# E-MODUL AERODROME FLIGHT INFORMATION (AFI) PROCEDURE BASED ON LEARNING MANAGEMENT SYSTEM (LMS)

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**ABSTRACT**
The framework of the Aerodrome Flight Information (AFI) Procedure e-module will be based on the Aerodrome Flight Information (AFI) Procedure Semester Learning Plan of Poltekbang Surabaya. For theoretical and practical references, the e-module will draw from both international and national documents. The result of this research is an Aerodrome Flight Information (AFI) Procedure e-module that can be used for the cadets' learning process in the Aerodrome Flight Information (AFI) Procedure course. The e-module contains learning materials presented through written content, images, audio, and videos. The purpose of this study is to be used and practiced in learning, to add variety in learning and to increase preparation before On the Job Training (OJT).

**Keywords:** *E-modul, Aerodrome Flight Information* (AFI) *Procedure*, *waterfall, Research & Development*

## 1. INTRODUCTION

One of the course taught in the Aeronauticql Commuincation and Air Traffic Management is Aerodrome Flight Information (AFI) Procedure. The Aerodrome Flight Information (AFI) Procedure course is utilized to provide an understanding of the definition of the Aerodrome Flight Information Services (AFIS) Unit along with its responsibilities and authorities. AFIS is a service that provides useful information for the safety and efficiency of flight traffic where aerodrome control services are not provided. AFIS is a service that provides useful information for the safety and efficiency of flight traffic where aerodrome control services are not provided [1].

Aerodrome Flight Information (AFI) Procedure course in the Aeronautical Communication program carries a weight of 4 credit hours, with 1 credit hour for theory and 3 credit hours for practical training [2]. For the Air Traffic Management program, the course holds 5 credit hours, all dedicated to practical training. The goal of these courses is to enable students to identify, explain procedures, understand the responsibilities of the Aerodrome Flight Information Services (AFIS) unit, conduct guidance in the Aerodrome Flight Information Zone (AFIZ), and coordinate with relevant units to provide necessary information and data for flight safety [2]. Navigation-related learning is essential for navigation personnel [3].

Based on the existing semester credit units, students are expected to have a stronger grasp of practical aspects of the Aerodrome Flight Information Service (AFIS) subject. The Semester Learning Plan for the Aerodrome Flight Information (AFI) Procedure course aims for students to acquire the following skills:
1. Ability to explain regulations related to Aerodrome Flight Information Service (AFIS) and provide information beneficial for flight safety.
2. Ability to explain and provide information on meteorology, airport conditions and facilities, navigation aids, and other relevant information.
3. Understanding of communication principles and their application in providing Aerodrome Flight Information Service (AFIS).
4. Capability to explain, identify, and manage traffic under different Flight Rules.
5. Knowledge of airspace classification definitions and types of services provided in Indonesian airspace.
6. Proficiency in explaining and demonstrating service procedures in AFIS.
7. Proficiency in using Phraseology and pronouncing ICAO Alphabet, numbers, and station call signs in AFIS service.
8. Understanding, managing, and publishing AFIS service operational hours.
9. Explanation of qualifications, requirements for AFIS personnel, and necessary training.
10. Familiarity with visual aids and their functions.

11. Explanation and execution of coordination between AFIS unit and related units.
12. Understanding of responsibilities and procedures for AFIS personnel.
13. Ability to explain, compile, and publish information and data related to AFIS service.
14. Ability to explain and identify equipment and tools needed for AFIS service [2].

Based on the Flight Information (FI) Curriculum and Syllabus developed by the Air Transportation Human Resources Development Agency (BPSDMPU), the competency standard for the Aerodrome Flight Information Service (AFIS) procedure covers several main topics:
A..General of AFIS
B. Coordination Between ATS Unit
C. Phraseology and AFIS Operational Requirements Procedure
D. Information related to the operation of aircraft general
E. Information related to the operation of aircraft– Departing Traffic
F. Information related to the operation of aircraft – arriving traffic
G. Alerting Service
H. Emergency [4]

During the course, students have been utilizing printed modules, which can lead to boredom and reduced interest in learning. Therefore, the author has introduced a new teaching method by developing a digital e-module for the Aerodrome Flight Information (AFI) Procedure course. This e-module offers various forms of content, including text, images, audio, and even instructional videos, which enhance the learning experience. An E-module is a tool or learning resource that systematically and engagingly contains content, methods, limitations, and evaluation techniques designed electronically to achieve the expected competencies according to their complexity level [5]. E-modules can be used for both online and offline teaching. Furthermore, e-modules are environmentally friendly and cost-effective, as they eliminate the need for printed materials and can be used by future batches [6]. Thus, it is recommended to create e-modules for other courses as well.

