# DEVELOPMENT OF RESEARCH FRAMEWORK FOR PBL PROBLEM SCENARIO USING LINEAR & NON-LINEAR MULTIMEDIA

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## Abstract

Problem Based Learning (PBL) is an instructional approach to provide student with knowledge suitable for problem solving. To support the research, PBLStat courseware is developed based on the PBL approach. In PBL approach, problem scenario is first presented during the learning process. Problem scenario helps to maintain student interest in course so it is important to create a good problem that can cause students' inquiry and drive students to solve the problems. The purpose of this paper is to highlight the development of research framework for PBL problem scenario presentation. Problem scenario can be presented using linear and non-linear multimedia categories. The framework of study contains the description of research control modes, content and output. The control modes of the research are consisting of two independent variables which are linear problem scenario and non-linear problem scenario. Content is the phase of courseware's development. The ADDIE model is used to complete the development of courseware. Finally is the research output, this is to evaluate student's preferences and performances based on the problem scenario categorization. There are four research instrument tools has been created to answer the research question which are questionnaire, observation, interview and PBLStat.

Keywords: Problem Scenario, Problem Based Learning, Linear and Non-Linear

## 1. Introduction

Developments in Information Communication Technologies (ICT) have been rapid in recent years and have influenced education field. As the move towards, ICT has been used in learning approaches to improve the quality of education. There are a few examples of learning method and approaches such as Collaborative Learning, Cooperative Learning, Discovery Learning, Discovery Based Learning, Engaged Learning, Problem Based Learning and Whole Language Approach. This study focuses on one of the approach which is Problem Based Learning (PBL). Problem Based Learning (PBL) is an instructional approach that is said to provide student with knowledge suitable for problem solving. One of the main defining characteristic of PBL, which distinguishes it from some other approach, is that the problem is presented to the students first at the start learning process, before other curriculum inputs (Barrett T., 2005).

We believe that it is important to design a proper problem scenario to encourage students on how to understand and solve the problem. Hence, developing a presentable problem scenario is important for the full benefits of PBL to be realized (Lynda Wee KN et. al, 2001). Multimedia is comprised of several elements including text, graphic, sound, video and animation. Audio, video and animation are integrated with instruction in order to create a more interesting, supportive and learning-conducive environment (Eng Hong L. et al, 2009). All of these multimedia elements can be divided into two categories which is linear and non-linear.

## 2. Research Framework

Research framework can be defined as research activities that used to produce specific activities. The research framework for this study is referred and guided by Eng Hong L. et al (2009) research framework. The framework contains the description of research control modes, content and output. Control modes of the research consist of two independent variables which are linear problem scenario and non-linear problem scenario. The content is the development of courseware. Then, the research output is to measure student's preferences and performances based on the problem scenario categorization. The following figure shows the research framework for this project:

