

Development Of Social Media Applications To Support Online Learning Of Computer Simulation Course

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Abstract

Due to the pandemic Covid-19, Department of Industrial Engineering, University of Diponegoro started requiring online learning for each subject using the Microsoft platform Teams. However, the use of Microsoft Teams has some problems. Firstly, the students complain of difficulties using the platform when the internet connection is limited. Secondly, the students have difficulty accessing Microsoft Teams because their hardware is not capable to run the Microsoft Teams. Thirdly, students also find it difficult to do flashback learning that has been done previously because access to video records cannot be accessed after 20 days after recording. This study discusses the development of social media applications to support online learning, especially in computer simulation courses. To support computer simulation learning, this research develops applications based on social media (Telegram) and websites (Wordpress). Requirements Engineering methods is used to identify the users' requirements, determine system requirements, design the application and perform application testing.

Keywords

Online Learning, Social Media, Requirement Engineering, Telegram, Wordpress,.

1. Introduction

The Covid-19 pandemic has forced all learning in the Industrial Engineering Department of Diponegoro University (DTIDU) to be carried out online. The learning environment system used in DTIDU is Microsoft Teams. The Microsoft Teams platform is used to make lectures more lively because of the two-way communication between students and lecturers. We conducted a preliminary study to find any problems that may arise during the online learning using Microsoft Teams. From the study, we find some weaknesses that students complain about. Problems that arise include students' complaint of difficulties in using the Microsoft Teams when their network is bad, students having difficulty accessing Microsoft Teams because their hardware is not capable of running Microsoft Teams, students also find it difficult to do flashback learning that has been done previously because access to video records cannot be accessed after 20 days after recorded. Some of these weaknesses cause student dissatisfaction.

This phenomena in the Department of Industrial Engineering and in other educational institutions reveal that the pandemic has caused disruption in the world of education. (Alvin et al., 2020) and (Renfrew et al., 2021) conducted research on the impact of the COVID-19 pandemic on students in the radiology field. (Azubuike et al., 2020) and (Lapitan et al., 2021) are part of a study that studies the distribution, strategy and implementation of online learning in Nigeria. (Slanetz et al., 2020) and (Lapitan et al., 2021) developed various learning strategies during a pandemic. (Larocque et al., 2021) are among the few studies that develop learning media during a pandemic and measure how students and lecturers respond after using these learning media.

Based on the literature review that discuss the learning in the pandemic era, there is an opportunity to research the development of learning media. Referring to the weakness of Microsoft Teams, this research was conducted by utilizing social media and website that contain learning materials. We choose Telegram as a social media application is used as an interactive medium in online learning to become an entry point for more complete learning content in the form of a website. The social media and website that have been developed also support student-centered learning

(SCL). The SCL using Telegram and website can be conducted in the form of learning content can be built by students independently with direction from the lecturers.

The Requirement Engineering method is used to design telegram group and website. With Requirements Engineering, learning support facilities are expected to meet the quality of media and learning systems that reduce student fatigue and improve the quality of student learning (Renfrew et al., 2021) (Zhang et al., 2021).

2. Literature Review

2.1 Online Learning

Online learning is an online classroom program to reach a massive and broad target audience. By utilizing this online learning, learning can be held for free or paid. The role of technology is increasingly being felt in various sectors including the education sector (Bilfaqih and Qomarudin 2015). The use of online learning in the pandemic era is increasingly finding its relevance. (Alvin et al., 2020) and (Renfrew et al., 2021) conducted research on the impact of the COVID-19 pandemic on students in the radiology field.

