

# Design of Hybrid Learning in Classroom Using Web Camera and Website

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**ABSTRACT** — The Covid pandemic that hit the world including Indonesia caused changes in lifestyle and ways of working and studying to prevent the transmission of COVID-19 virus. This is certainly a challenge for education in the era of the pandemic on how the learning process can be proceeded so the knowledge is conveyed. Hybrid learning is a combination of some learning methods; online method (outside classroom) with face-to-face meeting method for several hours (inside classroom). Therefore, hybrid learning is suitable to be carried out during this pandemic. Hybrid learning is built in a class that is built based on Internet and uses web camera technology that can be done anywhere with the Internet by students and lecturers. This class provides hybrid learning process using website and 4G internet network so that students get a better learning experience and understanding easier to learn materials. The web camera is utilized as a student online learning process that views the movement of the lecturer so that it makes learning easier for the student. This hybrid learning also uses website to support in-class monitoring and future hybrid learning processes and capable of recording the learning process so the recording can be used in the future.

**KEYWORDS** —hybrid learning; website, web camera, classroom

## I. INTRODUCTION

The COVID-19 pandemic that has emerged in the world since 2020 has changed many people's conditions, from work processes, health, and even education. Everything is done remotely to avoid the spread and transmission of the coronavirus 19. All of this can be done because technology is very supportive for the process, from information technology to the internet which has reached the 5G era with up to 1Gbps speed. Conference technology such as zoom and google meet which support working online and from home as well as Internet-based distance learning have provided a new experience in the distance learning process in the era of the coronavirus pandemic. One of the technologies to support learning is hybrid learning which is a combination of face-to-face learning with online learning with class capacity which can be reduced by up to 50% to reduce the impact of transmission of the coronavirus 19. Hybrid learning is a learning system that combines various approaches in learning, namely online learning and face-to-face, computer-based learning, and online-based learning with internet media or mobile learning [1]. This hybrid learning is a challenge for lecturers to create content or material that is able to keep up with the times that are developing so rapidly. Thus, lecturers don't get called out of date or even "old school" lecturers. Because the demands of the students with the development of information technology are also getting higher. According to [1], the right interactive-based learning media plays a very important role in the creation of educational goals. Multimedia is considered an interesting learning media based on efforts that touch the various senses: sight, hearing and touch. Also, according to Francis M. Dwyer in [2] the use of graphics in education as a medium that can help the effectiveness and efficiency of achieving learning objectives. Graphics as a visual illustration are able to create learning messages that can provide a number of stimulation stimuli with different strengths from one another. This study designs the concept of hybrid learning that can be used by the students for the learning process by utilizing the current technology, namely web cameras and internet [4].

Hybrid learning is an educational model approach that combines online learning with teaching in real classrooms such as face-to-face learning in general, in this hybrid learning research combines face-to-face learning classes with web-based online learning or computer or smartphone-mediated learning [5]. In a learning model in a network or online, the learning process applied is a hybrid method where the systematic learning of the lecturer divides several sessions; online and face-to-face sessions ergo health protocols continue to be carried out by keeping a distance [6]. Schemes and learning trends inside and outside the classroom are arranged in such a way as to get the advantages of each learning. Five keys to "Hybrid Learning" There are five main keys in implementing the hybrid learning process. In its application, hybrid learning emphasizes the application of Keller, Gagne, Bloom, Merrill, Clark and Gray learning theories [7].

- 1) Live event, defined as direct or face-to-face learning that is carried out synchronously in the same time and place. It could also be the same time in a different place.
- 2) Self-paced learning, which means combining it with independent learning allows students to learn anytime and anywhere online.
- 3) Collaboration, namely collaboration between teachers and students, as well as collaboration between fellow students in teaching and learning activities.
- 4) Assessment, meaning that the teacher must be able to mix a combination of online or offline assessment types. The form can be in the form of tests or non-tests such as class projects.
- 5) Performance support materials, namely to ensure learning materials are prepared in digital form. The goal is that these learning materials can be easily accessed by students, both online and offline. Evaluation of hybrid learning includes evaluation of learning outcomes to measure cognitive, psychomotor, and affective mastery. Exams can be conducted face-to-face at school or online. This research has some purpose to solve the problem in learning, and how to build hybrid learning in a classroom,

that is how to design a hybrid class at Bangka Belitung University that can support the hybrid learning process and how to build hybrid learning in a class with we camera technology and the website to control the hybrid learning?

