

E-MODULE FOR BASIC COMMUNICATION NAVIGATION AND SURVEILLANCE (CNS)

Muhammad Khoiruman Fadilah*, Fatmawati, Putu Agus Valguna

Politeknik Penerbangan Surabaya, Jalan Jemur Andayani I No 73, Kota Surabaya, 60236

**Corresponding author. Email: khoiruman.fadilah2002@poltekbangsby.ac.id*

Abstract

Basic Communication Navigation and Surveillance is one of the courses in the Aviation Communication program. Basic CNS covers the technology that forms the infrastructure for managing and ensuring safe and efficient air traffic. The objective of this final project is to design and create an e-module for Basic CNS as a new, innovative, and engaging learning media to assist in teaching Basic CNS. The e-module will be implemented into the existing Learning Management System at Aviation Polytechnic of Surabaya. The research method used is qualitative descriptive, with data collected through interviews, researcher's notes, and documentation. The e-module is designed using the ASSURE development method, which includes analyzing learner characteristics, stating objectives, selecting, modifying or designing media, utilizing media, requiring learner responses, and evaluating. The result of this research is an e-module that contains the materials for the Basic Communication Navigation and Surveillance (CNS) course, aligned with the academic syllabus. It includes flipbook-style teaching materials with images, videos, audios, midterm and final exam questions. Each question can be used to deepen the knowledge and understanding of the subject matter.

Keywords: Basic Communication Navigation and Surveillance (CNS)1, Electronic Module 2, ASSURE Model.3,

INTRODUCTION

In accordance with the regulation of the Head of the Transportation Human Resources Development Agency number 09 of 2016 concerning the curriculum of the formation education and training program in the aviation sector, it is explained that the D3 Aviation Communication study program has a Basic Communication Navigation and Surveillance course curriculum with semester credit units (SKS) 1 SKS Theory and 1 SKS Practice in semester 1 [1].

During the lecture process of learning the Basic Communication Navigation and Surveillance course, cadets of the D3 aviation communication study program Batch 6 learn from home or online due to the COVID-19 pandemic. so that cadets quickly feel bored and less interested in learning and also material from documents is difficult to understand. So that there needs to be a new learning method so that it can increase the cadets' interest in learning. With the information and communication technology that has developed today, learning resources are wider and easier to obtain. This can be utilized to develop various kinds of learning platforms that can be accessed anywhere, such as learning videos and electronic modules. Surabaya Aviation Polytechnic which currently has an LMS is something that can be useful for cadets. Especially at this time, cadets are familiar with smartphones and other gadgets that can

access the internet. Due to this, it is necessary to utilize technological advances, one of which is by presenting an electronic module based on the Moodle LMS as an easily accessible learning media. And the reason the author chose the Basic CNS course was because there was no e-module on the Surabaya Aviation Polytechnic LMS.

For cadets of the Aviation Communication Study Program at the Surabaya Aviation Polytechnic, the module can be one of the tools that can be used as a means of improving the quality of learning. Web-based learning modules can be a learning tool in presenting the material needed by cadets quickly and completely. Reflecting on the need for learning that can be accessed online as a virtual support for learning activities, it is appropriate for the Aviation Communication D3 Study Program at the Surabaya Aviation Polytechnic to have its own container to present various important information to all cadets, especially on materials supporting learning activities, in the form of a website-based electronic module.

Based on the background explanation above, in this study, the authors will design an e-module and Basic CNS teaching materials with the ASSURE development model to support learning that is more effective and not boring. The author uses the ASSURE development model because the ASSURE development model has more components than the teaching material model. These components include: learning analysis, learning

strategy, delivery system, learning process assessment and learning assessment [2].

Electronic Module (E-Module)

According to Rahmi in her journal *Designing E-Module Personal Computer Assembly and Installation as Media* in 2018 explained, E-module is a form of self-learning media compiled in digital form where it aims as an effort to realize the learning competencies to be achieved in addition to making students more interactive by using the application [3].

