DESIGNING EN-ROUTE FLIGHT INFORMATION (EFI) FLIPBOOK

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ABSTRACT

En-route Flight Information (EFI) is the main subject of the aeronautical communication study program,but in learning there is no EFI module. The author's goal of this final project is to create a design in the form of an EFI e-module as a reference medium in an interesting and systematic learning optimization process. The e-module is made using flipbook. The number of participants in the product feasibility trial was 20 people, 10 cadets of class 6, 10 flight communication alumnus. The research method uses PIECES testing techniques. This e-module was tested using the Borg & Gall; (1) Potential and problems, (2) Data collection, (3) Product design, (4) Design validation, (5) Design revision, (6) Product trial, (7) Product revision, (8) Trial use , (9) Product revision and (10) dissemination and implementation. The result of this research is an e-module that contains learning material for EFI courses, especially Theory, which is adjusted to the academic syllabus, in which there is material made according to the semester learning plan equipped with pictures and videos, there are mini tests for each chapter, midterm exam questions and semester final exams in the form of multiple choice and true and false, automatic correction of answers that can be used to measure the level of understanding of cadets.

Keywords: e-module, En-route Flight Information, Flipbook, Aeronautical Communication.

1. INTRODUCTION

Learning media is an important element in the learning process, as a learning resource that can assist

lecturers in enriching the insights of cadets. [1] [2] [3] Aviation Polytechnic of Surabaya has and develops a Learning Management System (LMS) facility as a system that helps teachers create syllabuses, manage learning materials, manage cadets' learning activities. This Learning Management System (LMS) facility is in the form of a website application with the name https://courses.poltekbangsby.ac.id/ which is open source and uses the Moodle platform.[4] [5] [6] [7] [8] [9]

In the independent curriculum, the module as a guide or guideline in teaching and learning activities, the function of the module is stated as independent teaching material without depending on the educator, besides that it is an evaluation tool to measure the mastery of students in the material that has been studied. E-modules or electronic modules are modules in digital form, consisting of text, images, or both that contain digital electronic material accompanied by simulations that can and should be used in learning. [10] [11] [12] [13] En-route Flight Information (EFI) is a course in semester 4 including work expertise courses (MKB) Aeronautical communication Study Program. En- route Flight Information (EFI) studies

the procedures for guiding aircraft in uncontrolled airspace [14] [15] [16] [17] [18] [19] [20] But in real conditions there is no EFI module.

From the above study, as a form of research preparation aimed at improving the quality and effectiveness of the education system in terms of reference search as one of the interactive EFI learning resources at the Aviation Polytechnic of Surabaya, Aeronautical communication Study Program, the researcher designed this research.

This research only focuses on the initial design of LMS-based electronic modules, En-route flight information courses. how to make students of aeronautical communication study programs understand learning material with interactive learning available learning videos, practice questions for each chapter, and as one of the independent learning materials without depending on the teacher where students can set the period of time or not learning according to their abilities. The teachers only focus. The teachers only focus on the extent of each student's learning activities, not on the summary orreference material, the syllabus and learning objectives have also been uploaded. product feasibility testing is also assessed in this study, whether the EFI emodule is

feasible or not in use. To fulfill the objectives of this study,the questions below are posed:

1. How to design an e-module in the EFI Theory course using the Borg & Gall method for the D3 KP Study Program at Aviation Polytechnic of Surabaya using LMS?

2. How is the feasibility test of the LMS-based EFI e-module product?
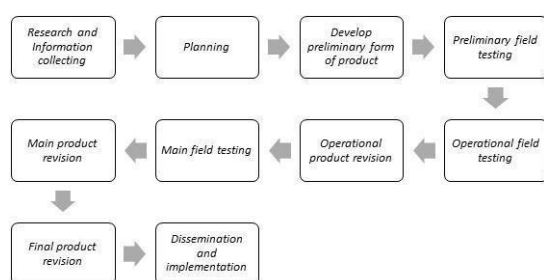
2. METHODS

2.1 E-module Design

Figure 1 Borg & Gall Model R&D Testing Technique

2.1.1 Potential & Problems

1) Material selection

The material developed in this research and development of learning media is En-route Flight Information (EFI). The selection of the material is based on several reasons, namely:

a) EFI is flight communication guiding material which is the main lesson of the flight communication study program where students will be trained to have EFI control technique skills in order to guide and provide information to aircraft in order to create flight safety.

b) EFI is a training for the Aviation Communication study program where students will be given an Aeronautical Communication Officer (ACO) license which includes an FI rating for students to work or On The Job Training (OJT) at the airport.

