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Advanced Telecommunications System Practicum Digital Transformation with Virtual

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ABSTRACT
This research aims to practice the digital transformation of advanced telecommunication systems with virtual lab technology. It is intended that the virtual lab will continue to be held due to one of two factors, there needs to be more and complete practicum equipment. Second, practicums are still being carried out even though they cannot attend in person due to a pandemic or a practitioner's illness. So that the virtual lab with practicum equipment is expected to improve skills in practice in the lab without being bound by time and place, as well as help students to keep practising. Digital transformation of advanced telecommunication system practicum Virtual lab consists of several parts: Module, Practicum steps must register by filling in a username and password. Digital Transformation Technology Virtual lab is a future web-based practicum development so that Advanced Telecommunication Systems courses can be carried out online supported by implementation instructions. Implementing a virtual lab can facilitate students to be able to practicum still even though there are still limited infrastructure constraints. From the research results obtained, digital transformation with virtual lab technology can be used without being limited by time with the internet network. Digital transformation with virtual lab technology can increase student competence to be more independent. A virtual lab practicum has been carried out for all students who are programming the 2022/2023 advanced Telecommunication Systems Course Semester V.

Keywords: *Transformation, digital, system, telecommunications, continue*

1. INTRODUCTION

In the current era, progress related to advanced telecommunications systems is significant in society because it is the most urgent part of modern society/, because we must always be connected to other people, both those closest and farthest so that the communication process becomes more efficient [1]. Telecommunications is a way of sending or delivering Information from one place to another. In relation to telecommunications, forms of long-distance Communication can be divided into three, namely:

1) One-way Communication (simplex).
2) Two-way Communication (duplex).
3) Two-way semi-communication (half duplex).

1.1. Information Technology Equipment

Information technology equipment is the equipment used to obtain the required Information through electronic or print media [2].

1.2. Urgency (Priority) of Research

The purpose of this research is for digital transformation for initial virtual lab prototypes to improve skills in laboratory practice with and can be accessed at any time without being bound by time and place, and facilitating students to continue practising advanced information systems digital transformation Virtual lab consists of several parts, namely: Modules, Responses, practicum steps, assignments, practicum tools and materials, and making reports.

Virtual lab digital transformation was developed in the Advanced Telecommunication Systems course and supported by implementation instructions. Virtual labs

must be interactive, dynamic, animative, exciting and supported by students' desires as users for learning and understanding advanced telecommunications systems courses [3].

1.3. Target Findings/Innovations

The target of the findings in this study is to obtain a system that is capable of carrying out digital transformation of the initial prototype of an advanced Telecommunication Systems Practicum [4].

2. LITERATURE REVIEW

2.1. Supporting Theory

Referentially, the definition of Information and Communication Technology/, is: Kenneth. C. Laudon & Jane. P. Laudon, (2014) [5].

2.1.1. Technology

Namely various needs and facilities in the form of various kinds of goods, which function to provide convenience to maintain human life.

2.1.2. Information

Namely notification in the form of news or news about something;

2.1.3. Communication

Namely the process of withdrawing messages by one person to another to inform/, and change attitudes, opinions, or behaviour both orally and in writing.

The research title is: "DIGITAL TRANSFORMATION OF ADVANCED TELECOMMUNICATION SYSTEM PRACTICUM WITH VIRTUAL LAB TECHNOLOGY."

2.2. Websites

The website is an information system site page that can be accessed quickly. This website is based on the development of Information and communication technology. The development of information technology/, created a network of interconnected computers. The network known as the internet is continuously converting electronic messages, including email, file transmission, and two-way Communication between individuals or computers [6].

This website provides Information for computer users connected to the internet, ranging from "garbage" information or Information that is completely useless to serious Information, from free Information to commercial Information [7]. A website or site can be interpreted as a collection of pages that are used to display text information, still or moving images, animation, sound, and or a combination of all of these, both static and dynamic, that form a series of interrelated buildings where each is connected to a network of pages (hyperlinks). In this increasingly advanced modern era, computers have evolved so that they have reached the fifth generation, which has given birth to a new generation, namely the merger of Computer and Communication Technology that is often referred to as Information and Communication Technology which was made to help solve various problems easily and quickly. Communication technology does not only affect one area of people's lives/, but affects almost all areas of people's lives [8].

2.3. Virtual labs

A laboratory is usually defined as:/ (1) a place equipped for experimental study in science or for testing and analysis; a place that provides an opportunity for experimentation, observation, or practice in a field of study, Or (2) an academic period set aside for laboratory work.

A virtual laboratory is defined as an interactive environment for creating and conducting simulated experiments: a playground for experimenting. It consists of a domain-dependent simulation program, an experimental unit called an object which includes data files, tools that operate on the objects, and a reference book [9]. The virtual laboratory is a system that can be used to support practicum systems that run conventionally. This virtual laboratory is commonly called the Virtual Laboratory or V-Lab. It is hoped that the existence of this virtual laboratory will provide opportunities for students, especially to carry out practicums via internet access so that these students do not need to be present to take part in practicums in the laboratory room. This becomes effective learning because students can actively learn on their own without the help of an instructor or assistant like a running system. With a web-based display format, it is enough to help students to be able to take part in practicums independently [10].