E-module is a form of media that is used and utilized in the process of independent teaching and learning activities where this has the aim of obtaining skills in the desired learning where the learning is arranged in an electronic formation which includes animation, audio, navigation which forms students to be more interactive by using the application [4].

The same thing is supported by previous research. Related to e-module development research, some research results are obtained that are in line with e-module development research, namely, stating that the use of e-modules for students majoring in network computer engineering at SMK Negeri 1 Labang can improve student learning outcomes, this is evidenced by the results of the t test with the obtained data T count greater than T table [5].

Based on several opinions of experts, e-modules are a form of compilation of materials as teaching materials for students effectively and efficiently independently, because they contain a guideline in the process of independent and self-learning. This means that students can carry out their teaching and learning activities independently even if they are not accompanied by a teacher.

Communication Navigation and Surveillance

Communication is the process of transferring news or messages from one person to another with the aim of changing the behavior or decisions of the recipient. In the past, communication could only be done directly. But over time, humans have advanced and managed to find many ways to communicate with others. Starting from through telegrams or letters that take a long time for the message to reach its destination. In addition, communication can also be done or by using telephone, sms, video calls, to communicate through chat facilities in various smartphone applications [6]. In aviation Communication is the exchange of voice and data information between pilots and air traffic controllers or flight information centers. [1]

In language, navigation is a guide or direction of travel that describes a map of the region [7]. In aviation terms navigation is an element of the Air Traffic

Management (ATM) system intended to provide accurate, reliable and smooth positioning capabilities for aircraft [1]

Surveillance means surveillance. Surveillance can be divided into two main types, namely dependent surveillance and independent surveillance. In a dependent surveillance system, the position of the aircraft is determined on board and then transmitted to ATC. Independent surveillance is a system that measures the position of the aircraft from the ground.

ASSURE Model

The ASSURE learning model is learning that is systematically planned and organized by integrating technology and media so that learning becomes more effective and meaningful for students. [7]

ASSURE learning model is one of the simple learning designs, easy to learn and utilize media and technology. This model was developed to create effective and efficient learning activities, especially in learning activities that use media and technology. [8]

The ASSURE learning model is a systematic step in planning the implementation of learning in the classroom by combining the use of technology and learning media. The ASSURE learning model is practical and easy to use and contains systematic and systemic steps. [9]

Learning Management System (LMS)

Learning Management System (LMS) is a software unit that can comprehensively integrate features for the delivery and management of a course, the LMS can automatically manage the features of the course catalog, course material delivery, and quizzes. [10]

Learning Management System (LMS) or Course Management System (CMS), also known as Virtual Learning Environment (VLE) is a software that can be used by teachers/lecturers such as in universities/colleges or in schools as online learning media using the internet. [11]

LMS is software that is used for administrative purposes, activity reports, teaching and learning activities online, e-learning and training materials that are all done online. [12]

Based on the above understanding, it can be synthesized that the Learning Management System or abbreviated as LMS is a software or software that is used in various activities such as administration, documentation, making an activity report, also including the process of online learning connected to the internet.

From the explanation above, it can be determined that the problem formulations raised in this study are: (1) How to design an E-Module based on Moodle LMS in

the Basic Communication Navigation and Surveillance (CNS) course with the ASSURE method. (2) How to implement the E-Module in the LMS.

Based on the description above, the objectives of the research are: (1) Understand and apply the workings of the E-Module Implementation in the Basic Communication Navigation and Surveillance (CNS) course for cadets of the Diploma 3 Aviation Communication study program at the Surabaya Aviation Polytechnic. (2) Knowing the purpose of making a website-based E-Module Design on Basic Communication Navigation and Surveillance (CNS) learning material for cadets of the Diploma 3 Aviation Communication study program at the Surabaya Aviation Polytechnic.