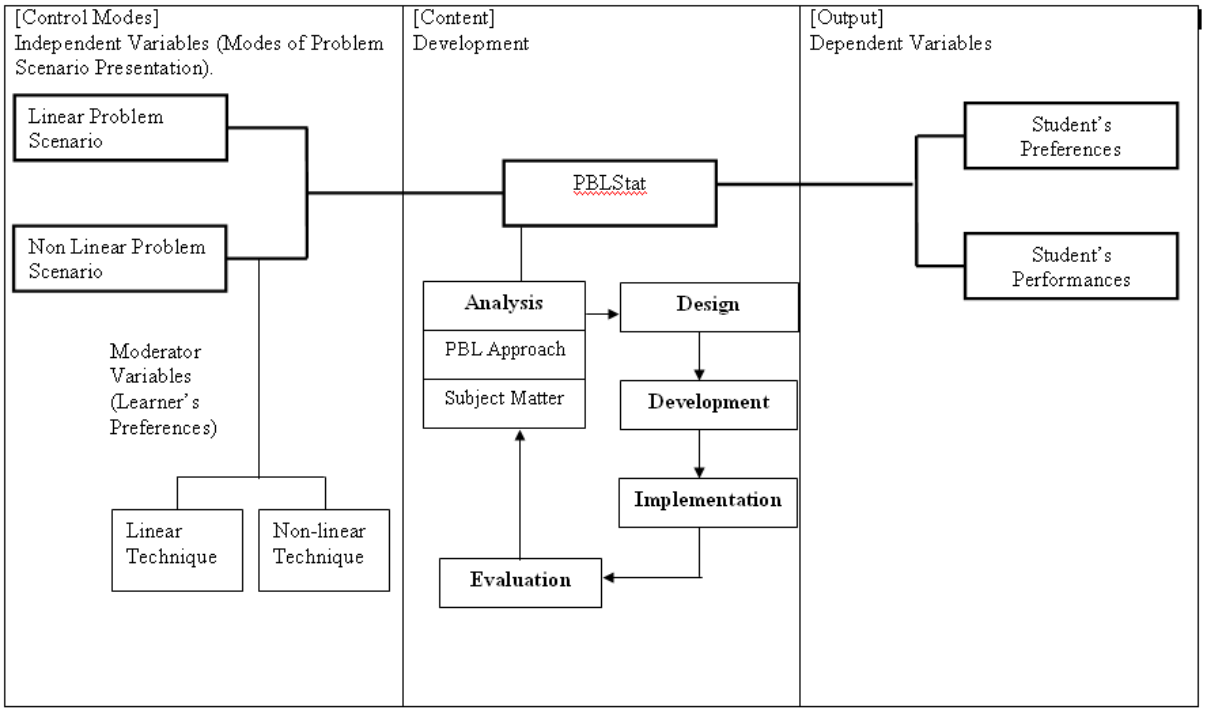


Figure 1: Research Framework

### *2.1. Control Modes*

PBL problem scenario is designed into two categorization of multimedia to evaluate the effectiveness among students. This is the control modes for this research. The two variables that measured are linear technique and non-linear technique. In linear problem scenario presentation, learners do not have to control over problem scenario. Non linear PBL problem scenario is interactive multimedia presentations which require input and interaction from the user. In non-linear problem scenario presentation, learner control over sequence of problem scenario instruction.

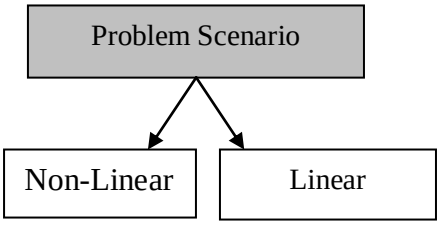


Figure 2: Categories of Problem Scenario

### *2.2. Content Development*

Content is the structuring process to develop PBLStat which is a research tools to measure hypothesis. To support the research, PBLStat courseware is developed based on the PBL approach. For this stage, the ADDIE methodology is used because PBLStat is a multimedia instructional courseware. This model is very flexible for building multimedia courseware and is widely used. The ADDIE model stands for five sequence states of the instructional design: Analysis, Design, Development, Implementation, and Evaluation.

