL) through a website development.
- b. Students' collaboration between a group members will increase after the implementation of Problem Based Learning (PBL) through a website development.
- c. Students' problem solving skills will increase after the implementation of Problem Based Learning (PBL) through a website development.

1.4 Objectives of the Study

The main objectives of the study are to identify the strategies of PBL in teaching among students of Kolej Poly-Tech MARA Batu Pahat. In addition, the research is also aims to investigate the impact of the implementation in the process of teaching and learning in Kolej Poly-Tech MARA Batu Pahat.

The objectives of the research are as follows:

- a. To investigate the current issues of Problem Based Learning (PBL).
- b. To analyse what are the current ICT techniques and tools that are used to handle PBL in teaching and learning in classroom.
- c. To develop a website that can handle PBL process for lecturers and students.
- d. To evaluate the effectiveness of PBL through a website for a learning process for lecturers and students.

1.5 Research Questions

Based on the objective of a study, the following research questions will be answered by this study:

- a. What are the suitable design of the web through the PBL model that meet with the student's perception?
- b. Is there a significant impact on student achievement after attending PBL class through the web?
- c. Is there a significant difference between the level of confidence of students to integrate the use of ICT in the classroom before and after joining the PBL through the web?
- d. Is there a significant impact on lecturers after the implementation of PBL through the web?

1.6 Scope and Limitations

This study was limited to students of Diploma in Computer System and Networking program at Kolej Poly-Tech Mara Batu Pahat who were agreed to participate in the research. This study was also limited to the one topic from one subject tested and the length of time was two or three weeks. The study uses an experimental designs, which are

pre-test-post-test design to compare and measure the degree of changes occurring as a result of the effectiveness of students' problem solving skills using PBL approach in teaching and learning process through a website.

In the research, the students will be divided into groups and will be given a pre-test questions that ask them about the theory of network configurations. Next, the students will be given the treatment which means will be operated with PBL approach through website and the results are gathered at the end of the topic covered. After the implementation of PBL, the students will be given a post-test questions that will ask to draw a layout of wireless network that combine all the hardware components of wireless network and the cost estimation required. The comparison about the knowledge and how the students solve the problem are recorded. The students are also will be given a questionnaire to test the problem solving skill after attending a PBL class. The students and lecturers are also will be asked some interview questions to record the feedback about the implementation of PBL.

The implementation of PBL website model that will be used in this study are as follows:

a. Phase 1: Orientation of students in trouble.

Lecturer explains the learning objectives, explain the necessary logistics, filed phenomenon or demonstrations or stories to reproduce the problem, motivating students to engage in problem-solving activities. The problem posed by websites developed the concept of PBL. It is also intended to provide clarification and information to students about PBL method that they will go through. Information and information allowing them to practice the methods of PBL and the role to be played by all parties involved in the learning process.

b. Phase 2: Organized a students.

Lecturer divide the students into groups, helping students define and organize learning tasks related to the problem. The students are exposed to problems that are specially designed according to the characteristics of PBL. This issue is fundamental to the learning process and it must be challenging, unstructured, complex, and oriented daily problem related to the concepts and principles of learning that will be passed.

c. Phase 3: Guide the research, develop and present the results.

Lecturer help the students to plan and complete assignments and help them to share their work with fellow friends. Lecturer will show every page in the website that can help students to solve a given problem. Students will find reference materials group through the link provided on the website built. These links contain files of other web sites that have information on learning that are related to the topics discussion, lecturers' notes, online books and video. Next, through a collaborative process and discussion refers to an issue that has to be solved The small group discussions among members of the group that has been divided is to identify the duties of each member in the group, select one or more of the issues of learning and then act to find reference materials and information related to the issue of learning that have been identified by using the website that has been developed.

d. Phase 4: Analyse and evaluate the process and results of troubleshooting.

Lecturer help the students to reflect or evaluate the process and results of the research they are doing. Students will show their solution about the problem asked and process of comparison before and after the implementation of PBL website will analyse.

1.7 Conclusion

In conclusion, PBL method of emphasis and focus on how students analyse and solve problems. These skills are important in shaping and educating would-be leaders who are responsible and believes in solving problems and being able to make the right decisions and fair. In general, PBL method can be used as an effective training approach and to produce leaders who possess a strong, visionary, practice proper communication and the ability to make decisions and solve problems appropriately. Such features are features that should be included in their leaders favoured and beloved by his followers. Therefore, the people will be led to respect and feel safe under his care.