Material Testing Laboratory Management Application at the Faculty of Engineering Universitas Negeri Medan

Zulkifli Matondang[1], Harun Sitompul[2], Fahmy Syahputra[3]

{zulkiflimato@gmail.com[1], prof_runsit@yahoo.co.id[2], famybd@unimed.ac.id[3]}

Faculty of Engineering, Universitas Negeri Medan, Indonesia 20371[1,2,3]

Abstract. This study aims to produce an application for managing materials testing laboratories at the Faculty of Engineering, Medan State University. The research method used is development research using the SDLC (System Development Life Cycle) development methodology, a waterfall model with stages namely requirements (identification of needs), analysis, design, implementation and testing. The resulting system is a multiplatform-based application using the PHP and MySQL programming languages. This information system can be used to process laboratory equipment data starting from inventorying tools, materials, using, checking, returning, making reports and other documentation.

Keywords: Material testing laboratory, System Development Life Cycle

1. Introduction

The development of information technology has had a lot of influence in several fields, one of the fields that utilizes technology is education. Technology plays a very important role as a means of obtaining information or knowledge, therefore technology and education are very closely related. Education is the learning of knowledge, skills, and habits of a group of people that is passed from one generation to the next through teaching, training, or research.

The laboratory is a means of supporting the smooth running of learning activities, with a laboratory students can develop their abilities in practice through the equipment in the laboratory. Students find it easier to find the learning resources they want. Apart from that, students can also get to know more about technology. Implementation of the learning activity process, maintenance and handling of various problems faced by laboratory managers and also students as target subjects for laboratory users.

The laboratory is usually used as a place to support practice and increase students' skills, so the function of this laboratory is used as a barometer for learning success. This laboratory will not be used as a learning resource and media in the teaching and learning process, but this laboratory is a place for activities needed in practice which is often used as a standard for student success.

The laboratory can carry out its role and function well, as an accelerator for the progress of the student learning process on campus. The benchmark for the development of campus laboratories can also be seen from the increase in students' abilities and creativity in using the facilities in the laboratory.

2. Methods

This research uses the waterfall development model. The waterfall software development model provides a sequential or ordered software development life cycle approach. According to Roger S. Pressman, the waterfall model is a classic, systematic, sequential model of building software, showing a systematic and sequential approach to software development that begins with the specification of customer requirements and progresses through planning, modeling, construction, and deployment, culminating in ongoing support of the finished software. The stages of the waterfall development model according to Roger S. Pressman (2015) can be seen in the following picture:
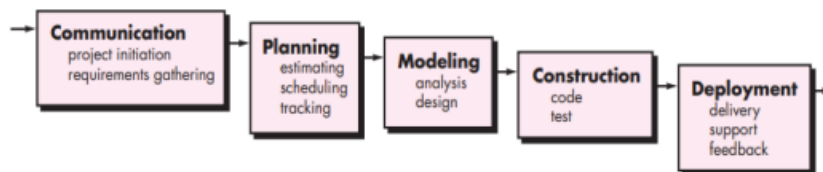
Fig. 1. Waterfall Model

a. Communication (Project Initiation & Requirements Gathering) Before starting to create a system, communication with the teacher is required. The aim of communicating with teachers is so that the system to be developed achieves the desired goals. Communication is carried out to initialize the project that will be created, such as analyzing the problems faced and collecting the data that will be needed, as well as explaining the features and functions of the system that will be developed. Additional data that will be collected can be taken from journal articles or other sources.

b. Planning (Estimating, Scheduling, Tracking) At this stage it explains the estimation of the tasks to be carried out, at this stage an analysis of the risks that might occur when creating the system is also carried out. At this stage, the resources needed to create the system as well as scheduling the work to be carried out and tracking the system work process are also needed.

c. Modeling (Analysis & Design) At this stage the focus will be on designing the required data structure, required software architecture, interface display and program algorithm. The aim of this stage is to provide a big picture of the system that will be worked on.

d. Construction (Code & Test) At this stage the previously created design will be made into a code or language that can be understood by machines. After this stage is complete, a testing process is carried out on the system and also the code that has been created. The goal is to find errors that may occur and will later be corrected.

e. Deployment (Delivery, Support, Feedback) The final stage is the Deployment stage, at this stage the system will be implemented to users, regular system maintenance or care will be carried out, system improvements, system evaluation and system development based on feedback received by users so that the system continues to run and develop according to the desired goals.

