Online Discussion with Virtual Classroom Method as Supporting Lecturer Digital Aircraft Simulator

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Abstract
E-Learning is a system or educational concept that uses information technology in teaching and learning to use electronic media—usually used for teaching and learning processes within an unlimited distance. In the learning process of the Digital Aircraft Simulator course using e-learning, some obstacles are difficult to understand, and there is no discussion facility in the material section. Based on this, e-learning with the virtual classroom method is expected to overcome these problems so that the learning process can run well and effectively. In the online discussion feature with the virtual classroom method, there are two methods: synchronous and asynchronous. Based on the test using a white box to 13 paths for three days obtained a success rate of 100%. While the black box test obtained a success rate of 100% for the faculty and 100% for the student side, accessed using a laptop device with Windows 7 and 8 operating systems. While accessed using the Android smartphone, Kitkat, Lollipop, and Oreo obtained a success rate of 80% for the lecturer and 60% for the student. Then the test results with the Guttman scale obtained a success rate close to the percentage of 92%. The online discussion feature in the virtual classroom can facilitate communication between the lecturer, and students can also directly ask the lecturer through this feature when there is lecturer material and explanations that are not understood.

INTRODUCTION
Today's learning technology is already using e-learning because e-learning prioritizes the effectiveness and flexibility of learning. For example, E-learning can make it easier for lecturers when uploading material and giving assignments to students, and they can also communicate through the chat facility in the e-learning application (Putranto, 2012). E-learning is online learning that uses information technology tools (Sara et al., 2020) which can be done remotely and flexibly (Yıldız, E., et al., 2015).

Online discussion forums in e-learning can exchange information, ideas, ideas, and questions. Information shared on forums can be in text, images, photos, or videos, making it easier for forum participants to understand the information (Kurniawan, et al., 2016). Online discussion forums can use 2 kinds of ways, namely synchronous and asynchronous. Asynchronous e-learning usually uses email
facilities, and discussion boards to support teaching and learning activities and communication between lecturers and students. Synchronous e-learning uses video conferencing and chat facilities to facilitate learning and communication between lecturers and students (Hratinski, 2018). Task-technology fit can affect student achievement in the academic field (Yi, Y.J., et al., 2016), as well as task-technology fit by utilizing online discussion features that can facilitate student and lecturer communication in learning activities.

We made this online discussion using synchronous and asynchronous techniques to make it easier for lecturers and students to teach learning activities and communicate. The existing facilities are not only for uploading material and viewing material but also being able to review assignments, and there are chat facilities that support it.

**METHOD**

This virtual classroom using the waterfall method. This method has stages, namely requirements, design, implementation, verification, and maintenance (Sadi; et al., 2019). At the requirements stage is an analysis for system requirements to be made, then the design stage is to make the overall system architecture, then at the implementation stage is to make the design stage that has been made into software, at the verification stage is to test the system that has been made. Then at the last stage, namely maintenance, is the maintenance of the system that has been made, including improvements to the system. The programming language is HTML to design the display, then uses PHP and Javascript for the process. The database used is MySQL. In this system implement a Virtual Classroom which is divided into synchronous and asynchronous. We used synchronous for features that are real time, while we used asynchronous for features that are not real time.

The next step is to make a flowchart of the discussion system. We describe the steps and procedures in the discussion process in the discussion system flowchart. The steps start with logging in. If you are logged in as a lecturer, you will enter the lecturer discussion page, then the lecturer will assess the students who are discussing and we will carry the calculation process out. If we logged you in as a student, you will enter the student discussion page.

After that make a Context Diagram and continued with relations between tables. That Diagram is useful for showing the system that is designed as a whole (Soulfitri, 2019) which summarizes data flows and the linkage of data flows between the system and the outer parts of a system (outer units). In Figure 2 there are 2 entities, namely lecturer and student entities, and we describe the lecturer as the manager of the entire database of this online discussion, while students can receive materials, assignments, chat, and also upload assignments.
RESULT AND DISCUSSION

The home menu form appears after logging in as a lecturer, on the home menu page display, as shown in Figure 4, there is information on we can do what access rights as a lecturer.

Implementing the form shows the material as shown in Figure 7 to display the uploaded material. At the top there is information on the name, title, date, and description of the material. Underneath there is a preview for the material, then there is a discussion column for lecturers and all registered students. In addition, there is a student list table which also functions for lecturers to fill in grades for discussions held by students.

Implementing the material upload form as shown in Figure 6 is used to upload lecture materials by lecturers. There is a button to select the file to be uploaded, a text field to fill in the material data, as well as a save button to save the selected material and a reset button to clear the data on it.
This menu displays a chat forum between lecturers and students. There is a chat column to display chats sent by lecturers and students. There is a textfield to type in the chat you want to send, then there is a send button that serves to send the text that has been typed in the textfield.

Testing of this application using black box testing and white box testing. While white box testing is used to ensure that it executed all commands and conditions in the application at a minimum. In white box testing using a flowgraph to describe the flow of the process in this web application.

The first step is to describe the flowchart first to find out the flow of the online discussion application process. Next is changing from flowchart to flowgraph which aims to calculate cyclomatic complexity so that it can be seen the number of paths that need to be carried out so that all processes are passed. Then the cyclomatic complexity can be calculated. The test results show the percentage of success for testing for 3 days from as many as 13 paths, which is 100%.

Black box is a test that focuses on the functional requirements of the system being built. In black box testing, it will be divided into testing on the lecturer side and testing on the student side.

Testing on a chat page test class (see Table 1) with a percentage value process test scenario. In this test, using a laptop device with the Windows 7, 8 operating system, and a smartphone with the Android Kitkat, Lollipop, and Oreo operating systems.

<table>
<thead>
<tr>
<th>Class Test</th>
<th>Scenario Test</th>
<th>Expected Results</th>
<th>Obtained Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page Chat</td>
<td>Display chat</td>
<td>Chat appears immediately</td>
<td>Windows 7 and 8: [√] Success</td>
</tr>
<tr>
<td></td>
<td>Chat Process</td>
<td>Chat sent and displayed</td>
<td>[ ] Not Success</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Android Kitkat, Lollipop, and Oreo:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[√] Success</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[ ] Not Success</td>
</tr>
</tbody>
</table>

**CONCLUSION**

This application can make it easier for lecturers and students to conduct discussions about lecture material both through group and private online discussions, facilitate assignments by lecturers, upload assignments by students, and make it easier to conduct activity assessments by lecturers. The results of testing using a white box on 13 paths for 3 days got success rate of 100%. The results of testing using black boxes got a success rate of 100% for the lecturer side and 100% for the student side accessed using a laptop device with Windows 7 and 8 operating systems. Meanwhile, it is accessed using an Android smartphone version of Kitkat, Lollipop, & Oreo obtained a success rate of 80% for the lecturer side and 60% for the student side. The online discussion feature in the virtual classroom supports teaching and learning activities and makes it easier for students to ask their lecturers when there is lecture material that they do not understand.

**REFERENCES**


