# Implementation of Project-Based Learning Model at Politeknik Negeri Medan

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**Abstract.** Each student has a different interpretation of the experiences gained in everyday life. When students are in the learning process in class, the lecturer facilitates learning activities so that new concepts are formed that are in accordance with scientific concepts. Lecturers should design effective learning by paying attention to the characteristics of the learning material delivered. The considerations that must be made by lecturers in designing learning are by choosing learning approaches, strategies, methods and techniques. A complete unity between approaches, strategies, methods, and learning techniques will form a learning model. The learning model that is very intensively being echoed now is Project-Based Learning (PBL) which is one of the methods implemented in Merdeka Belajar Kampus Merdeka (MBKM). The implementation of the PBL process needs to be recorded using digital technology to facilitate the management of the PBL. This research builds a PBL Information System (SisPBL) as a medium for recording the PBL implementation process. The SisPBL development method is based on the concept of Research and Development (R&D) and 5 stages, the first stage, problem analysis. Researchers conducted a literature study and needs analysis. The second stage, the researchers conducted a software design that started with the user interface design, program implementation, program testing. Stage three, System Configuration, researchers carry out hardware and software integration, testing, and evaluation. The fourth stage, socialization which consists of results seminars, publications, and reports. The fifth stage is the implementation of PBL. The result of this research generates SisPBL application which serves as a medium for recording the PBL process in each study program at Politeknik Negeri Medan starting from uploading PBL proposals, determining which projects have passed, uploading logbooks, progress reports and project final reports and PBL information periodically.

**Keywords:** PBL, MBKM, SisPBL, R&D.

## 1 Introduction

The science learning process focuses more on the process of giving experience to students in integrating students' initial knowledge with knowledge that is appropriate to the field of science. The student's initial knowledge obtained from the experience of observing phenomena in the environment where they live provides a background in


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building students' initial knowledge. Each student has a different interpretation of the experiences gained in everyday life. when students are in the learning process in class, the lecturer facilitates learning activities so that new concepts are formed that are in accordance with the concepts of scientists. Lecturers should design effective learning by paying attention to the characteristics of the learning material delivered.

Considerations of learning process need to be considered by lecturers. This because lectures, the one whose know in designing learning by choosing approaches, strategies, methods, and learning techniques. A complete unity between approaches, strategies, methods, and learning techniques will form a learning model. The learning model is basically a form of learning that is illustrated from start to finish which is presented in a special way by the Lecturer. Observing the learning reform efforts developed in Indonesia, currently many are offered a variety of learning model choices, as required in the national curriculum. If the lecturer has understood the characteristics of teaching materials and students, the selection of learning models is expected to be able to realize the goals and learning outcomes to be achieved. The current learning policies are project-based learning (PBL) and case-based learning (CBL). PBL and CBL are one of the learning models in the Merdeka Belajar Kampus Merdeka (MBKM) curriculum. Which the MBKM curriculum is one of the curricula that must be implemented in Indonesian universities today. The MBKM curriculum becomes a learning bridge that is independent and follows the 21$^{st}$ century learning style, so that now the learning process must be student-centered

But unfortunately, in managing administrative needs, especially in the implementation of project-based learning at Politeknik Negeri Medan manually, it is quite complicated. This is because Politeknik Negeri Medan already has 21 diploma program which now have approximately 6,000 active students. Therefore, in order to good data management it is necessary to have an information system.

In addition, studies on the PBL model have been around for a long time and have been widely applied, such as PBL can improve cognitive learning outcomes [1], shape caring attitudes and behavior towards the environment, science process skills [2], and effective learning [3]. PBL is more suitable for interdisciplinary teaching because it naturally involves many different academic skills, such as reading, writing and mathematics and is suitable for building conceptual understanding through the assimilation of different subjects [4]. PBL implementation needs to be integrated with digital systems, namely Science, Technology, Engineering, and Mathematics (STEM) in building 21st century skills. Several benefits of STEM education include making students better problem solvers, innovators, inventors, self-reliant, logical thinkers, and technologically literate [5][6].

PBL implementation must be recorded digitally to produce implementation information. Many studies have been carried out such as: Implementation of Mobile Problem-Based learning application to know the effect on thinking skills and creativity [6], Project Based Learning-Computational Thinking (PBL-CT) Product Development In Mobile Programming Courses [8], Using Moodle plugin in PBL implementation [9], Web based application to record all PBL processes and generate information about PBL [10].