2) Selection of Research Location

The research location used in this research is Politeknik Penerbangan Surabaya, the selection of the school is based on several reasons, namely:

a) Aviation Polytechnic of Surabaya has EFI laboratory facilities that have good quality and can resemble real conditions in the field.

b) The campus location is easily accessible by the author and the author is an active cadet at the

Aviation Polytechnic of Surabaya campus.

3) Needs Analysis

The initial step taken by the author in this research and development is to observe EFI learning in the classroom to find out the problems faced related to EFI learning at the Aviation Polytechnic of Surabaya.

2.1.2 Data collection

The planning stage for the development of EFI e-modules, the things that are done are starting by looking for various sources or references related to EFI books or documents tailored to the curriculum to be developed, understanding carefully related to the specifications of EFI learning, understanding the problems experienced by learners or students when EFI lessons take place, choosing the right design.

Planning the EFI e-module development process includes e-module design, learning materials tailored to the curriculum, midterm and final exam questions.

2.1.3 Product Design

The EFI e-module development process takes approximately 6 months, where the development of the EFI e-module goes through several stages of EFI e-module development including:

1) Development of EFI learning materials used in learning in the KP study program.

2) Development of LMS-based EFI e-module design at Aviation Polytechnic Surabaya.

3) Development of making practice questions for the midterm and final semester exams.

2.1.4 Design Validation

After product development is complete, the next step is to test whether the product developed is valid or not. Validation is an activity of collecting information from experts in their fields (validators) to determine whether the product developed is valid or not.

Validation aims to determine the level of feasibility of the EFI e-module developed before it is used in EFI training. A product is said to be valid or feasible to use if the degree of validity is high, while on the contrary it is said to be invalid if the degree of validity is low. The validity test was given to several expert validators, including:

1) Material expert

Experts in the field of EFI are lecturers of EFI courses at the Aviation Polytechnic of Surabaya.

2) Media Expert

Experts in the field of media, namely lecturers in Information Technology courses at the Aviation Polytechnic of Surabaya.

2.1.5 Design Revision

After the product has been validated by several experts, the next step is to conduct a product review. Product changes are made if there are many weaknesses and shortcomings in the form or content of standards, so that this product revision is based on the results of expert research from the collected validators. Various expert responses, criticisms and suggestions were analyzed. From the results of the analysis, changes or additions were made to the EFI e-module developed.

2.1.6 Product Trial

After revising the product, the next step is to test the product in the field. Product trials in the field are needed to assess the feasibility of the EFI e-modules developed. In this field trial, it was conducted on D3 KP cadets class 6 totaling 10 people, D3 KP alumnus totaling 10 people.

2.1.7 Product Revision

After testing the product, the author examines it again based on the results of the sample tests of students and alumnus of the D3 KP study program obtained after using the EFI e-module. If the analysis results show that the e-module is suitable for use in EFI learning, no confirmation or product revision is required again.

2.1.8 Usage trial

After revising the product, the next step is to test the product usage. With instruments and samples carried out to the same respondents, carried out to D3 KP cadets class 6 totaling 10 people, D3 KP alumnus totaling 10 people.

2.1.9 Final product revision (if necessary)

After testing the product, the author checks it again. This final version is based on the results of sample tests of students and alumnus of the D3 KP study program obtained after using the EFI e-module.

2.1.10 Dissemination and Implementation

Dissemination and Implementation is to convey the results of EFI e-module product development to experts through meeting forums, product dissemination.

2.2 Participants

This study was intended to determine the feasibility of the product, namely the EFI module, consisting of twenty participants. consisting of 10 6th grade aviation communication cadets, 10 aviation communication alumnus. Participants in this training were randomly selected.

2.3 Procedures

How to access the e-learning web page:

1) Open a web browser and access https://courses.poltekbangsby.ac.id/ in the URL column at the top of the browser then press enter. You will be directed to the Aviation Polytechnic of Surabaya e-learning system page to log in.

2) Click the Login button on the top right. You will be directed to the login page.