The total population of Indonesia is 270,203,917, with details of 136,661,899 male and 133,542,018 female (BPS, 2020). Marinoni et al. (2020) in Afrianty et al (2021) explains that due to the COVID-19 outbreak, learning in universities in the world must run online. Bahri et al. (2021) through their research explained that the adoption of online learning using social media can be applied more safely during the COVID-19 pandemic. With limited resources to build educational infrastructure, online learning is a feasible alternative. Azubuike et al. (2020) and Lapitan et al. (2021) are part of a study that studies the distribution, strategy and implementation of online learning in Nigeria. According to Bilfaqih and Qomarudin (2015) advances in information technology bring changes in human life. The role of technology is increasingly being felt in various sectors, including the education sector. Considering the trends that are developing in the world and the condition of education in Indonesia, it can be formulated the reasons for the importance of online learning, there are :

- Indonesia's educational capacity is still very limited.
- The distribution of education is not evenly distributed due to the increasing cost of education.
- There are still many educational units that do not yet have adequate and quality resources.
- Equal and quality education and training services have not yet been realized.
- Unable to guarantee the need and demand for quality education and training.
- There are still many people of compulsory school age who do not have the right to education.

This research focuses on developing applications that support the Microsoft Teams learning environment system that is run at DTIDU. The motivation for switching learning to online platforms is the Covid-19 pandemic. Several recent studies during the pandemic reinforce the need for online learning. In addition, online learning must consider and formulate strategies so as to enable learning effectiveness. (Slanetz et al., 2020) and (Lapitan et al., 2021) developed various learning strategies during a pandemic. (Larocque et al., 2021) are among the few studies that develop learning media during a pandemic and measure how students and lecturers respond after using these learning media.

2.2 Social Media

Social media can be used for academic purposes as a communication tool between students and other faculty members (Sobaih, et al, 2016). Kolhar et al. (2021) explained that the use of social networking sites is prevalent among students due to the easy availability of smartphones and easy access from home computers. Hamadi et al. (2020) explain that social media can be used in higher education classrooms.

The Microsoft Teams application is one of the learning environments. Martin (2005) in Bui et al. (2020) explains that video conferencing tools such as Microsoft Teams can be used for distance learning. The Microsoft Teams application adopts one of the features of social media, which is being able to be creative through chat. However, the class discussion activities carried out in Microsoft Teams are not efficient. When we want to have a discussion in class, we need to open the Microsoft Teams application which takes time, go to the Teams group menu, and search for the class group. An application that is efficient in conducting discussions is social media.

2.3 Requirement Engineering

This study is conducted using Requirements Engineering methods. Requirement engineering is a part of systems engineering that deals with discovery, development, tracing, qualification analysis, communication, and management

of requirements that determine a system at a sequential level of abstraction. The classic model called the V-Model is used to provide an overview of the stages of research development (Dick et al. 2017).

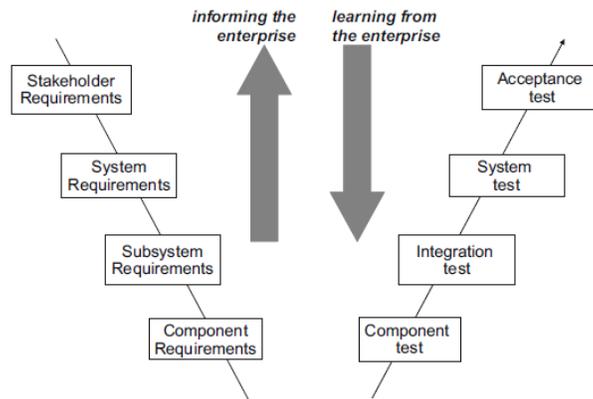


Figure 1. V-Model Requirement Engineering

These Requirements Engineering steps are the first to determine the needs of stakeholders. After the stakeholder needs are obtained, then determine the system and subsystem requirements. After that, identify the required component requirements. If all the requirements have been done, do the making of an information system. After the information system has been created, the next step is to carry out a series of tests such as component testing, integration testing (integration between components), overall system testing, and tests that involve users directly (Dick et al. 2017).

Based on a literature review of online learning and social media, this research focuses on complementing the learning environment (Microsoft Teams) at Industrial Engineering in Diponegoro University, especially in computer simulation lectures using social media. The Requirement Engineering method is used to gather user requirements to create an information system.