METHODS

This research refers to the ASSURE model. The ASSURE model has been coined by Heinich and developed by Smaldino, in the book "Instructional Technology & Media for Learning". This ASSURE model can help teachers in carrying out the learning process in the classroom by combining the use of technology and media in the classroom. The following is an analysis of each component of the ASSURE learning design model

a. Analyze Learner

In learning design, learning participants are the most important thing. Whatever the form of the product, the learning design model, all efforts are realized for the smooth learning process. In analyzing the learners, there are several things that need to be done, such as the general characteristics of the learners, the initial competencies that become their basic capital, the learning style of the learners, the psychological aspects of the learners and many more as needed.

b. State Objective

State objective or formulate learning objectives For Smaldino, et al "An objective is a statement of what will be achieved, not how it will be achieved" [9]. So formulating learning objectives can use the formulation of objectives with the ABCD model, which means: A = audience, learners with all their characteristics. B = behavior, verbs that describe the abilities that must be mastered; C = conditions, conditions that make it possible for learners to learn well; and D = degree, specific requirements formulated as standard standards for achieving learning objectives. Learning objectives can also be stated in the form of basic competency statements and indicators of success to be achieved at the end of the learning process.

c. Select, Modify or Design media

This stage involves selecting methods, media and teaching materials. There are three important stages to the second S of ASSURE. These three are: (1) determining the appropriate method for a particular learning activity; (2) selecting a media format to suit the method; and (3) selecting, designing, modifying or producing teaching materials. Neither media nor methods are better or best. Media and methods are determined because they are suitable, appropriate, and suitable for a learning process.

d. Utilize Media and Materials

The utilization of media and teaching materials in the ASSURE model is aimed at Lecturer and learners. Smaldino, et al proposed the 5 P formula for the utilization of learning media and materials. The five P's are: a) Preview the Materials b) Prepare the Materials c) Prepare Environment d) Prepare the Learners e) Provide the Learning Experience [9].

e. Required Learner Participation

Developing the participation of learning participants, the main purpose of learning is for participants to learn - to learn. Therefore, involving participants to learn is an activity that must be carried out by Lecturer in the learning process.

f. Evaluate and Revise

One of the purposes of assessment is to measure the level of understanding of the material that has just been given. In this case, the assessment is not to determine the level of "intelligence" of a learner, but rather to provide feedback to them. Likewise, evaluation is useful for assessing whether the whole learning process has gone well, or whether there are learning processes that need to be improved and revised to improve the quality of teaching and learning activities themselves.

The conclusion of the above text is that the ASSURE instructional model is an approach to designing learning that combines the use of technology and media in the classroom. The ASSURE model consists of several components that aid teachers in implementing the learning process. Assure model consists of learner analyze, state objective, select, modify or design media, utilize media and materials, required learner participation, evaluate and revise:

Instrument Design

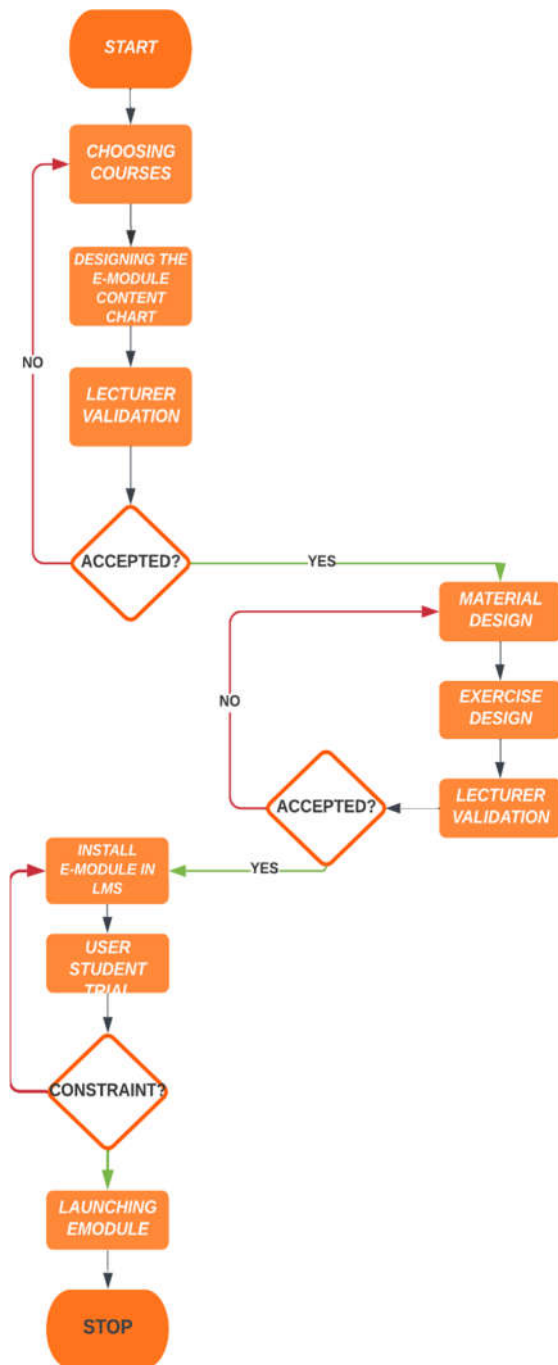


Figure 1 E-Module Design Flowchart

Figure 1 describes the design flow of the E-Module design. The author first determines the course that will be made into an E-Module. After that the author designs the E-Module content chart, then the author validates it with the lecturer in charge of the course. Then the author will proceed to design the E-Module material. After that the author will install the electronic module on the Surabaya Polytechnic LMS followed by conducting a trial, if there are no obstacles, the author will publish the electronic

module followed by analyzing the feasibility of the electronic module.

How Instruments Work



Figure 2 LMS Login Flow

When entering the Surabaya Aviation Polytechnic LMS website, a display will be given to log in. Before entering the Surabaya Aviation Polytechnic LMS website, users must have an account first. Then enter the username and password into the column that has been given. If successfully logged in, it will exit to the LMS main menu display.

Testing Technique

Testing will be carried out when the E-module has been made by making an instrument for assessing the e-module. In the testing technique the author makes 2 validations, namely Material Validation and Media Validation. Material validation was tested by lecturers teaching the Basic Communication Navigation and Surveillance course in the Aviation Communication D3 Study Program at Surabaya Aviation Polytechnic. Media validation was tested by lecturers teaching the Basic Information and Technology course of the Aviation Communication D3 Study Program at the Surabaya Aviation Polytechnic.

Data Analysis Techniques

The analysis technique is the process of searching for data, systematically compiling data obtained from

interviews, notes by researchers after collecting data from the field and documentation. by organizing data into categories, breaking it down into units, synthesizing, compiling into patterns, choosing what is important and what will be studied, and making conclusions so that it is easily understood by oneself and others.

RESULTS AND DISCUSSION

E-module Result

In designing the Basic Communication Navigation and Surveillance E-Module with the ASSURE development method from Analyze learner, State Objective, Select Method and Design Media, Utilize Media, Required Learner Participation, to Evaluate shows that this method is complete. From determining the learning style of learners to how learners learn and there is an evaluation to develop this ASSURE method..

a. Analyze Learner

In this research, the author provides a learner characteristic form in the LMS, which must be filled in so that the lecturer knows the characteristics and learning styles of students. The author took the form from a journal entitled learning style questionnaire written by Yuliana Kristina in 2022. The test is divided into 3 parts, then each part is summed up the points selected.

If the most points on test A then the type of learning style of students is visual. If the most points in test B then the type of learning style of students is Auditory. If test C is more dominant then the type of learning style of learners is Kinesthetic. In Figure 3 is a diagram of the results of a learning style questionnaire that has been given to 24 cadets of the D3 Aviation Communication Study Program Batch 6, 11 cadets with visual learning styles, 11 cadets with auditory learning styles and 2 cadets with kinesthetic styles.