The E-Module runs in a system, namely LMS. The general understanding of a Learning Management System (LMS) is software designed to create, distribute, and manage the delivery of learning materials [7]. The primary use of a Learning Management System (LMS) is to efficiently manage, deliver, and track educational content and training programs in a digital format. It supports educators in creating courses, sharing materials, assessing learners, fostering collaboration, and monitoring progress, all within a centralized online platform [8].

In the design of the e-module I will create, the structure is as follows:

1. Theory Section:
In the theory section, comprehensive explanations of AFIS procedures will be provided, referencing relevant regulations and documents, both internationally and nationally. This ensures that the content is aligned with authoritative standards. The theory section will cover key concepts and guidelines.

2. Practice Section
The practice section will feature examples of aircraft activities and specific aircraft conditions. It will explain the phraseology used to handle these situations, with the objective of enabling cadets to improvise aircraft control in accordance with established standards. Within this practical segment, scenarios related to aircraft activities or conditions will be presented, along with the applicable phraseology. Coordination methods with adjacent units will be outlined where relevant. The intention is to enhance cadets' understanding of aircraft handling and coordination, providing valuable preparation for On-the-Job Training (OJT).

3. Applied Practice Section
This section will present scenarios involving aircraft activities or conditions along with the appropriate phraseology. It will also include guidance on coordinating with adjacent units. The aim is to deepen cadets' comprehension of aircraft handling and coordination, with the hope of aiding their preparedness for On-the-Job Training (OJT) initiation and execution.

Both the theory and practice components will align with the Semester Learning Plan (SLP) to ensure coherence with the curriculum.

Additionally, I will design quizzes featuring questions about specific aircraft conditions. Cadets will respond to these questions using voice responses, simulating real-life communication scenarios. This practice intends to improve cadets' fluency and comprehension of the phraseology used. These quizzes can serve as preparation for Mid-Semester Exams or Final Exams, as well as practice or assessment tools for readiness prior to On-the-Job Training (OJT). Responses will be evaluated by relevant instructors.

The process of creating E-Module content uses a Content Management System. CMS (Content Management System). CMS is an abbreviation for Content Management System, which is software designed to

manage websites [9]. The primary use of a Content Management System (CMS) is to facilitate the creation, management, and publication of digital content, such as websites, blogs, and online platforms. It enables users to easily organize, edit, and update content without requiring extensive technical expertise, allowing for efficient and dynamic content delivery [10].

To personalize the content and all designs use Moodle. Moodle is a web-based platform commonly used for e-learning purposes. In other words, Moodle is specifically designed as an effective online learning application system [11]. The primary use of Moodle is to provide a web-based platform for e-learning, offering tools and features for creating, managing, and delivering online courses and educational content. It facilitates interactive learning, communication, assessment, and collaboration between educators and learners in a digital environment [12].

In this study, the researcher utilized the Research and Development (R&D) research method, as defined by Sugiyono (2019). The Research and Development (R&D) method is employed to produce a specific product and test the effectiveness of that product [13].

In the creation of this e-module, the author employed the waterfall development method. The waterfall method was first introduced by Herbert D. Benington on June 25, 1956. The waterfall method introduced by him consists of five development stages, which are analogized to a waterfall [14]. The waterfall method is a sequential software development approach where each phase is completed before moving on to the next. It entails a structured, step-by-step process, making it suitable for well-defined projects with clear requirements. However, it may lack flexibility for changing needs during development [15].

Additionally, due to the limited availability of instructors who are graduates of the Aeronautical Communication program, creating e-modules for the Aerodrome Flight Information (AFI) Procedure will greatly support and assist the Aeronautical Communication program's e-learning efforts. E-learning is the use of electronic technology to deliver educational content and facilitate learning, often via the internet. It enables flexible, interactive, and remote learning experiences, allowing learners to access materials, engage in activities, and receive instruction digitally, anytime and anywhere [16].The e-learning platform at the Surabaya Aviation Polytechnic uses the Moodle LMS and can be accessed via the following URL: https://courses.poltekbangsby.ac.id

Based on the background that has been described above, it is found that the formulation of the problem includes:
1) How to design the e-module for Aerodrome Flight Information (AFI) Procedure at Surabaya Aviation Polytechnic?
2) How to implement the e-module design for the Aerodrome Flight Information (AFI) Procedure in the Learning Management System (LMS) of Surabaya Aviation Polytechnic?