2.4. Digital Transformation to Support

Virtual environments, called virtual laboratories, vary from static web pages with video and text to dynamic pages with sophisticated environments,

collaborative authoring, video on demand, virtual meetings, and many other features. This virtual laboratory can also allow remote access to measuring instruments, video cameras, microphones, electrical and mechanical circuits, chemical reactions, biological experiments, and so on.

The variety of models and structures for virtual laboratories is wide-ranging and varies according to the nature of the project under study, the objectives, and the technologies involved. The motivation for virtual laboratory implementation includes, but is not limited to:

a. Limitations on resources and space in real-world laboratories. This type of limitation can cause delays in the learning activities of students, who may face situations where they have to compete or wait for the availability of a given resource, in addition to the fact that one's experiments may be interrupted before concluding/, due to divided resource requirements.
b. The Possibility of sharing equipment is usually expensive.
c. Stimulus for research collaboration or work in their physically distanced independent groups.
d. The existence of a learning environment outside of school, which allows students to participate in or develop their own projects together with other students in their free time.
e. Possibility of developing different experiments in different locations.
f. Remote surveillance and intervention in dangerous experiments, thereby helping to prevent accidents.

3. RESEARCH METHOD

This research was carried out in several steps, namely data collection, literature review, data analysis, system design and design, system validation, design of virtual labs determination system, testing and perfecting the system, application usage. The description of the research steps is as follows:

1. Data Collection. The first step in this research is to get data
2. Literature Study, a literature study was conducted to obtain Information on how to carry out digital transformation with Virtual Lab technology
3. Determine the parameters of the digital transformation system with web-based virtual lab technology in the Advanced Telecommunication Systems Practicum
4. Designing an initial prototype of digital transformation with web-based Virtual Lab technology
5. The results of the initial digital transformation prototype were tested for implementing software on the system Advanced Telecommunication System Practicum Virtual Lab.
6. Implementation The research was carried out by collecting literature related to digital transformation using Virtual Lab technology.

The type of research carried out is a literature study and development of PHP programming software and AJAX programming technology, starting from the design stage [11]. After the design results are complete, then the implementation stage (coding) is carried out into the PHP and AJAX programming languages [12], W. Purbo & Antonius Aditya Hartanto, (2002) the next stage is the testing stage to test whether the virtual system office can perform its function correctly in this case, the test is on the local host and the final stage is implemented via the internet on the website Fatek.ac.id/Elektro/laboratorium.

4. RESULTS AND UNDERSTANDING

Based on the formulation of the problem and the design of the virtual Lab system in the previous chapter, the design and implementation of the virtual Lab system [13]. Produces application programs consisting of several main menu forms, namely Home/Announcement/Information Page Forms, Information Detail Forms, Profile Forms, Structure Page Forms Organization, practicum schedule form, practicum module form, virtual laboratory material page form, virtual lab form, archive page form, registration page form, login page for access to this makeup will appear after the web browser http://www.labtte.ft.ung.ac.id, then the front page will appear, then select one of the menu forms namely [14]:

To be able to use this application, users (Students) are required to register in the Register form contained in the application. Lecturers/teachers can contact the admin/operator to get access to the application [15].

1. Application Page Explanation
1. Home page

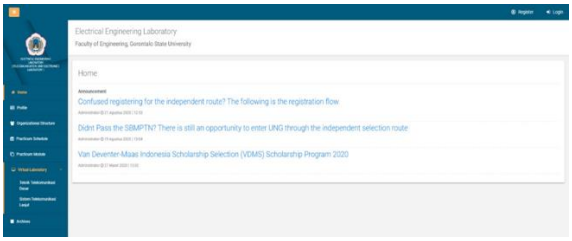

Figure 1. Home page Practicum Module page

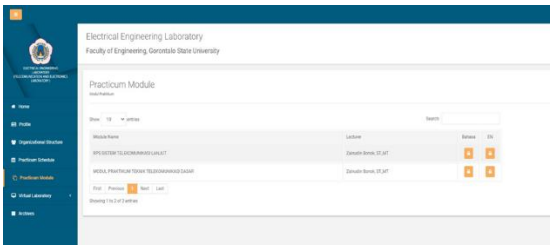

Figure 2. Practicum Module Page

This page contains practicum course modules which are uploaded by the lecturer/teacher concerned in accordance with the effective course. Students can download the file, provided that students are required to log in to the application.

2. Virtual Lab page

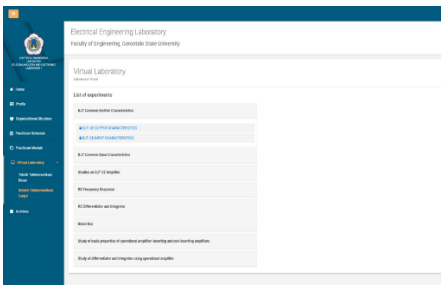

Figure 3. Virtual Lab page

5. CONCLUSION

Based on the discussion of research results, it can be concluded as follows:

1. The application of a virtual lab can facilitate students to continue to be able to carry out practicums even though there are still infrastructure constraints
2. From the research results obtained, digital transformation with virtual lab technology can be used without being limited by time with an internet network.
3. Utilization of digital transformation with virtual lab technology can increase student competence to become more independent, and a virtual lab practicum has been implemented for all students of the Advanced Telecommunication Systems Course program semester V for the 2022/2023 school year.

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