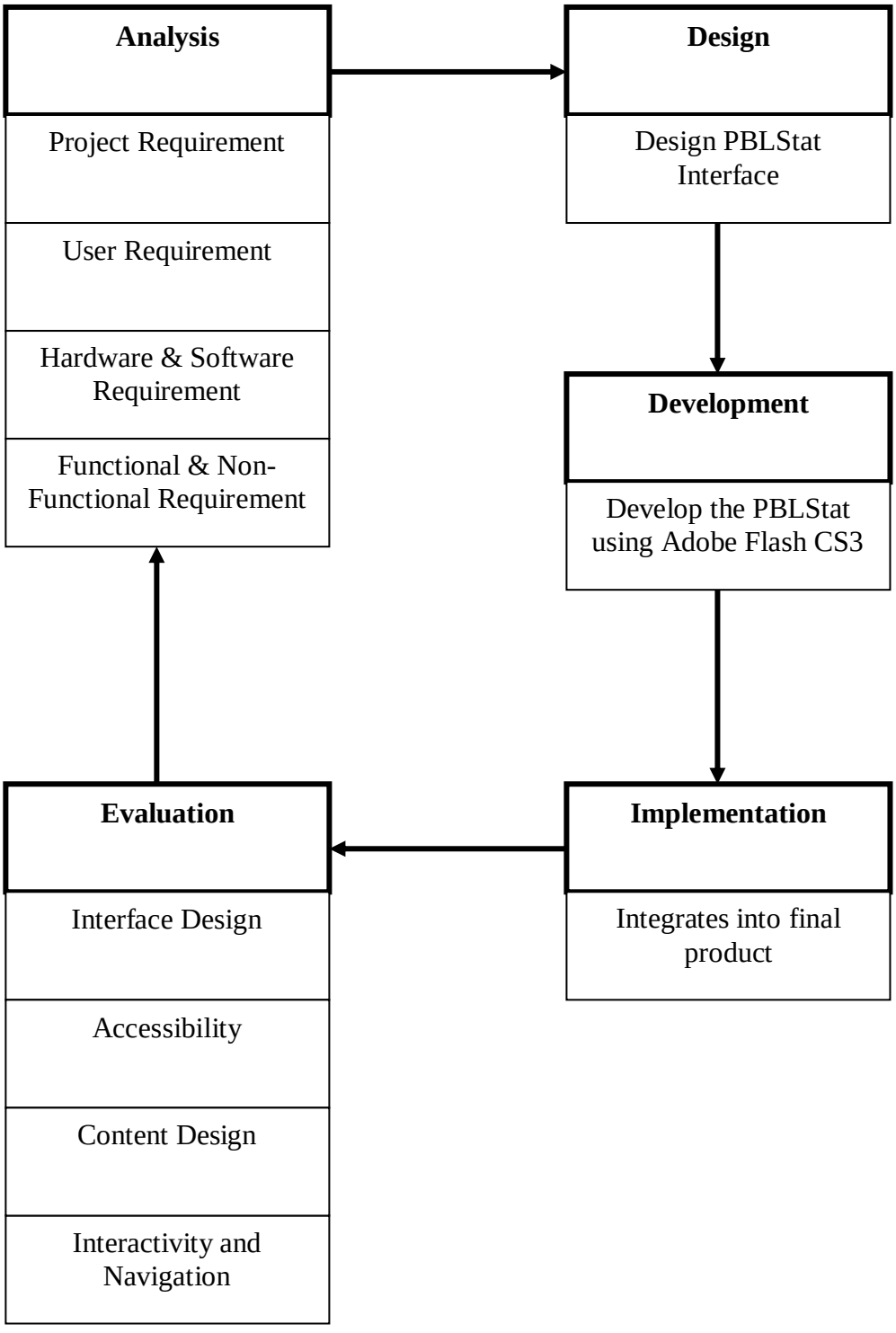


Figure 3: Adapted from ADDIE model

### *2.3 Output*

Output is the stage to test the project and make an improvement based on the objectives. After finishing the development stage, the research will evaluate to know the result of hypothesis. This phase is when the developer test for the success of the learning objects in helping the learners to attain the appropriate concepts. It is important to know the objectives of the project are achieved or not. This study measures the instructional outcomes of student's preferences and student's performances. Questionnaire and PBLStat have been used as research instrument tools to measure these outcomes. The following figures show the output and testing procedure for the research question.

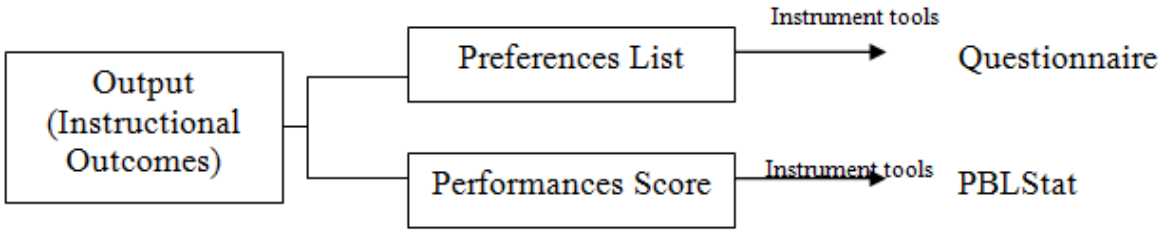


Figure 4: Output

There are three research question need to be measure and this paper discuss two of research question. One of the research questions is "Is there any difference in terms of student's performances in linear and non-linear problem scenario presentation?" In order to answer this research question the testing procedure has been design as figure below:

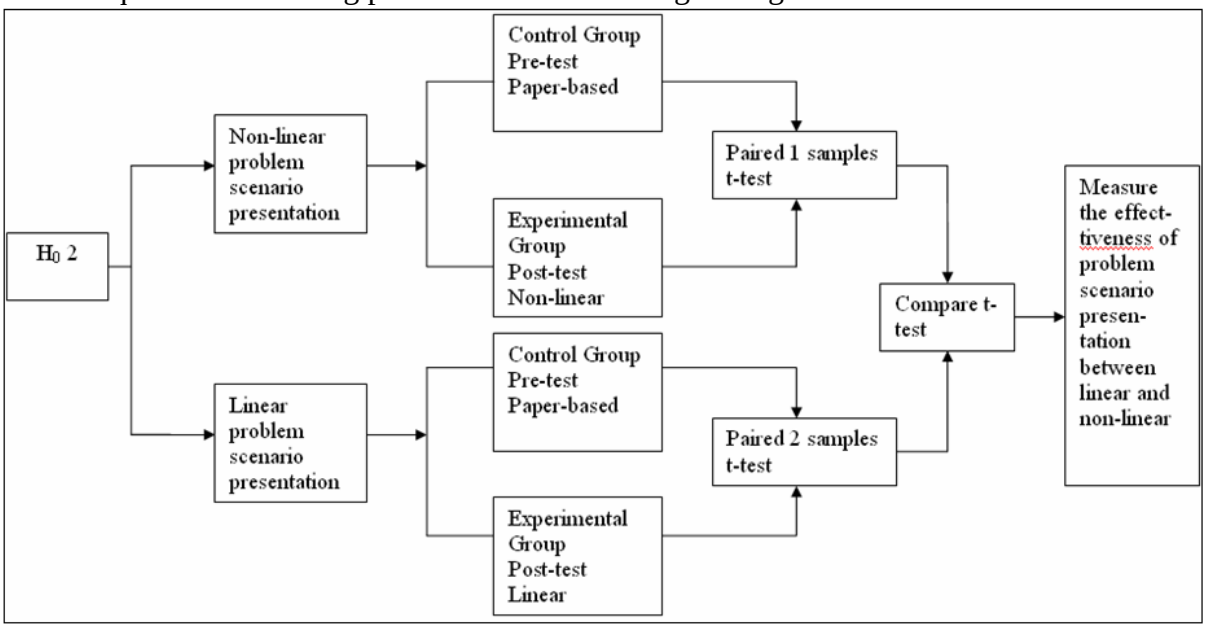


Figure 5: Testing Procedure

The next research question is "Is there any relationship between student's performances and preferences?" Figure below show the testing procedure to answer this research question.

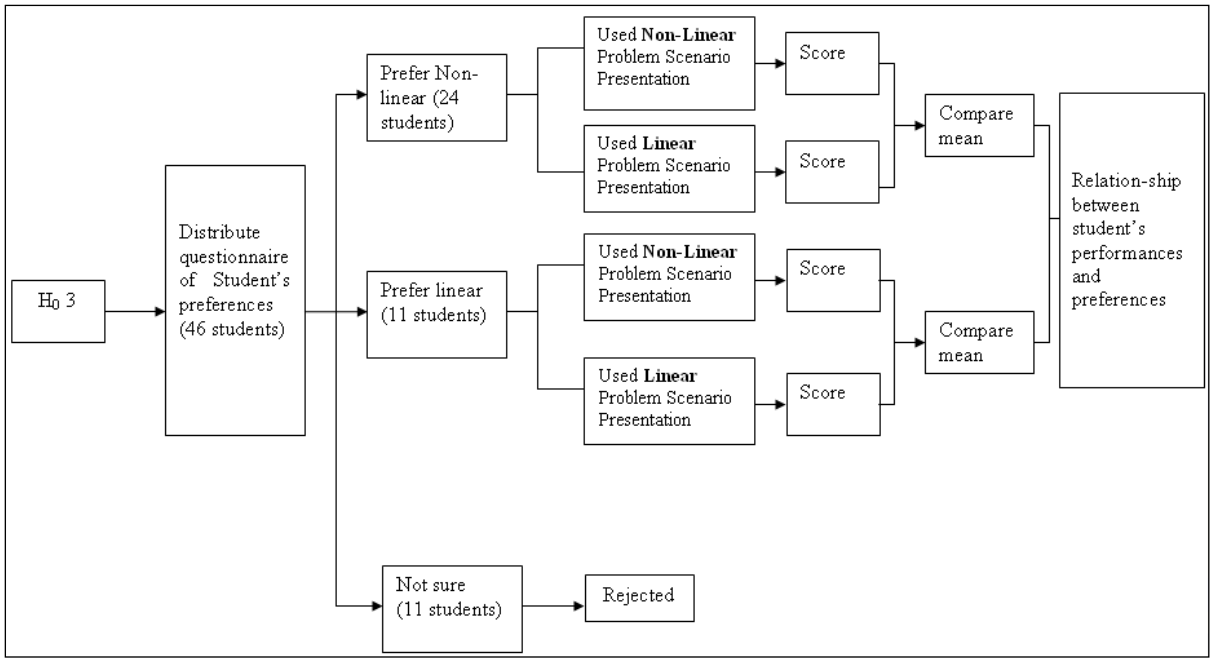


Figure 6: Testing Procedure

## 3. Conclusion

Every part of the stage in research framework and methodology that involves is important to complete the study. In Control Modes, learner is allowed to select the problem scenario technique and choose the part that interested. In Content, consists of ADDIE model to complete the PBLStat which is one of instrument tool to measure objective of project. Then in Output, which is the instructional outcomes that to test the project objective. A systematic research framework is used to investigate the effectiveness of problem scenario presentation between linear and non-linear techniques. It is important to clear and complete the phase in this research framework to achieve the project goal.

## References

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