The issue in this research is that the process of storing data and sending data requires large data storage and wide bandwidth so that the hybrid learning process in class using a camera can run well. With this research, the learning process in class can be recorded as well. can be accessed using the internet network, making the distance learning process easier and the learning process in class can also be monitored by the department admin. With this learning system via web camera, it provides a more interactive and interesting distance learning process with varied learning displays.

## II. RESEARCH METHOD

At the stage of implementing the activity, it is to find the root of the problem on how the learning process can still be carried out even in the current pandemic conditions, namely by applying online or online learning models. The implementation stage of the Hybrid Learning in class implementation is based on the research flowchart in Figure 1.

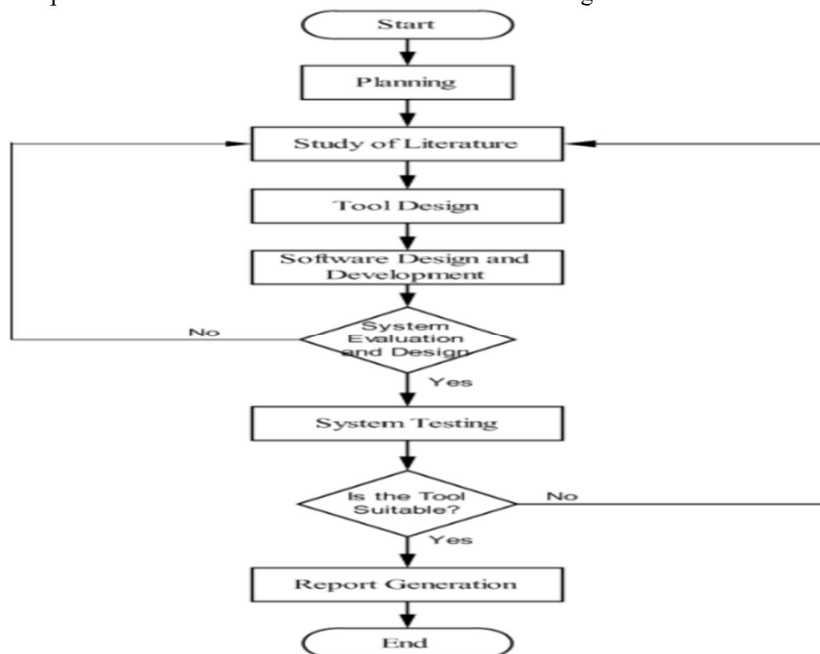


Figure 1. Research Flowchart

### A. PLANNING

By designing a hybrid class design that is comfortable and can keep a distance from each other, therefore the health protocols are always adhered during the teaching and learning process. Class modelling that can help lecturers make presentations to their students as easy as possible, hence online learning can feel like offline it will make online lessons more effective [8-18]. Among them can be done by using a camera with a motion sensor and a website to support hybrid learning [19].