3. Methods

This study discusses the gap between the limitations of the current learning environment and the needs of users. For example of the gap is that users need some features such as content search but the current learning environment does not have them. Another example of a gap is the problem of the practicality of learning. The purposes of this research are (1) to analyze online learning needs. (2) knowing the flow of information in the online learning system. (3) create an integrated information system between social media and website. (4) Understand the strategy for using telegram-based social media and websites in learning environment.

The research procedure for this article begins with a preliminary study by giving questionnaires to students studying online. The number of samples used were 160 Industrial Engineering students at Diponegoro University who had already done online learning. After the preliminary study, it can be concluded that the formulation of the problem is "designing an information system by utilizing social media". There are several objectives to direct research such as (1) Identifying the need for social media-based learning. (2) Knowing the flow of information in the social media-based learning information system. (3) Designing a social media-based information system that improves the quality of online learning at the Department of Industrial Engineering UNDIP. (4) Understanding online learning strategies that can be used when developing social media. To achieve this goal, the first step is to identify the needs of stakeholders. Then proceed to identify system requirements, subsystem requirements, component requirements, design information systems, and create information systems. After the information system has been created, the next step is to carry out a series of tests such as component tests, integration tests, system tests, acceptance tests.

4. Data Collection

The initial stage of the research was carried out by identifying stakeholders. Each stakeholder has their own role which can be seen in table 1.

Table 1. The Role of Each Stakeholder

Stakeholder	Role
Lecturer	Lecturers have a role in providing material in the form of videos or articles as discussion material and learning materials for students.
Student	Students have the role of receiving material to complement learning and discuss material both with lecturers and with fellow students.

Creating an information system requires capturing the needs of each stakeholder involved. To find out the needs of stakeholders, further interviews were conducted with the stakeholders involved.

Based on the results of interviews with stakeholders, there are several needs that are used as a basic reference in identifying requirements. The needs captured from the interview results are presented in Table 2.

There are two supporting applications for computer simulation learning, there are Telegram (social media) and website. The Telegram application provides discussion group and channel features. Telegram channels can carry out discussions with a focus on a topic without disturbing/interrupting other discussions. The website can display course material entirety, which cannot be displayed on Telegram.

Table 2. Statement of Needs

Category	Statement of Needs	Telegram	Website
Appearance	Users need an application with a simple appearance	✓	✓
	Users need an application with bright colors	✓	✓
	The user needs an illustration in the form of an image	✓	✓
	Users need an application with clearly displayed menus	✓	✓
Facility	Users need an application with a content search feature	✓	✓
	Users need an application that can provide questions (quizzes) or assignments as student evaluation materials	✓	✓
	Users need an application that can present learning videos	✓	✓
	Users need an application that can display course material	✓	✓
	Users need an application that can be accessed by laptops, smartphones and tablets	✓	✓
	Users need an application that displays class schedules	-	✓
	Users need an application that can recommend related articles	-	✓
	Users need an application that can provide online library features	-	✓
	Users need an application with emoticon features	✓	✓
	Users need an application that provides material in the form of games	-	✓
	Users need an interactive application (there is a two-way interaction)	✓	✓
	Users need an application to upload and download various types of files	✓	✓
	Users need an application that can categorize the material	✓	✓
	Users need an application that provides file download access	✓	✓
Users need an application equipped with a virtual assistant	-	✓	

Category	Statement of Needs	Telegram	Website
Facility	Users need an application that can display computer simulation case studies	✓	✓
	Users need an application that can provide an overview of computer simulation software	✓	✓
	Users need a reminder in the form of an email	-	✓
	Users need a download link for the latest computer simulation software	-	✓
	Users need an application that can find out user activity	-	✓
Comfortable	Users need an application that doesn't waste internet quota	✓	✓
	Users need an application that is easy to operate (lots of symbols)	✓	✓
	Users need an application that is responsive (not slow)	✓	✓
	Users need an application that is not easy to down	✓	✓
	Users need an application that does not have many advertisements (no more than 3)	✓	✓
	Users need an application whose security is guaranteed	✓	✓
	Users need an application that can be accessed 24 hours	✓	✓
	Users need an application that can be accessed on outdated devices	-	✓