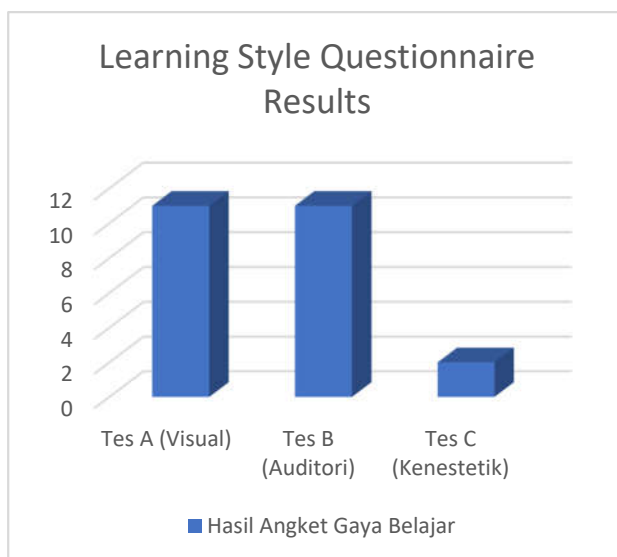


Figure 3 Diagram of Learning Style Questionnaire Results

b. State objective

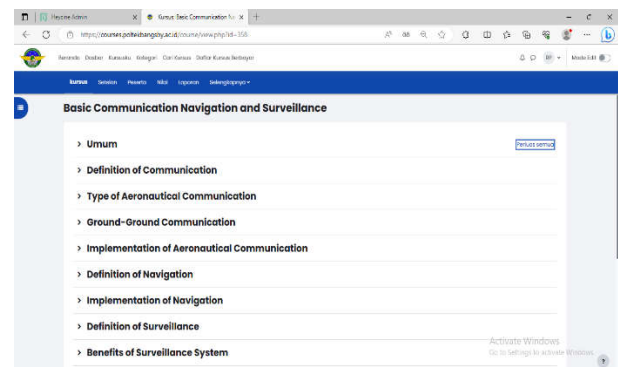
State objectives or formulate learning objectives, The learning objectives of the basic CNS course are stated in the basic CNS semester learning plan as follows: (1) Able to explain radio theory, characteristics, and classification of radio waves and modulation, (2) Able to explain the working principles of NDB, VHF Marker Beacon, ILS, VOR, DME, including techniques and working principles of NDB, instruments in the cockpit of the aircraft and the use of flight navigation systems, (3) Able to explain the components and systems of Inertial navigation, (4) Able to explain the RNAV method.

c. Select, Modify or Design media

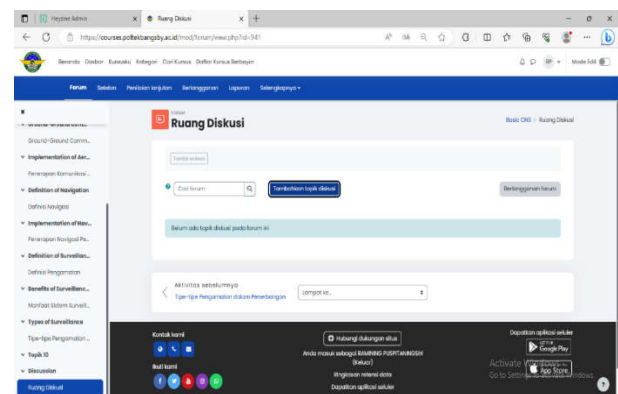
At this stage the author uses the audiovisual interactive method, based on the results of the previous stage where in making the e-module the author adds videos and sounds that can be played so as to increase motivation and make it easier for students to understand the lesson. The media for designing in this study used Canva and Hyzine media.

