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Development of E-Practicum Module for Pharmacy Physics Learning

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Abstract: This research develops learning methods through the development of teaching materials. In addition to this study develops an e-practicum module in one of the subjects in the pharmacy department, namely physics pharmacy. Today, the physics pharmacy practice uses printed module practice in the form of module books. This research intends to make innovation in practical learning. Current educational innovations that are developing in technological innovations, one of which is information technology. The use of information technology is very fast and sophisticated, currently technological computer-based has been developing with software applications that also continue to fulfil the world's needs. The development of this electronic technology can be utilized in educational innovations in practice methods. The printed module practice was developed into a web-based electronic practicum module. The method used in this research is the waterfall model which consists of the main stages of needs analysis, system and software design, system implementation and testing as well as a maintenance. The results of this study are a web-based module-practice named E-mulsi which can be accessed via e-mulsi.com. This application has been tested in one of the pharmacy physics classes and has received positive responses from users not only students but also lecturers because it is easier to use modules and preparation of technology-based reports.

***Keywords**:* E-Practical Module; Practicum Learning; Practicum Module; Pharmacy Physics

1. Introduction

Education has important role to create better generation (Liao & Kachalia, 2015). It is a necessity to improve education to support the purpose stated in The Indonesia Constitution of 1945--Undang Dasar 1945--that is to educate the nation life (Tim, 2016). In recent education, curriculum target encourages teacher to have innovative skill in learning process (Haridza & Irving, 2017). Various innovative education is developed by the role of industrial revolution 4.0 with which takes advantage of technology as the bridge (L. Dewi & Sutisna, 2019; Gorbunova, Papchenko, Bazhenov, & Putkina, 2018; Puncreobutr, 2016). Today, the development of information technology has been growing rapidly. One of them is the use of computer and android in education (I. Widiaty, Riza, Danuwijaya, Hurriyati, & Mubaroq, 2017; Isma Widiaty et al., 2019).

Learning process in school and university has played two parts, which are material and practice. Material is the theory conveyed in teacher-student interactions for students' comprehension. One of the subjects in majoring Pharmacy is Pharmacy Physics which is the basic of physics used in pharmacy (Mallick, 2016; Santyasa, Santyadiputra, & Juniantari, 2019). This subject has practice learning conducted in laboratory. It is admitted by students and lecturer that during the learning process has been difficult to strengthen the theory (Retnawati, Arlinwibowo, Wulandari, & Pradani, 2018). Furthermore, thinking skill in practice has become difficulty. This study is synergy to the introductory study conducted by interviewing method to the students and the laboratory assistant. This study shows that the amount of 85% in one of

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private universities state that many students, many tasks with reports. In addition to questionnaire of 30 students say that practice is a burden.

Ideally, laboratory practice should be able to increase understanding of theoretical material and increase interest / motivation to develop knowledge (Aronson & Laughter, 2016; Englund, Olofsson, & Price, 2017; Makransky, Bonde, et al., 2016). If with the practice, students get real proof of the concepts learned, then practice activities can be done as a bridge between theory and the real world in daily life. However, if the relevance between theory and laboratory practice is low, students' interest/motivation in learning will also be low (Frank et al., 2017). There is no harmony between so do the practicums needed to support the theory, even it is expected to develop the thinking skills of students who move assignments into burdens (Makransky, Thisgaard, & Gadegaard, 2016; Pritchard, 2017). This is contrary to the design of learning with practical methods that are more attractive to students because the practicum is an effective learning experience to achieve three kinds of shared competencies, namely cognitive, affective and psychomotor (Frank et al., 2017; Makransky, Thisgaard, et al., 2016; O'Donovan, Rust, & Price, 2016; Pritchard, 2017).

Learning with practice methods that use manual/conventional modules requires innovation. Current educational innovations that are developing are technological innovations, one of which is using information technology (Altbach, Reisberg, & Rumbley, 2019; P. Y. A. Dewi & Primayana, 2019; Hawkridge, Vincent, & Hales, 2018). The use of information technology is very fast and sophisticated, currently computer technology is developing with software applications that also continue to follow the world's needs. The development of this technology can be utilized in educational innovations in practice methods (Altbach et al., 2019; Coburn & Penuel, 2016; Lewis, 2015). From various backgrounds that have been explained, this research was conducted to carry out educational innovations through the development of educational technology in the physics pharmacy practice module, which was initially changed from a printed book module to an electronic module based on web applications. This study aims to make applications that are easy to use in learning practical work and are more practical for students. How the application of this electronic module is able to play a role in changing education, especially ease in practice method.