## 2. METHOD

Data analysis is the process of processing for the purpose of discovering useful information that can be transformed into data; this data will be used as the research outcome or new information. The data obtained will be based on validation from experts who teach the Aerodrome Flight Information Service (AFIS) course and will also be derived from questionnaires filled out by the cadets.
The questionnaire data acquired will be analyzed and processed using a Likert scale collection technique. The Likert scale is a measurement scale used to assess an individual's or group's perceptions, attitudes, or opinions towards events or social phenomena, in accordance with the operational definitions determined by the researcher [17]. Respondents are presented with a range of statements or items, and they indicate their level of agreement or disagreement on a scale, typically ranging from "Strongly Disagree" to "Strongly Agree." It helps researchers quantify subjective data and understand participants' sentiments towards various aspects [18].

The Likert scale provides insights into participants' viewpoints but may not capture nuanced details. Effective use involves careful question design and thoughtful analysis of the collected data [19].

### 2.1 Participants

The aspects being measured involve 23 respondents, including cadets from the Aviation Communication Program, instructors of the Aerodrome Flight Information (AFI) Procedure course, alumni of the Aviation Communication cadets, and the community of the Aeronautical Communication Program.

### 2.2 Instruments

At this design stage the aim is to produce an E-Module design that will be implemented into the Surabaya Aviation Polytechnic LMS. The design process goes through several stages including media validation and material validation in the E-Module. After the validation process is carried out, these materials are compiled into an AFI Procedure learning E-Module. The material in the AFI Procedure E-Module consists of 8 topics, namely:

Topic 1 Definition Of Afis

Topic 1 will elaborate on the definition of Aerodrome Flight Information Service (AFIS), the duties and responsibilities of AFIS units in providing air traffic services, and discuss the requirements necessary for AFIS units.

Topic 2 Coordination With Adjacent Unit

Topic 2 will delve into the coordination between AFIS units and adjacent units. This section will define what constitutes an "adjacent unit." The chapter will also cover the sequence of providing information to ATC units and will provide a brief overview of Air Traffic Controller (ATC) units. Furthermore, it will outline the procedures involved in coordinating with adjacent units.

Topic 3 Phraseology

Topic 3 will focus on the phraseology used in providing flight traffic service information and will explore its application in specific conditions. This section will also include explanations of the procedures for handling particular situations.

Topic 4 Information That Related With The Operational Of Aricraft

In topic 4, the discussion revolves around the procedures that flight crews need to follow for startup or engine starting. This chapter covers the procedures for providing aerodrome-related information and meteorological information that should be delivered by the AFIS unit.

Topic 5 Information That Related With The Operational Of Aricraft-Departing Traffic

Topic 5 addresses the procedures to be followed in the event of aircraft arrivals. It covers the required information that the AFIS unit must provide and outlines the procedures for managing and disseminating information to departure aircraft.

Topic 6 Information That Related With The Operational Of Aricraft-Arriving Traffic

Topic 6 delves into the determination of the usage of Flight Level or Altitude, along with its objectives. Additionally, this section includes an explanation of the purpose behind providing Altimeter Setting information to arrival aircraft.

Topic 7 Alerting Service

In topic 7, the content centers on explaining the definition of Alerting Service and how it is handled. It provides insight into procedures for coordinating with adjacent units that convey messages to the Rescue Coordination Centre. The chapter also outlines procedures for managing abnormal situations such as unlawful interference, bomb threats, and communication failures. Towards the end of the chapter, there will be an explanation of emergency phases and the responsibilities of the AFIS unit in delivering Alerting Service.

Topic 8 Emergency

Topic 8 delves deeper into the explanation of emergency procedures, bomb threats, unlawful interference, and communication failures.

The creation of this e-module is driven by the need to not only support the learning of cadets but also to facilitate the teaching process for the Aerodrome Flight Information (AFI) Procedure. Given the shortage of instructors who are graduates of the Aviation Communication study program, there is a demand for a practical and user-friendly learning resource that can serve as an effective teaching tool.

The process of creating the e-module for the Aerodrome Flight Information (AFI) Procedure course involves using Canva to design the content and then exporting it as a PDF file. This PDF file is then transformed into a book format using the Heyzine Flipbook website. This workflow allows for the creation of engaging and interactive learning materials that can be easily accessed by students.

For the practice questions available in each chapter, the author utilizes Quizziz as the platform for creating these questions. This choice allows for an interactive and engaging way for cadets to practice and test their understanding of the material through quizzes.

This e-module is implemented within the Learning Management System (LMS) of Politeknik Penerbangan Surabaya for the Aviation Communication study program. The content is accessible through the Online Courses Poltekbang Surabaya website (poltekbangsby.ac.id). The implementation for the Air Traffic Management study program can be carried out once the program is established at Politeknik Penerbangan Surabaya.

To conduct a trial and gather feedback on the product created, the author employs a Likert scale assessment through a questionnaire. This questionnaire employs a linear scale model and is distributed to the 6th Aeronautical Communication cadets, Aeronautival Communication Communication alumni, and members of the Aeronautical Communication study program community. This approach allows for an evaluation of satisfaction and opinions regarding the produced content.