## 2 Method

This research begins with the implementation of PBL by observing and identifying real problems that exist in the environment, then students choose projects to solve problems in accordance with predetermined project objectives, show in Fig. 1. Therefore, this is the main basis for developing the PBL Information System application at Politeknik Negeri Medan.

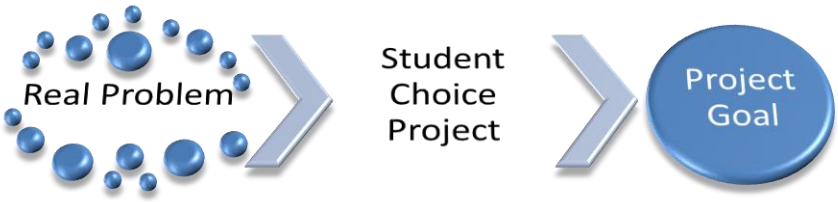


**Fig. 1.** Project Based Learning Implementation Models

The research method refers to the concept of research and development (R&D). the research and development method focuses on product design. In this study, the product built was the PBL Information System (SisPBL). Which is a management information system for implementing project-based learning methods or Project Base Learning (PBL) at Politeknik Negeri Medan

There is also an overview of the stages of the research and development process as presented in Fig. 2.

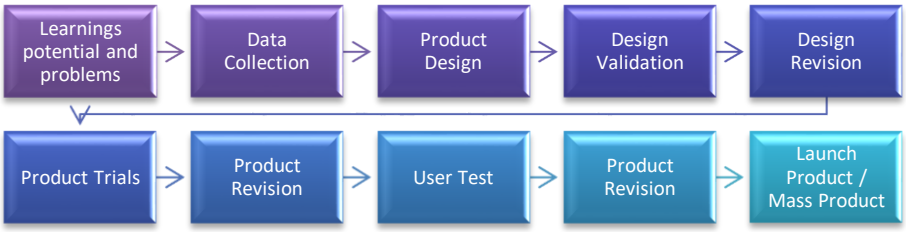


**Fig. 2.** Research Method

Then the flow in the research and development method is lowered into 5 stages of design. The design stages carried out are: Problem Analysis, Software Design, System Configuration, Outreach. The first stage, problem analysis. Researchers conducted a literature study and needs analysis. The second stage, the researchers conducted a software design that started with the user interface design, program implementation, program testing. Stage three, System Configuration, researchers carry out hardware and

software integration, testing, and evaluation. The fourth stage, socialization which consists of results seminars, publications, and reports. Fig. 3, the fifth stage is the implementation of PBL.

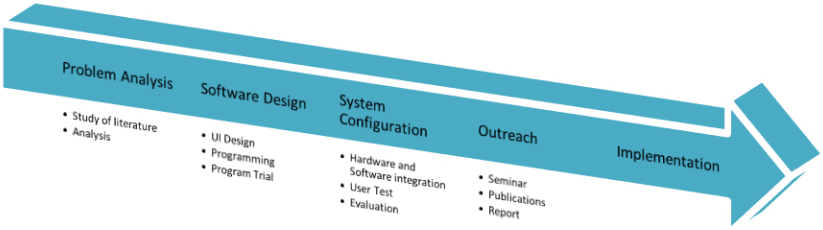


**Fig. 3.** Stages of Design Research

## 3 Result and Discussion

### 3.1 Design of Application

Based on the results of the needs analysis, it was found that the application that was built did not only cover 1 program, but the general research design was packaged in a Learning Information System or abbreviated as SIMBEL which consisted of an MBKM Information System or abbreviated as SisMBKM, PBL Information System or abbreviated as SisPBL and Information Systems. CBL or SisCBL for short. These three systems exist to assist in matters of student data collection, proposals, and administration that take place at Politeknik Negeri Medan and are directly integrated with the Politeknik Negeri Medan Academic Information System (SIAKAD). Fig. 4 shows a SIMBEL's Diagra.