5. Results and Discussion

5.1 Create a Website

Website created using wordpress. Wordpress supports a variety of plugins needed to answer the needs of every stakeholder. WordPress is a content management system (CMS) that is user-friendly and easy to use. It can be seen in Figure 2 that the WordPress dashboard displays the entire menu clearly and simply. Wordpress dashboard has a function for navigation that displays all menus in wordpress (example: edit menu, post lessons, install plugins, etc.). Figure 3 shows a user-friendly wordpress information menu, so wordpress is easy to use.

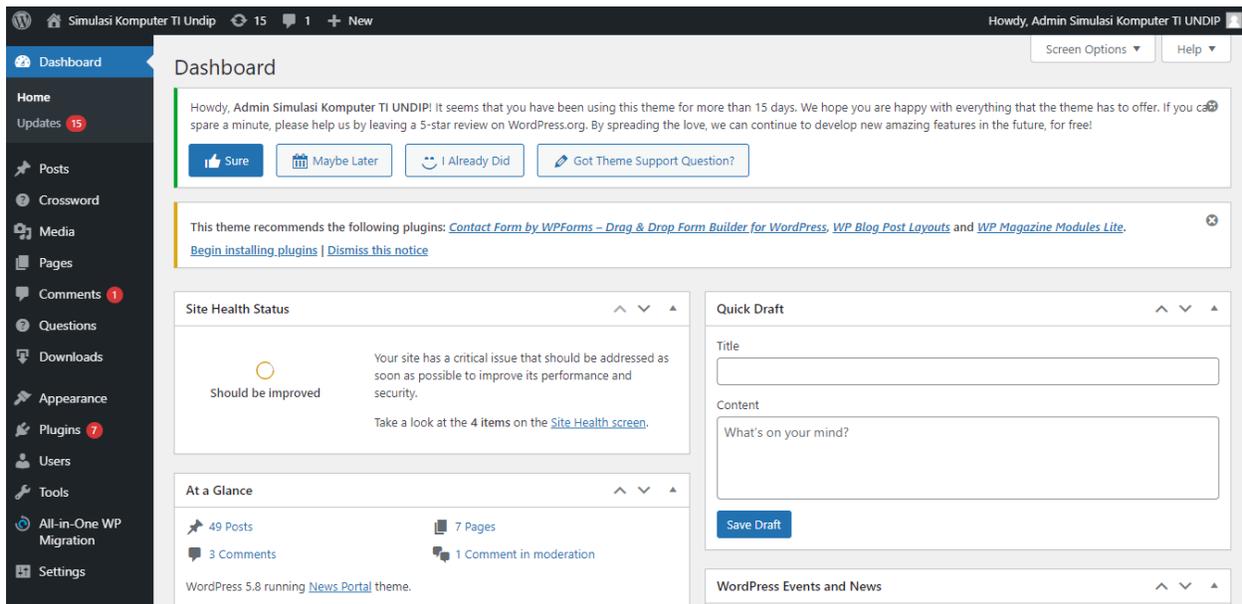


Figure 2. WordPress Administrator Dashboard View

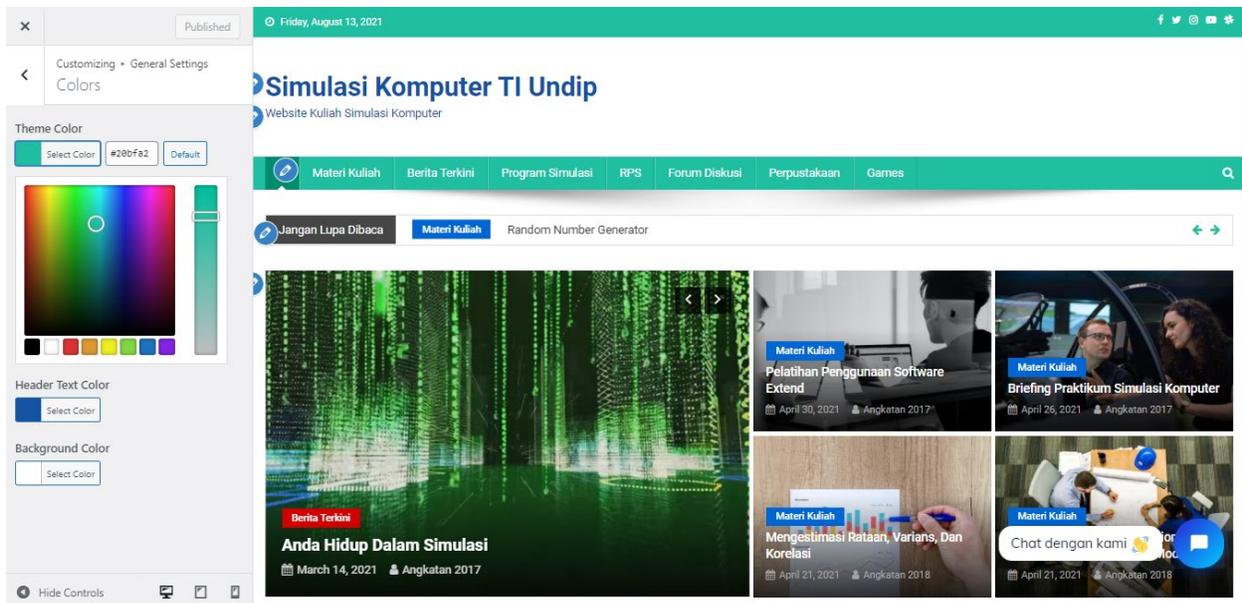


Figure 3 User-friendly WordPress in The Editing Menu

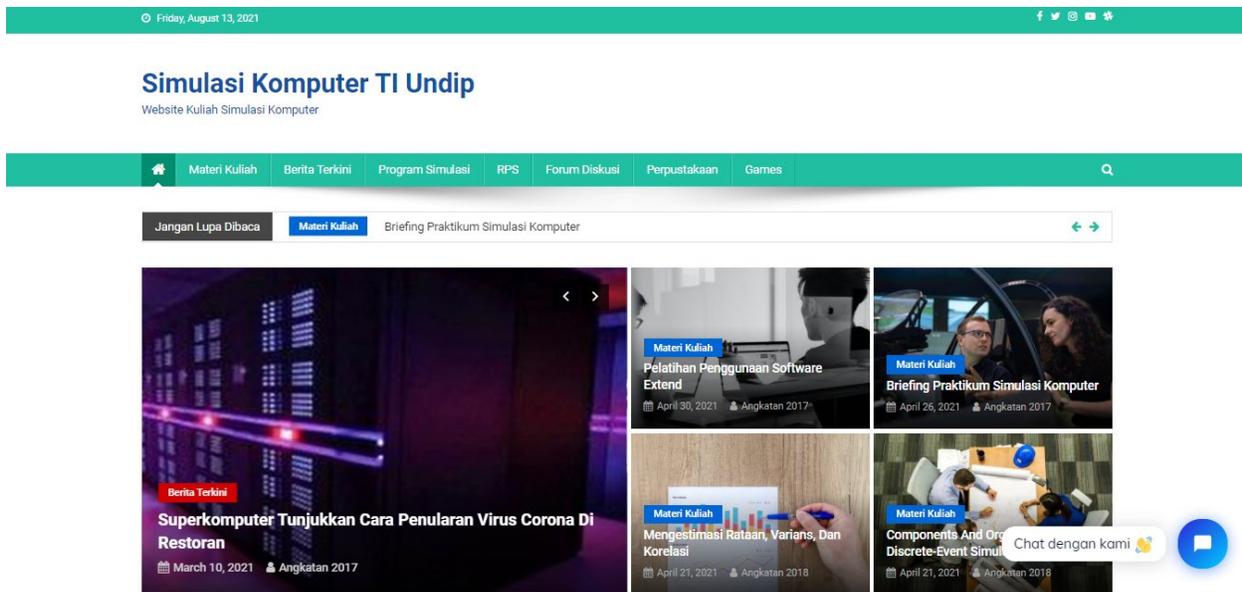


Figure 4. Website Views