2. Method

Research conducted in odd and even semesters in 2019 was conducted in the Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Al-Ghifari University. The research used to answer the research problem that has been formulated in this study is a waterfall model consisting of the stages of needs research, system and device design, system implementation and testing, and maintenance (Nugroho, 2009). The stages of designing a web-based lab module application as shown in Figure 1.

Data collected in this study consisted of primary and secondary data. Primary Data is data or information obtained directly, conducted with interview techniques, observation, and documentation studies supported by literature studies, for the needs of the wholeness in the implementation of physical pharmacy practicum. Data collection was carried out on several batches of pharmacy students to determine the implementation of practicum using conventional methods using practicum module books. While secondary data obtained by collecting data using the method of literature study and document review by collecting data by conducting through the study of literature by studying literature, as well as the latest journals related to the preparation of this research.

Instruments in collecting data in the form of interviews, observation and system validation. While the data analysis techniques included data analysis at the preliminary study, development and validation stages. In the preliminary study stage, the findings about e-modules as a result of development are described in the form of narrative data presentations, then analyzed qualitatively.

Application testing is also carried out as an important instrument in developing web applications, so that quality products are produced as expected by users (Sneha & Malle, 2017; S. Wang, Wu, & Sun, 2018). Testing is an activity to evaluate the quality of a product and to improve the product by identifying defects and problems. An error occurs if the results of the testing are not the same as the expected results. Error is the difference between values or conditions that are calculated, observed, measured by the reality, specifications and correctness of the theory. The main goal of testing is to find errors, but testing does not lead to quality improvements even though errors have been detected and removed (Lakshmi & Mallika, 2017; Sneha & Malle, 2017; S. Wang et al., 2018). Testing is successful if an error is detected, especially if it is successful in getting additional information about the problem from the application.

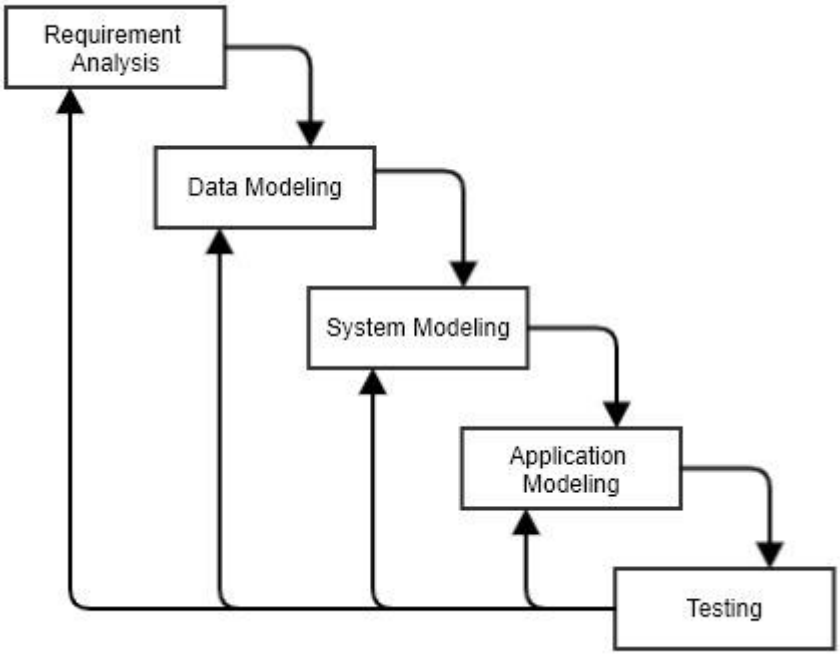

Figure 1. The stages of designing a web-based lab module application

E-module testing method is carried out with several stages. The first step is testing the user interface (UI) which aims to determine the functionality of the interface elements contained on each e-module page works well. Testing functionality and performance, functional testing is carried out to test functioning system when run online. Functional testing is carried out according to ISO 9126 (Noviyarto & Sari, 2019; G. Wang, Bernanda, Andry, & Fajar, 2019). While Performance testing is carried out on the aspects of reliability and efficiency by using the LoadImpact ("Load Impact | Performance testing for DevOps teams," n.d.) and GTMatrix applications ("GTmetrix | Website Speed and Performance Optimization," n.d.). Some factors that are considered in testing reliability and efficiency is bandwidth, and the capacity of web hosting because both can affect the speed and performance of a web-based application.