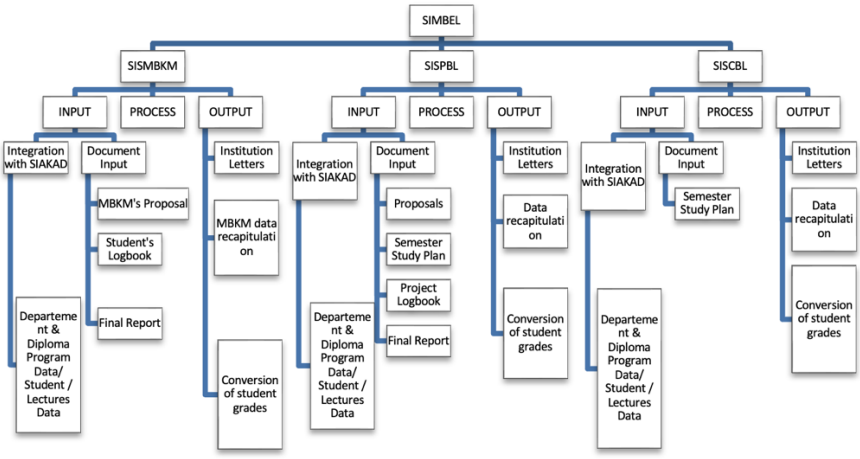

**Fig. 4.** SIMBEL's Diagram

However, in the development of this research the focus was on the development of SisPBL. SisPBL is a SIMBEL sub menu for recording PBL activities in each study program starting from proposal submission, proposal review, project implementation and reporting. Which then in the design of this information system program an access design is made to facilitate programming. The access design in SisPBL is divided into 2 namely the admin/head of the diploma program and the project team. The admin/head of the diploma program has access to managing user data, incoming proposal data, reviewed proposal data, logbook reports/final reports, as in Fig. 5. While the project team has access in submitting proposals, making project reports (logbooks, periodic reports, and final reports).

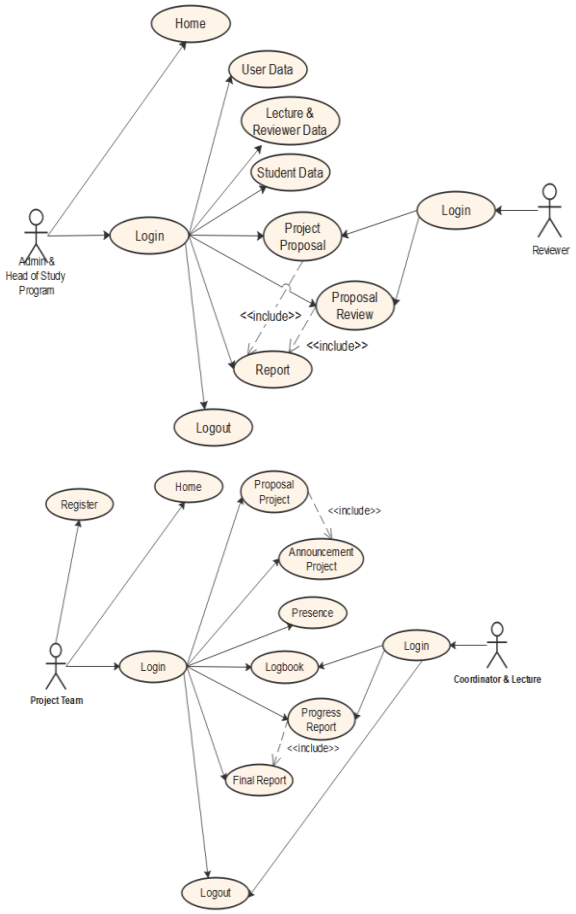


**Fig. 5.** Left: Use Case Diagram Admin, Right: Use Case Diagram Project Team

Furthermore, the process in developing this information system is the development of the interface, the development of the interface is carried out to make it easier for users to use the information system. The interface in the SIMBEL application is made with a

purple background at login which shows the identity of the Politeknik Negeri Medan which is known as the purple campus. Furthermore, on the main page of the SIMBEL application, it has a simple and clean interface design style, making it easier to use the application and as a form of implementation of a good web design if the website created can work and display information properly [7]. Fig. 6 shows the UI of SIMBEL.