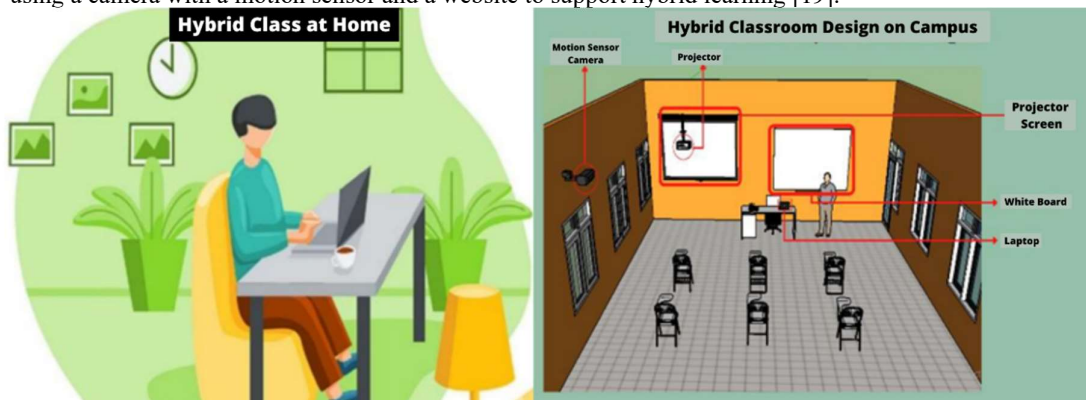


Figure 2. Hybrid Learning Design

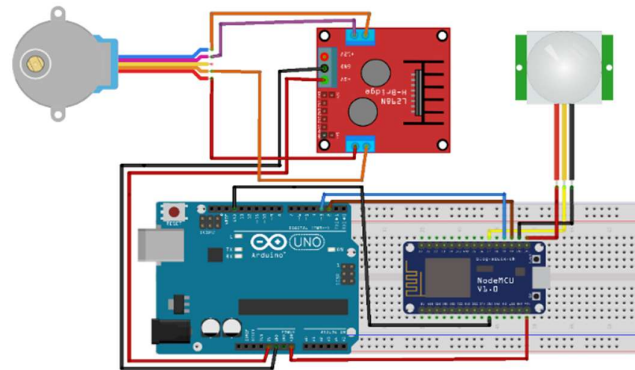


Figure 3. Circuit Schematic of the Webcam

## B. LITERATURE REVIEW

This process is carried out by studying literature and observing the condition of the entire community. The study of existing literature comes from income from blogs, websites, and data in scientific journals that convey things related to hybrid learning, webcams, hardware and websites to manage hybrid learning in the classroom [20].

## C. DESIGN THE HYBRID LEARNING SYSTEM

At this stage, the design is carried out based on the theory that has been obtained at the literature study stage. The desired work system is to be able to carry out a hybrid learning system using a camera with a motion sensor by detecting existing movements according to the part we want to focus on when presenting lessons in a hybrid class. Consequently, the students who receive online learning can take hybrid lectures more effectively [21].

## D. SOFTWARE DESIGN AND DEVELOPMENT

This phase is dedicated to build a website using PHP and MySQL to control the hybrid learning system, control the classroom, monitor, and detect from the web camera and monitor the hybrid learning process in the classroom [22]. In this manner, the lecturer's movements are detected through the web camera and then sent to the website. For coding the web camera programming using Arduino IDE so that it can connect dashboards for lecturers, admin and students in this hybrid learning that is already built.

## E. EVALUATION

At this stage, it is done to find out how effective hybrid learning is in the classroom that has been built using web cameras and websites.

## F. TESTING THE HYBRID LEARNING SYSTEM

After the hybrid learning system has been ready to be utilized and tested, this trial system is also to see if there are still errors and there are improvements and developments wherefore it is ready to be implemented as a whole [22].

Figure 3 is the schematic of the hybrid class circuit with a web camera, the necessary components are connected to the Arduino via a breadboard, the PIR HC-SR501 sensor will work to detect movement by saving data first to the Arduino. The web camera can rotate using a stepper motor with a 360-degrees rotation in order to display a more interesting and interactive learning process.

## III. RESULTS AND DISCUSSION

Figure 2 is a hybrid class design for a campus environment with a motion sensor camera feature, and a hybrid class for those who study from home so they can study simultaneously at different places synchronously. By implementing this method, learning at home and in the classroom is almost the same and provides a new experience in distance learning so that this makes it easier to add to the learning process.

## A. WORKING PRINCIPLE

Figure 4 describes how the hybrid classroom device works which prototype is connected to a computer. Through the website, video conference for hybrid learning can take place so that the web camera can record the movements of lecturers who are teaching in class so that students who study from home can understand the lesson better, clear and effective again, the web camera will consist of 3 cameras with 3 different views, namely the lecturer's view, the presentation view and the class room view during learning. With a choice of camera views, you can choose using a website that controls this hybrid learning.