5.2 Making a Groups and Channels Telegram

Groups and Channels on Telegram are created to support online learning. Telegram Group utilizes a bot that can present the lecture material.

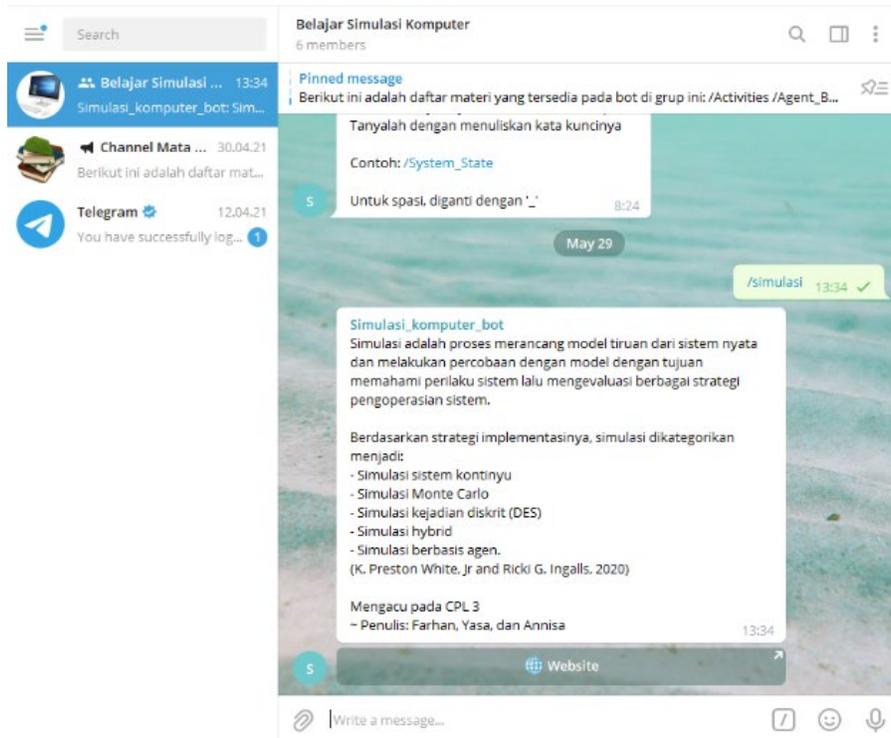


Figure 5. Utilization of Bots in Telegram Groups

Channels are used to make notifications by lecturers such as notifications about exam schedules or new content made on the website.