3. Result and Discussion

The development of e-practicum modules has been carried out in accordance with the planned stages of research. The design phase begins with the preparation of the practical module which requires revision of the previous module in the form of a printed book. This planning phase involves physics lecturers as a resource for developing material from the content of the material. In addition to the development of the content module the contents of the content were also carried out preliminary studies through questionnaires and interviews with students and lecturers related to physics pharmacy practicum. The results of the student questionnaire obtained data that students felt that the lab felt was heavy

because they needed to make a practicum report. The results of interviews with lecturers of practicum modules need to be developed using current technology.

After the preparatory phase is carried out then an analysis phase is carried out on the application requirements and modules that must be synchronized. At this stage the module of the practicum book developed into an electronic module with steps like in Figure 2.

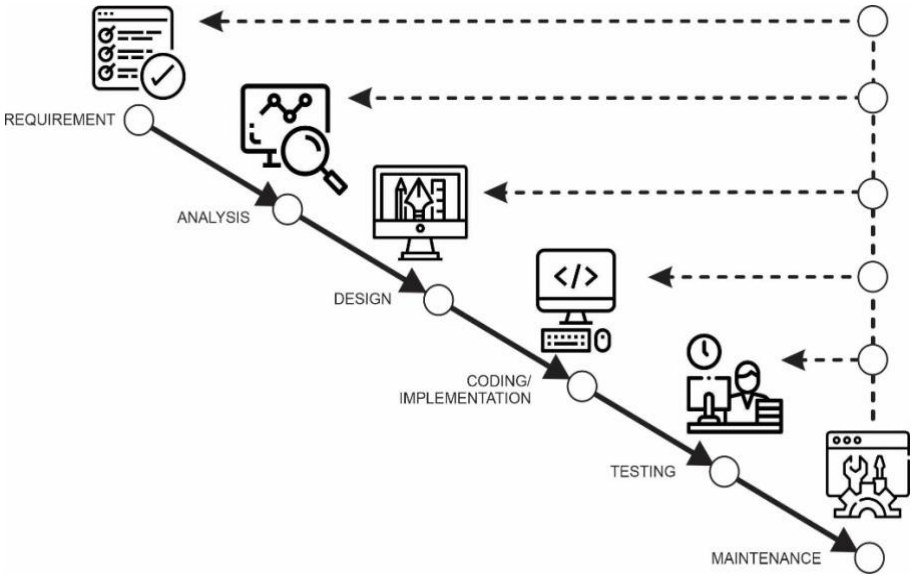

Figure 2. Steps for making an E-Practicum module

The application design is done by referring to the needs of the module and the practicum process carried out in the laboratory. This design was carried out with the IT team who became the research design data processing team into an application. In this case the researcher makes the desired module concept according to the needs of the practicum. The IT team conducted a research phase with researchers ranging from the design of electronic modules and coding of raw data into application data. Applications have been made for physics pharmacy courses with the initial appearance as Figure 3.