3. Result and Discussion

The product developed in this research is a laboratory management information system. This laboratory management information system was developed in accordance with what previously existed, namely, a system that was still manual by preparing scheduling using Microsoft Word which would be distributed to each class in PDF format. Lack of responsibility for the use of equipment in the laboratory. This would be risky if some of the equipment in the laboratory was lost, besides that it would be difficult to process the search for which students and classes had just entered the laboratory room at a certain time. This web-based laboratory management information system was created to facilitate all activities in using the laboratory, such as viewing the scheduling of laboratory use for lecturers and students, this system will help teachers see the results of student assignments that have been given in the Jobsheet menu which will appear in the lecturer's system, this system It will also make it easier for laboratory assistants to check the completeness of equipment in the laboratory. This web-based laboratory management information system can be accessed using the internet, so that users such as lecturers, laboratory assistants and students can easily access the system.

This web-based laboratory management information system was created using the PHP programming language, XAMPP Control Panel 3.2.3 and Sublime Text as a text editor. This system has 4 (four) users, namely admin, teacher, laboratory assistant and students. Each user has a different menu, namely:

a. Admin Admin has several menus, namely dashboard menu, department menu, productive teacher menu, laboratory assistant menu, class menu, student menu, laboratory menu, scheduling menu, training menu, equipment menu and print equipment.
b. Teachers Teachers have several menus, namely the dashboard menu, student assignment menu and jobsheet menu.
c. Laboratory Assistant Laboratory has several menus, namely the dashboard menu, equipment menu, equipment menu and print equipment menu.
d. Students have several menus, namely the dashboard menu and the Jobsheet menu.

The following displays the interface of the information system created :

a. Login Menu Display
The admin login menu display on the web-based laboratory management information system can be seen in the image below:


Fig. 2. Login Page

The admin login menu displays, the admin must enter the username and password to enter the main page. If the username and password are invalid then there will be error

information, if the username and password are valid then it will continue to the main page. There is also a user guide menu to find out how to use the system

b. Dashboard Menu Display The dashboard menu display in the web-based laboratory management information system can be seen in the image below
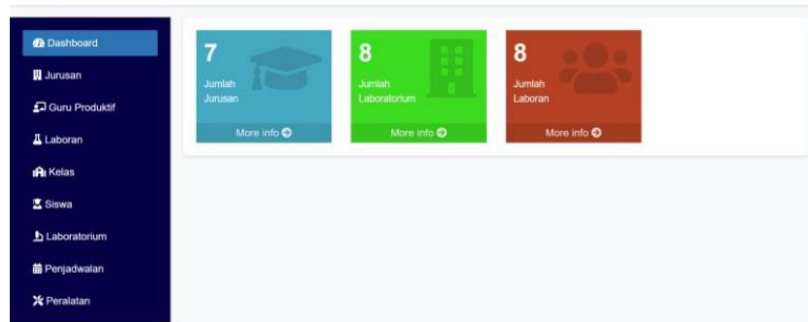
Fig. 3. Dashbord Page

Dashboard menu display, in this display there is information regarding the number of departments, number of laboratories and number of laboratory assistants at SMK Negeri 1 Beringin. The admin dashboard also has several menus, including department menu, productive teacher menu, laboratory assistant menu, class menu, student menu, laboratory menu, scheduling menu, equipment menu and equipment menu.

c. Laboratories Menu Display

The laboratory menu display in the web-based laboratory management information system can be seen in the image below:

Fig. 4. Laboratories Menu Display

Laboratory menu display, in this view the admin can see information regarding laboratory data such as laboratory number and laboratory name. Admin can add new laboratory assistants using the add useful laboratory button so that laboratory assistants can access the system with the laboratory number on the display The admin can also edit laboratory data with the edit button, admin too You can delete existing laboratory data with the delete button.

5. Conclusion

This web-based laboratory management information system was created for makes all activities in laboratory use easier, such as viewing scheduling laboratory use for teachers and students, this system will help teachers see the results of student assignments that have been given, this system will also makes it easier for laboratory assistants to check the completeness of existing equipment laboratory. This web-based laboratory management information system can accessed using the internet, so that users such as teachers, laboratory assistants and students can easily access the system.

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