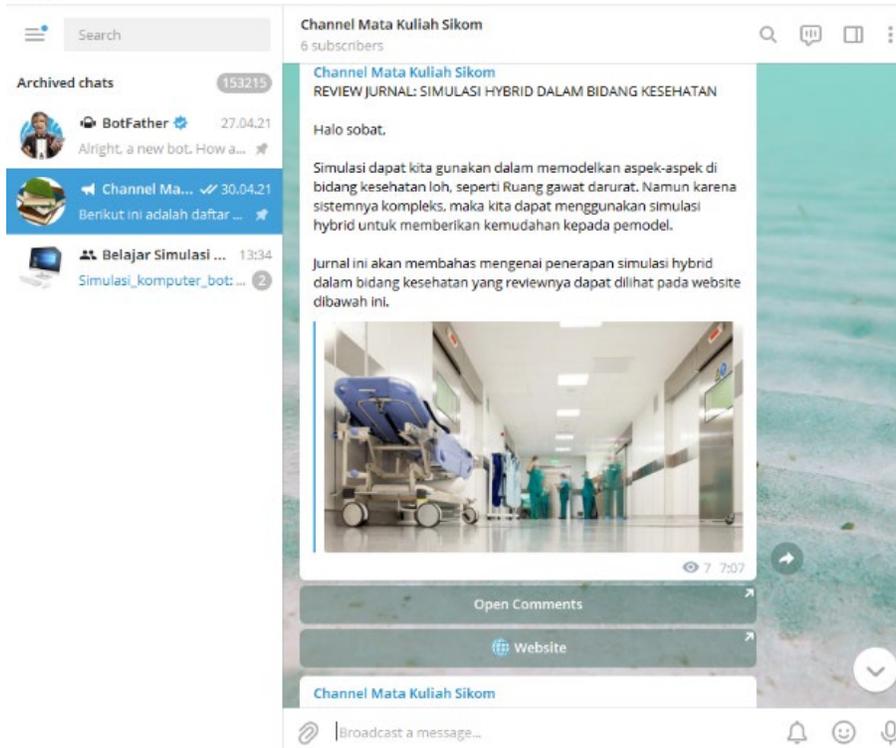


Figure 6. Making a Channel Telegram

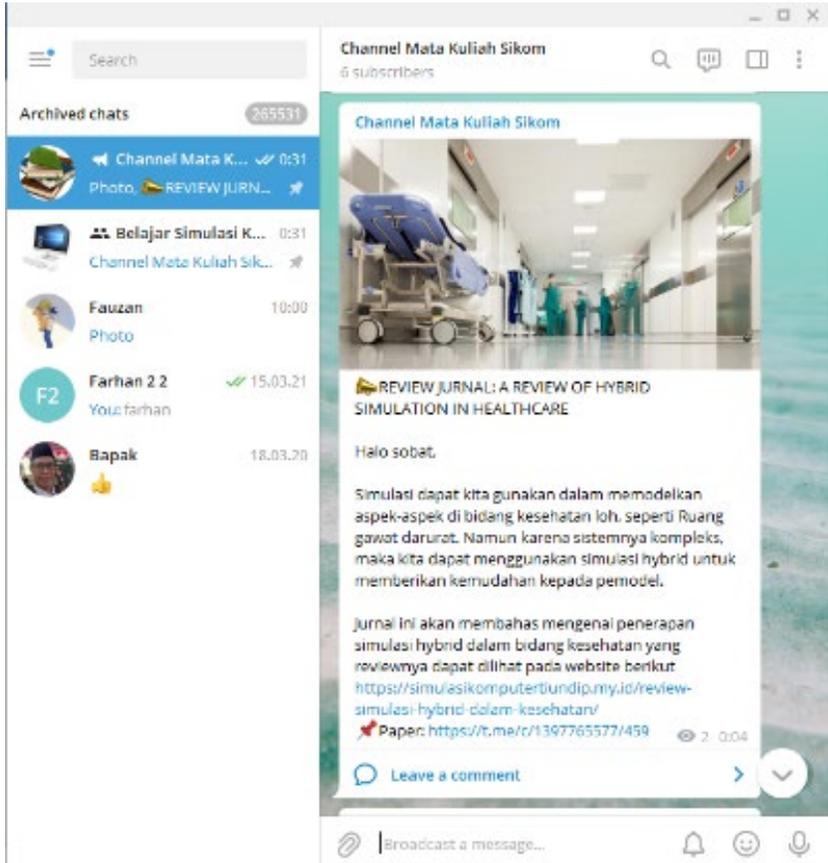
5.3 Component Test

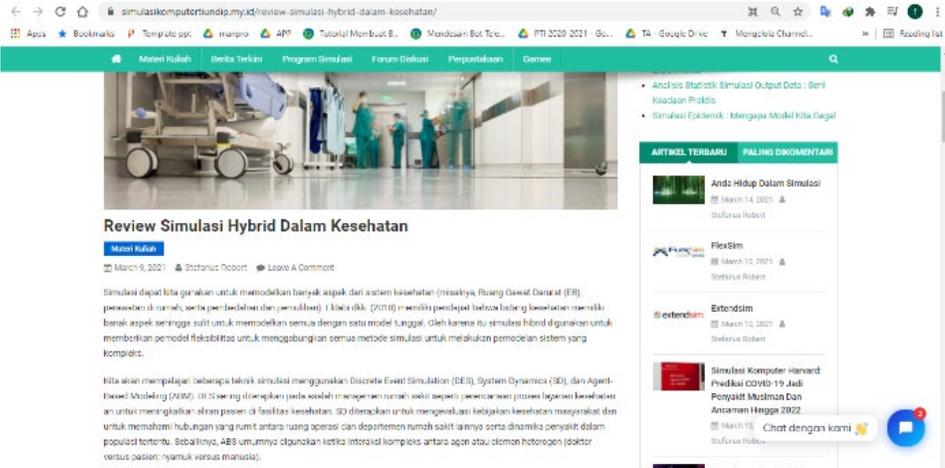
The component test is the initial stage in conducting system testing. The component test stage is carried out by comparing the functions of each existing subsystem whether it is in accordance with user needs or not. From the tests that have been done, the results show that 100% of the functions in the subsystem are in accordance with the needs of the user.

5.4 Integration Test

Integration test is a series of tests after the component test. Integration test is done by checking the integration of each workflow that has been made.

Table 3. Example of Integration Test Results

Learning Materials	Platforms	Integration Test Results
Journal Review: Hybrid Simulation in the Health Sector	Telegram	 <p>The screenshot shows a Telegram chat interface. On the left is a list of archived chats, including 'Channel Mata K...', 'Belajar Simulasi K...', 'Fauzan', 'Farhan 2 2', and 'Bapak'. The main chat area shows a post from 'Channel Mata Kuliah Sikom' with 6 subscribers. The post includes a photo of a hospital hallway and a text message titled 'REVIEW JURNAL: A REVIEW OF HYBRID SIMULATION IN HEALTHCARE'. The text discusses the use of hybrid simulation in healthcare, specifically in emergency rooms, and provides a link to a journal review on the website https://simulasikomputeriundipumy.id/review-simulasi-hybrid-dalam-kesehatan/.</p>

Learning Materials	Platforms	Integration Test Results
	Website	

After testing, the results show that the achievement of each integration is 100%. So it can be concluded that this computer simulation learning website has a very good interpretation.

5.5 System Test