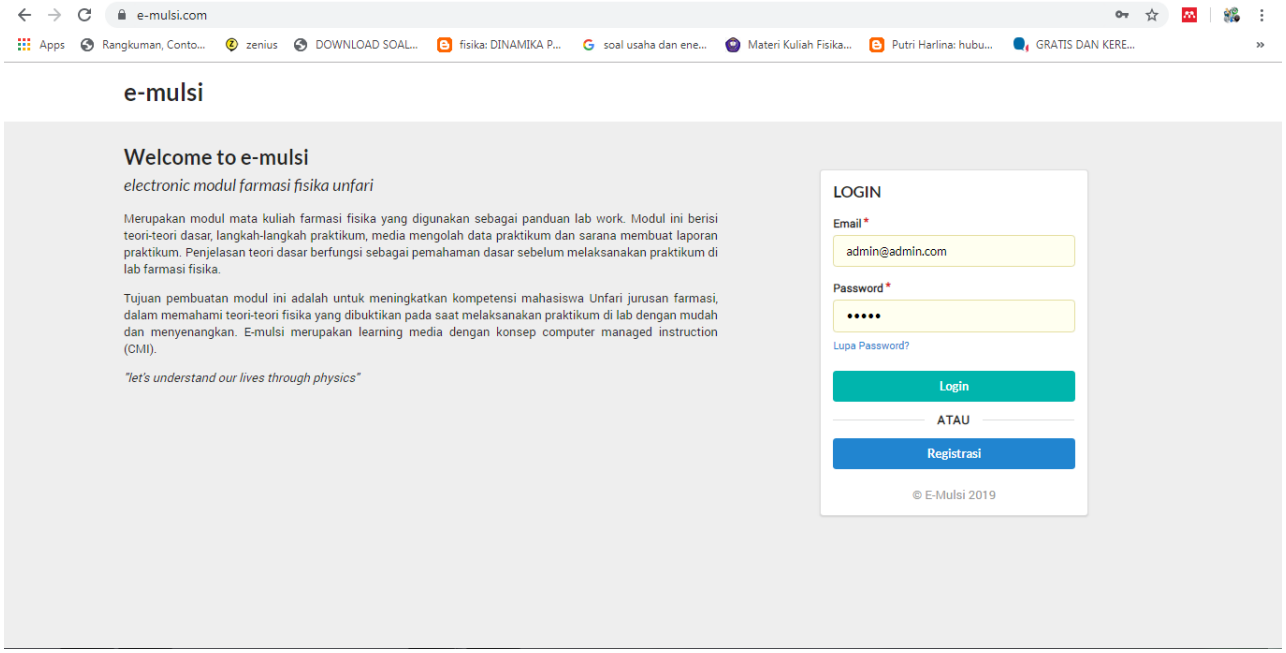

Figure 3. Initial Display of E-Practicum Module

In the home view, the login column can be used by admins, lecturers and students who have registered first. Register page that must be filled out by students as shown in Figure 4.