d. Utilize Media and Materials

The use of interactive learning media, the author uses an e-module that has been uploaded to the Surabaya Aviation Polytechnic LMS. And the author's material takes from several international source documents such as ICAO annex 10 Volume 1 to 3..



e. Required Learner Participation



Developing the participation of learners, the main purpose of learning is so that students have the motivation to learn. Therefore, involving learners to learn is an activity that must be done by lecturers in the learning process. After conducting a test to determine learning styles at the Analyze Learner point and learners have been able to identify their learning styles, the ways of learning that suit their learning styles are: (1) Visual, (2) Auditory, (3) Kinesthetic.

f. Evaluate

At this stage the author creates a forum for discussion or students want to provide constructive criticism and suggestions in order to provide innovation in the Basic CNS e-module in the future.

E-modules are implemented into the LMS of the Surabaya Aviation Polytechnic to facilitate and assist Basic CNS learning. This E-Module has learning features that can attract reading interest and facilitate the understanding of cadets and people who access the E-Module. In it there are sources of information in the form of videos, images, documents and sound. In addition, there are also practice questions on each topic and also a final exam to measure the extent of understanding of cadets or people who access the Basic CNS E-Module on the Surabaya Aviation Polytechnic LMS. [13]

Interview Results

Researchers use qualitative methods to determine the results of the E-Module development. Data collection was carried out by interviews whose data was taken from lecturers teaching Basic CNS courses and 5 (five) cadets / Aviation Communication 6th batch of Surabaya Aviation Polytechnic.

In an interview with Mr. Putu Agus Valguna as a lecturer of Basic Communication Navigation and Surveillance material experts, explained that he taught Basic CNS in the D3 Aviation Communication class. And he made a Semester Lecture Plan that was adjusted to the course. However, in the implementation of learning there is a problem with the lack of interest and supervision of students. because the way of presenting the subject matter delivered is less interesting and the lack of creativity and innovation of lecturers in managing classes during distance or online learning. Therefore the author makes an interactive E-module Basic Communication Navigation and Surveillance to add variety to learning and optimize teaching and learning activities.

In interviews with 5 cadets, they agreed that they had already learned Basic CNS. and online or online learning. The method used by lecturers in teaching and learning activities is to provide ppt in Google Classroom, and explanations are delivered using Zoom or Google Meet media. Of the 5 cadets the author interviewed stated that the Basic CNS e-module helps students learn, especially when learning online.

E-module Basic CNS Learning also has several advantages, namely that it can be accessed anywhere E-modules also present text, images, videos and sounds that can be played to increase students' understanding. and also more efficient because digital traces in the form of links will always be stored.

CONCLUSION

Based on the results of the design and research of the Basic Communication Navigation and Surveillance E-Module, the following conclusions can be drawn:

1. E-Module Basic Communication Navigation and Surveillance with ASSURE method has the advantages of Analyze Learner to find out the learning style of students and help learning and feasible to use.
2. LMS-based Basic Communication Navigation Surveillance E-Module adds variety to learning and optimizes teaching and learning activities.

Based on the results of the website design that has been done, the authors present the following suggestions:

3. The LMS-based Basic Communication Navigation Surveillance E-Module that has been designed with the ASSURE development method is expected to be used by lecturers in teaching and learning activities at the Surabaya Aviation Polytechnic.
4. With the LMS-based Basic Communication Navigation Surveillance E-Module as a valid learning media, it is hoped that in the future it can make teaching and learning activities more optimal.

REFERENCES

- [1] KEPALA BADAN PENGEMBANGAN SUMBER DAYA MANUSIA PERHUBUNGAN, "NOMOR PK. 09 TENTANG KURIKULUM PROGRAM PENDIDIKAN DAN PELATIHAN PEMBENTUKAN DI BIDANG PENERBANGAN," 2016. [Online].
- [2] M. Riadi, "Model Pembelajaran ASSURE," *KAJIAN PUSTAKA*, 2022. [Online]. Available: <https://www.kajianpustaka.com/2022/08/model-pembelajaran-assure.html>. [Accessed 19 Agustus 2023].
- [3] L. Rahmi, "Perancangan E-Module Perakitan Dan Instalasi Personal Komputer Sebagai Media," *TA'DIB*, p. 105–111, 2018.
- [4] S. Sugianto, D. Dony, A. G. Abdullah, S. Elvyanti and Y. Muladi, "MODUL VIRTUAL :

MULTIMEDIA FLIPBOOK DASAR TEKNIK DIGITAL," *Innovation of Vocational Technology Education*, p. 101–116, 2013.