The system test is a series of tests after the integration test. System test is done by testing every system on the website and telegram whether the system is functioning as planned or not. In this study, testing the existing system got 100% working results, which means that the existing system has been able to work properly. Then performed compatibility testing, in which the existing system is tested on various devices.

5.6 Acceptance Test

The acceptance test is the last stage in testing the system. Acceptance tests are carried out by directly involving each stakeholder involved. The step taken was conducting direct interviews with the stakeholders involved. Based on the results of interviews with all stakeholders involved in this study, the average yield value was 90.81%, which means that this website is very much in accordance with what is expected by all stakeholders.

6. Conclusion

The design and creation of websites and telegram groups in this study were carried out to complement the online learning media of the Diponegoro University Industrial Engineering Department. This design is carried out by meeting the needs of stakeholders as shown in table 2.

To improve student understanding, online learning is carried out not only through the Microsoft Teams platform, but also through the Telegram application as learning content that is integrated with learning websites.

The expected online learning strategy is that students and lecturers can take advantage of the various facilities provided by Telegram and the website so that they can improve the quality of learning and teaching.

This study found that social media and websites can be used to complement the current learning environment (Microsoft Teams). This research creates an integrated system between social media and website. This study also found that the integrated system of social media and website was in line with what was expected by all stakeholders.

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Biography

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