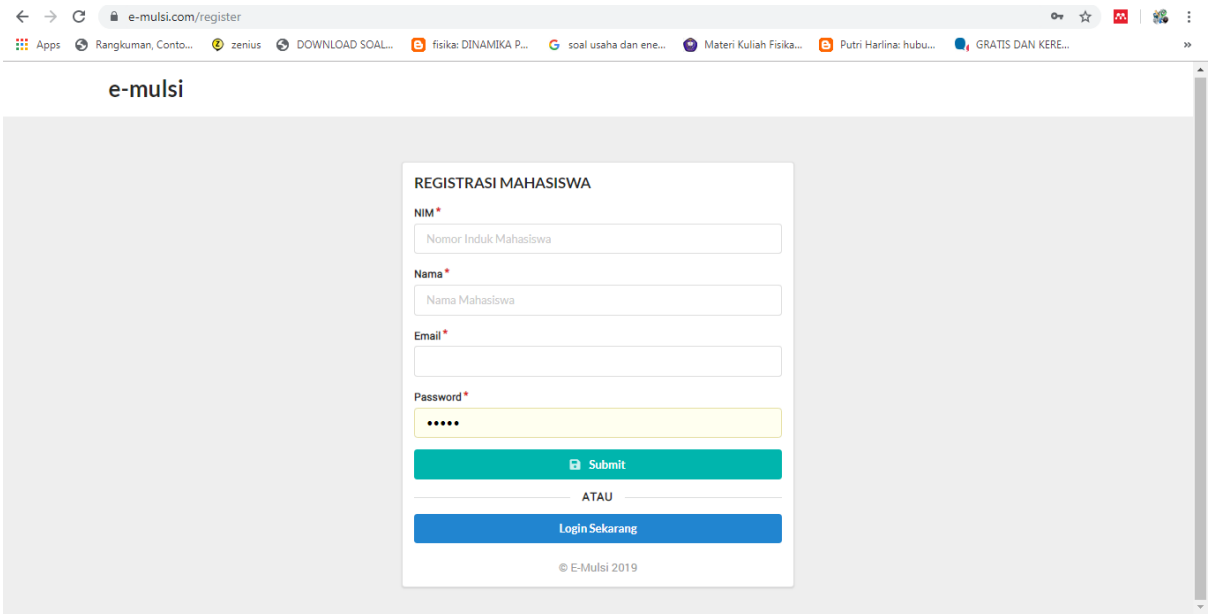

Figure 4. Student Register Page

After students are registered, they can enter the login menu as shown in Figure 3. After entering the login menu, a practicum page will open like Figure 5.

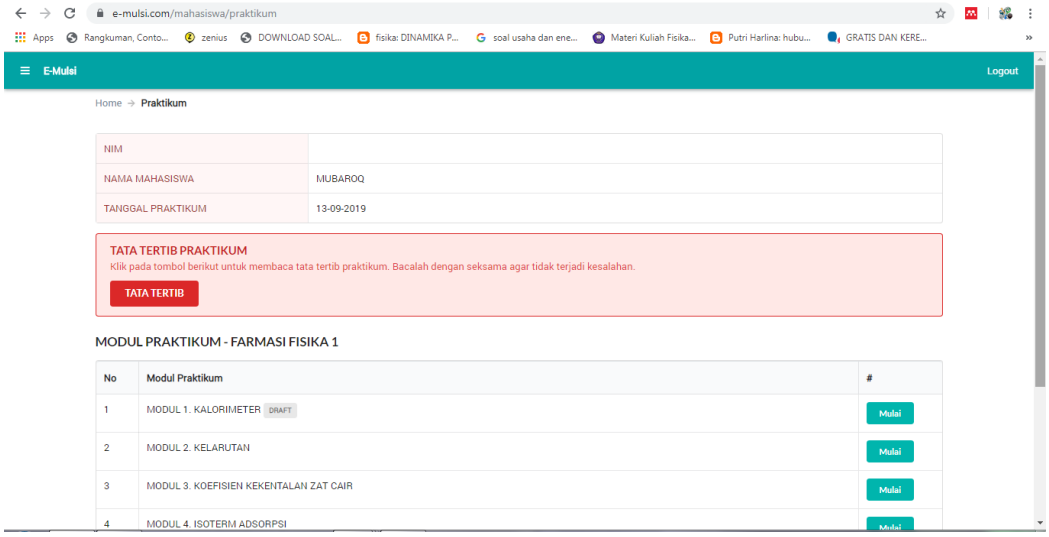

Figure 5. E-Practicum Module Page.

On the module page, students can choose the module that will be done by the practicum and report with the blue button click start. This electronic practicum module consists of practicum guides and can be processed into practicum reports by students. After the student does the practicum, data processing to answer the practicum questions he must click the submit button as shown in Figure 6.

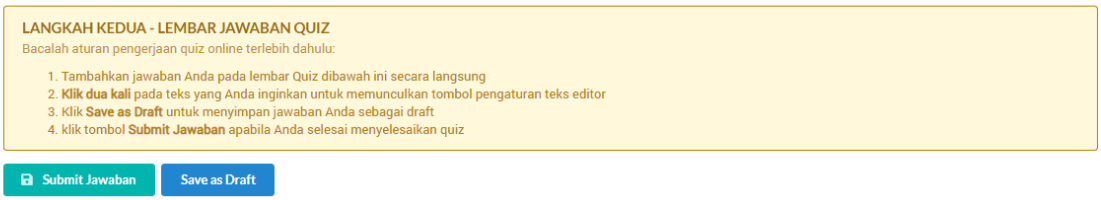

Figure 6. Submit Report Finish Button

In the lecturer account you will see data that has been done by students, so the lecturer can monitor the results of students working as shown in Figure 7.