- [5] Fausih, M., & Danang, T, "Pengembangan Media E-Modul Mata Pelajaran Produktif Pokok Bahasan “Instalasi Jaringan Lan (Local Area Network)” Untuk Siswa Kelas Xi Jurusan Teknik Komputer Jaringan Di Smk Negeri 1 Labang Bangkalan Madura," *Jurnal UNESA*, p. 1–9, 2015.
- [6] F. Nugroho, "CNS/ATM," *Artikel Penerbangan*, 2008.
- [7] N. A. d. S. Suryani, "Penerapan Model Assure dengan Menggunakan Media Power Point dalam Pembelajaran Bahasa Inggris sebagai Usaha Peningkatan Motivasi dan Prestasi Belajar Siswa Kelas X MAN Sukoharjo Tahun Pelajaran 2012/2013," *Jurnal Teknologi Pendidikan dan Pembelajaran*, 2014.
- [8] B. A. Pribadi, *Model Desain Sistem Pembelajaran*, Jakarta: Dian Rakyat, 2009.
- [9] S. Smaldino, D. Lowther and J. Russell, *Instructional Technology & Media For Learning*, Kencana Prenada Media Group, 2011.
- [10] R. Riad, A. E. Mohammed and H. El-Ghareeb, "Evaluating of Utilizing Service Oriented Architecture as A Suitable Solution to Align University Management Information Systems and Learning Management Systems," *Turkish Online Journal of Distance Education*, vol. 10, 2009.
- [11] Amiroh, *Kupas Tuntas membangun e-learning dengan Learning Management System Moodle*, Sidoarjo: Genta Group, 2012.
- [12] Ellis, K. Ryann., "A Field Guide to Learning Management System.," *American Society For Training and Development (ASTD)*, 2009.
- [13] L. Rochmawati, L. S. Moonlight, D. R. Sari, D. Hariyanto and F. Fatmawati, "Peningkatan Kemampuan Aeronautical Communication Officer Melalui Pelatihan ICAO English Language Proficiency Berbasis Digital Learning," *Jurnal Penelitian*, vol. 7, 2022.
- [14] L. S. Moonlight, D. Hariyanto, F. Fatmawati, L. Rochmawati and D. R. Sari, "Peningkatan Kemampuan Aeronautical Communication Officer Melalui Pelatihan ICAO English Language Proficiency Berbasis Digital Learning," *Jurnal Penelitian*, vol. 7, 2022.
- [15] L. S. Moonlight, L. Rochmawati, F. Fatmawati, F. A. Furyanto and T. Arifianto, "Rancang Bangun Website Prodi D3 Komunikasi Penerbangan Menggunakan Metode Prototype," *INTEGER: Journal of Information Technology*, vol. 7, 2022.
- [16] L. Rochmawati, L. S. Moonlight and S. B. Erlangga, "Rancang Bangun Interface Sistem Informasi Program Studi D3 Komunikasi Penerbangan Menggunakan Wordpress Di Politeknik Penerbangan Surabaya," *SNITP (Seminar Nasional Inovasi Teknologi Penerbangan)*, vol. 5, 2021.
- [17] F. H. Widiana and B. Rosy, "Pengembangan E-Modul Berbasis Flipbook Maker pada Mata Pelajaran Teknologi Perkantoran," *EDUKATIF: JURNAL ILMU PENDIDIKAN*, 2021.