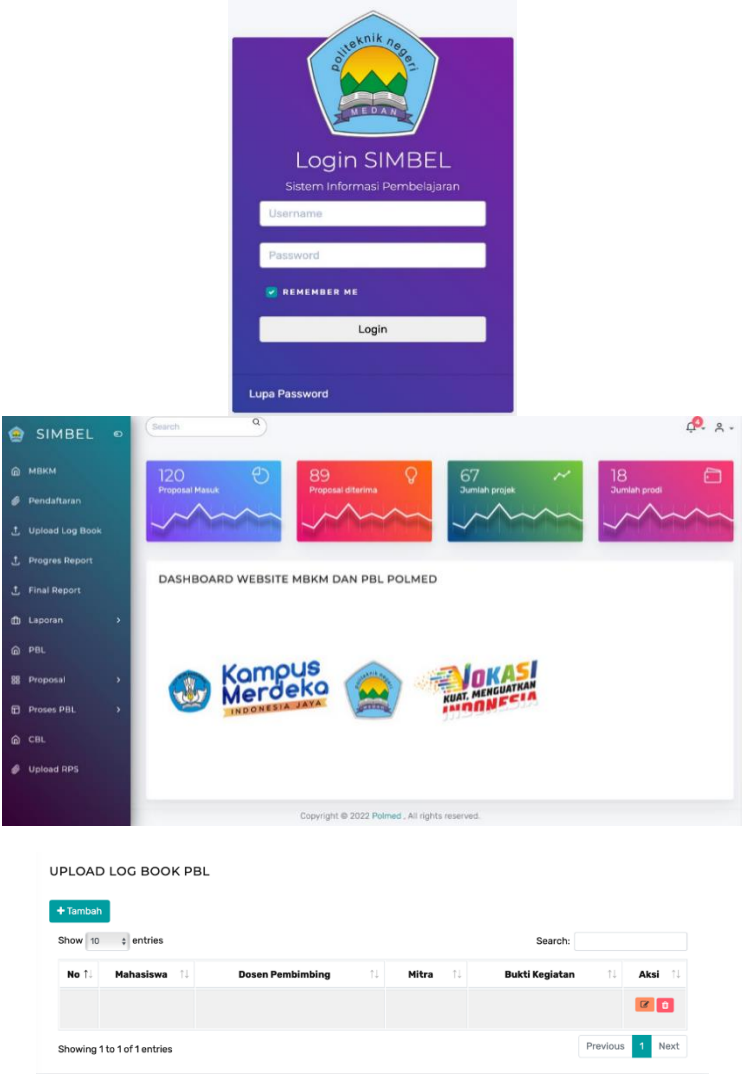


**Fig. 6.** a: UI Login page SIMBEL; b: Main Page SIMBEL; c: Logbook page PBL

The process of implementing PBL begins with the idea of solving problems both internal problems (Polmed) and solving external problems (society, industry, business world, MSMEs and others). The Head/Secretary of the Study Program invites course lecturers to distribute projects, determine students and courses involved in each project

and determine project managers from Study Program Lecturers. The next stage is preparing a project proposal by the project team under the coordination of the project manager and uploading it to the upload proposal form. Furthermore, the reviewers consist of one lecturer and the head/secretary of the study program assigned by the Head of the department to assess project proposals and upload the results of the proposal assessment. The assessment criteria with a rating scale of 100 are divided into 5 assessment variables: Proposal Format: 10%, Content: 30%, Budget Plan : 25%, Project Scheduling : 25%, Reference : 10%.

Passing status is determined based on the average score of two reviewers, with a minimum score of 60. The next stage is the proposal with the status declared passed, continuing the project implementation activities.

### 3.2 User Test Result

Testing is carried out using the User Acceptance Test (UAT) which is carried out on users who are involved in SisPBL. Tests were carried out on the SisPBL components according to the function of each component. Here are defined the ten main functions of the SisPBL application being tested. Test results through a process of try and error, overall, the application functions properly. Table 1 shows the results of the SisPBL test.

**Table 1.** Result of User Acceptance Test SisPBL

| No | Function Test | Result Test as | |
|---|---|---|---|
| | | Admin | Lecturer |
| 1 | Login | Success/ Works | Success/ Works |
| 2 | Change Password | Success/ Works | Success/ Works |
| 3 | Input User Data | Success/ Works | Success/ Works |
| 4 | Proposal Upload | Success/ Works | Success/ Works |
| 5 | Proposal Appears on Screen | Success/ Works | Success/ Works |
| 6 | Proposal Grade | Success/ Works | Success/ Works |
| 7 | Input Logbook | Success/ Works | Success/ Works |
| 8 | Logbook History Appears on Screen | Success/ Works | Success/ Works |
| 9 | Report Appears on Screen | Success/ Works | Success/ Works |
| 10 | Logout | Success/ Works | Success/ Works |

## 4 Conclusion

This research has resulted in the SisPBL application which serves as a medium for recording the PBL process in each study program at Politeknik Negeri Medan starting from uploading PBL proposals, determining which projects have passed, uploading logbooks, progress reports and project final reports. SisPBL generates information about the implementation of PBL on a regular basis. However, researchers still realize that SisPBL can proceed to a more advanced stage of implementation and evaluation of SisPBL in order to support the acceleration of the application of the PBL learning method at Politeknik Negeri Medan

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