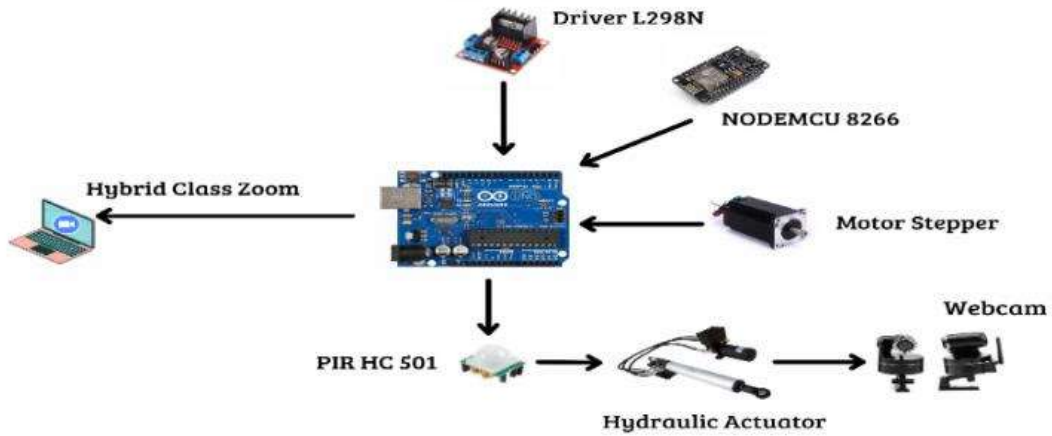


Figure 4. Design of the Hybrid Class using Webcam

In addition to this hybrid class, there is also a dashboard system to make it easier to handle the management and supervision in the hybrid class whether the device is working and can support the learning process. The dashboard for this hybrid class can be seen in Figures 5 to 8 which is a system dashboard hybrid learning. This dashboard uses the PHP programming language to display Code Igniter layouts for programming from a web camera to a website using javascript.

### B. HYBRID LEARNING DASHBOARD

Figure 5 is a login page for admin, student and lecture to enter the dashboard of hybrid learning that is already created using the Internet. After login then the user can use the hybrid learning in the classroom.



Figure 5. Login Page

Then after an admin logged in, they will be prompted to the dashboard for admin which is shown on Figure 6, where admin can control and monitor the hybrid learning process in the classroom and also to manage the hybrid learning for the lecture.

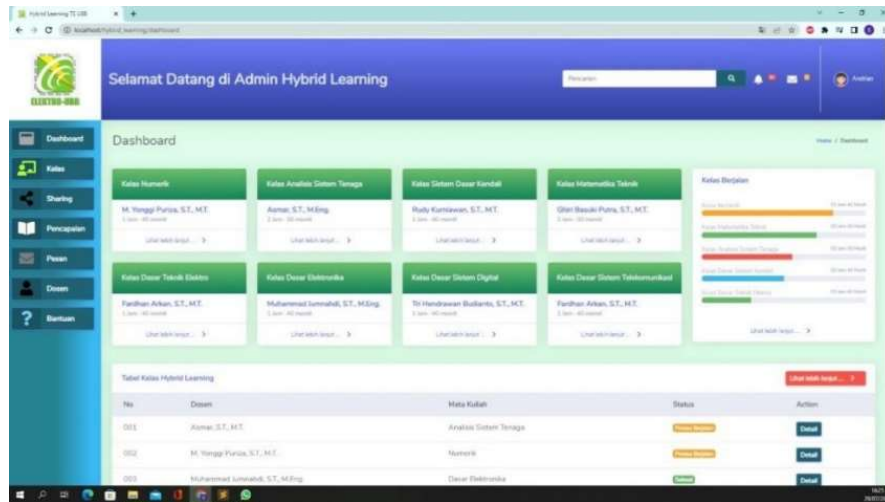


Figure 6. Admin Dashboard

Whilst when a student signed in, they will be directed to the dashboard for students as displayed on Figure 7 when using the hybrid learning system. In this dashboard, students have two view modes and have more attractive studying using this application.



Figure 7. Student's Dashboard



Figure 8. Lecturer's Dashboard

On the other hand, if a lecturer logged on, they will be Figure 8 is the dashboard for the lecturer when using the hybrid learning system, in this dashboard have three view angles and have ease of access using this application when applied to hybrid learning.

This learning system still require development in implementation, mainly the bandwidth and video storage that are still large. However, it facilitates a more interesting distance learning and capable of recording the learning process in class that can be utilized another time and become learning video which can be watched by the students.

#### IV. CONCLUSION

With this hybrid learning, it is expected that the distance learning process during the COVID-19 pandemic will be more interesting and funnier for students. With this hybrid learning design, the distance learning process can also be monitored and controlled by the admin therefore the distance learning process can run well. The use of web cameras and the internet in this hybrid learning becomes very important in helping the learning process to be more interesting and easier. It is hoped that this hybrid learning system designed can further improve student understanding in distance learning and increase the ease of distance learning during the COVID-19 pandemic. After covid pandemic ends, then this web camera learning system may be utilized as distance learning facility, to record learning process in the class and for the future lecture.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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