Testing the inputted product within the system can be verified by accessing the student's account. The process involves logging in with the existing account credentials. After logging in, students can navigate to the category menu, where they will find a selection of all the courses

available at Politeknik Penerbangan Surabaya. This method enables students to conveniently explore and access the content that has been incorporated into the system.

To ensure ongoing accessibility of this e-module for the cadets, the author suggests that during the maintenance phase, collaboration with individuals skilled in the field of computer science is essential. This partnership will help prevent any potential errors in the system and ensure the continuous functionality and availability of the e-module.

## 3. RESULT

This data collection utilized the Likert scale method, gathering data through satisfaction ratings provided by expert instructors, alumni, and fellow cadets of the Aronautical Communication in determining the outcomes of this final project.

Throughout the process of crafting this final project, the author accumulated various references from both international and national documents, as well as accredited journals. This was supplemented by guidance from faculty advisors.

Once the product development is complete, the next step involves testing whether the developed product is valid or not. In this final project, the Research and Development (R&D) methodology is employed, acknowledging that there may be certain limitations in the research process. Validation is the act of gathering information from experts in the field to determine the suitability of a product. The purpose of validation is to assess the suitability of the Aerodrome Flight Information (AFI) Procedure e-module before its implementation into the learning system. The validity test was conducted by two expert validators, as follows:

a. Subject Matter Expert:
The subject matter expert validator is the instructor who teaches the Aerodrome Flight Information (AFI) Procedure course.

b. Media Expert:
The media expert validator is a faculty member with expertise in computer science or related fields.

The validation results from both the media and subject matter experts indicate that the e-module is valid and highly comprehensible. The subject matter expert's validation results suggest that the e-module is sufficiently valid and comprehensible, with a few recommendations such as incorporating content about Flight Progress Strips (FPS) and additional information related to Yani Info.

The media expert's validation results indicate that the e-module is valid and comprehensible, with suggestions to include references and Learning Outcomes for the course.

These validation outcomes demonstrate the e-module's validity and ease of understanding, accompanied by constructive recommendations for enhancing its content and comprehensibility.

Based on research regarding the development of this e-module, which proves beneficial in supporting the Aerodrome Flight Information (AFI) Procedure learning within the Aviation Communication study program, it can also be adapted for future use in the Air Traffic Management study program. The results of this final project have been aligned with the Flight Information training syllabus published by the Air Transportation Human Resources Development Agency (BPSDM Perhubungan Udara).
After conducting various research steps, there are strengths and weaknesses identified in the e-module developed for the Aerodrome Flight Information (AFI) Procedure course. The advantages and disadvantages are as follows:
Advantages:
a. Accessible without time limitations
b. Diverse learning resources including videos and audio
c. Incorporates practice questions to assess students' abilities
d. Engaging design to maintain student interest
e. Supports teaching process for instructors
f. Content can be modified, added, or reduced by instructors
g. Environmentally friendly as it eliminates paper usage and associated costs
Disadvantages:
a. Requires higher comprehension due to the presence of foreign terminology
b. Cannot replace the role of instructors, necessitating their assistance
c. Self-paced learning requires consistent monitoring by instructors

## 4. CONCLUSION

Based on the research conducted on the design of the e-module for the Aerodrome Flight Information (AFI) Procedure course using a Learning Management System (LMS) at Surabaya Aviation Polytechnic, the author concludes the following:

1) The design of the e-module for the Aerodrome Flight Information (AFI) Procedure course was created using Canva, and for its transformation into an e-book format, Heyzine Flipbook was employed. The e-module for Aerodrome Flight Information (AFI) Procedure includes chapter-wise questions and also Mid-Semester and End-Semester exams, with question creation accomplished through Quizziz.

2) The application of the e-module within the Learning Management System (LMS) website is restricted to registered faculty accounts. This implementation of the e-module is exclusively intended for the Aviation Communication program.

Based on the research findings and the author's conclusions mentioned above, the E-module created by the author has limitations in terms of references. As a result, the author suggests that instructors should supplement necessary materials in the teaching process. Additionally, it is recommended to regularly update the practice questions to enhance cadets' skills.

It should be noted that this E-module cannot replace the role of instructors in the teaching and learning process; rather, it serves as a supplementary tool. Therefore, it is hoped that instructors will innovate their teaching methods to enhance cadets' understanding of the subject matter.

Regarding the interface of the product, further variety can be introduced, including the implementation of a dark mode feature. This enhancement aims to provide users with greater comfort while reading and/or completing tasks within the Aerodrome Flight Information (AFI) Procedure E-module.

It is important to recognize that this E-module is a human-made product and consequently possesses certain limitations. These shortcomings are expected to be addressed through future revisions in accordance with established guidelines.

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