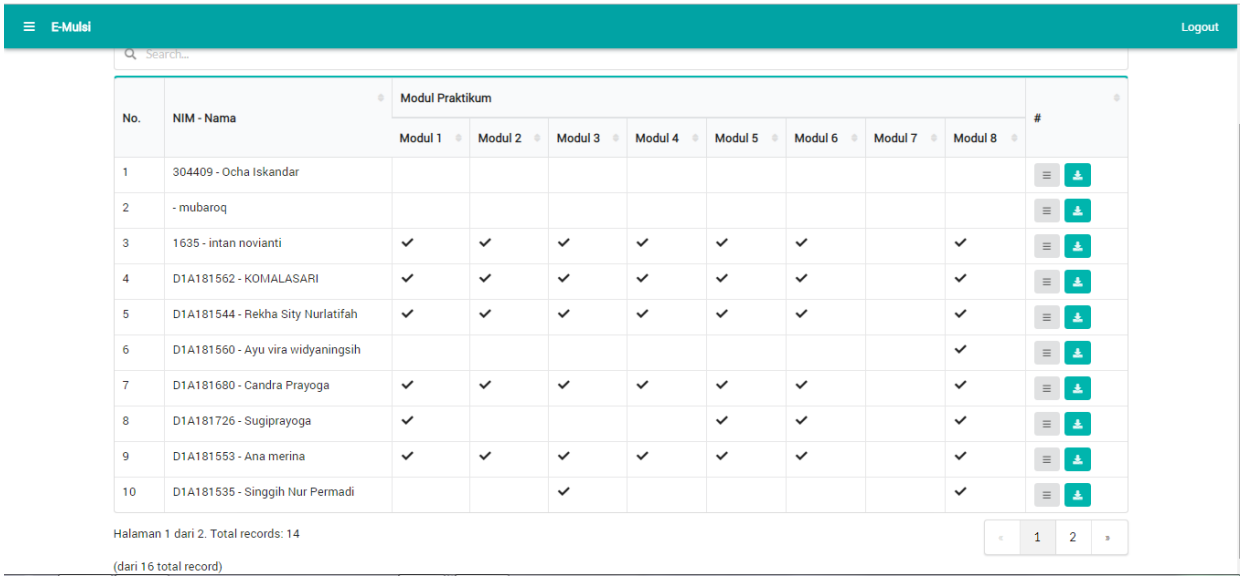

Figure 7. Lecturer Monitor Page

After this application was made, the trial run of the application of this e-practicum module for 10 students and obtained data that students felt the ease of using the module as well as preparing the practical report.

Tests have been made on the application of e-practicum module. Functional testing that aims to test the functioning of the system when run online. The results of the e-practicum module application functionality function properly and can be used as a tool in practicum learning in pharmacy physics courses. Performance testing conducted using the LoadImpact application can be seen in Figure 8. Testing using GTMatrix can be seen in Figure 9. Based on testing using the LoadImpact application there are no failures, so it can be concluded that the performance of the e-practicum module application is said to be good. This is reinforced by testing using GTMatrix, which results in the performance of the e-practicum module application are in the range of 85% - 62%.

Figure 8. The Results of Testing The E-Practicum Module Application Using Loadimpact

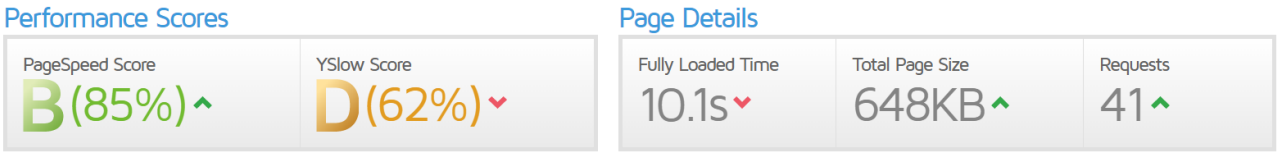

Figure 9. The Results of Testing The E-Practicum Module Application Using Gtmatrix

4. Conclusion

The development of e-practicum module is the development of educational technology. E-practicum module that have been created using computer technology with internet networks through web-based applications. This practicum module has also passed the test of both its functionality and performance. The practicum module can be accessed via e-mulsi.com on internet roaming via a personal computer or the android platform. This practicum application makes it easy for students to use modules which are usually in the form of sheets of paper, and can now be read on their smartphone and laptop respectively. students also find it helpful because work on practicum reports can be accessed through the same web page. In addition to facilitating students, this practicum module also facilitates lecturers in assessing student practicum reports through the same web page.

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