Figure 2 Login Page Display

3) Enter your Username and Password. After that press Enter or click the Login button.
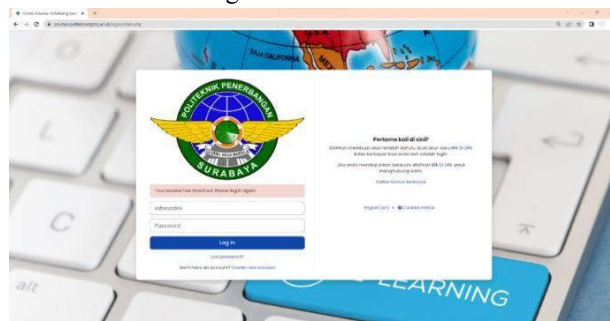

Figure 3 Login Page Display

4) After successfully logging in, the lecturer's name will appear in place of the previous Login text in the upper right corner.
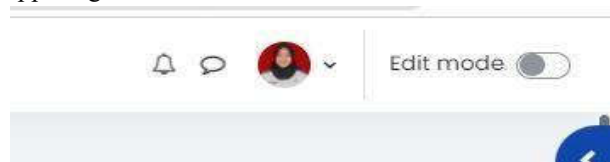

Figure 4 Login Page Display

To view the courses taught, please follow the instructions below:

5) After successfully logging in, you will be on the frontpage of the Aviation Polytechnic of Surabaya e-learning. On the Home page, you can see a list of courses located in the Course Categories of the e-learning website.
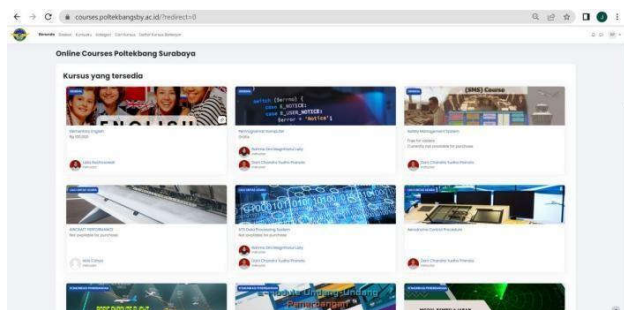

Figure 5 Page Display After Login

6) In addition, you can access the courses or courses taught in the Course Categories on the Navigation panel on the left sidebar of the e-learning website page.
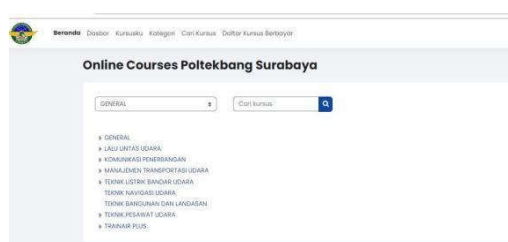

Figure 6 Course Catagories Display

7) After that, you will be given a Course Overview view along with menu panels for course content management as shown below.
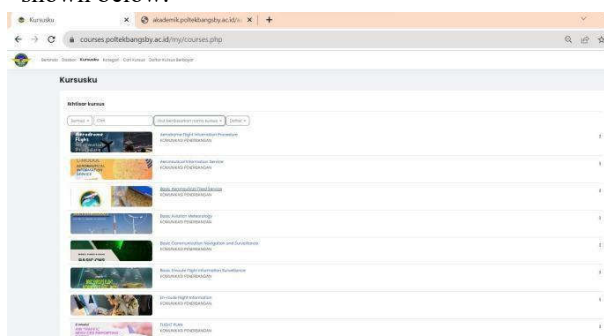

Figure 7 Course Overview Display

8) Select the material and you will be directed to the course page. On this page will be displayed a list of lecture activities added to the course.
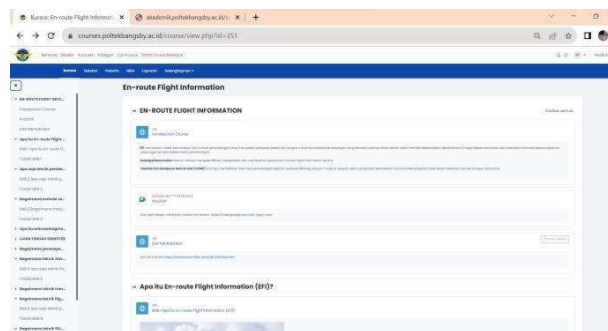

Figure 8 EFI Course Page Display

3 RESULTS AND DISCUSSION

This section will explain the results of the research and its discussion. This research implementation report includes potential and problems, data collection, product design, design validation, design revision, product trial, product trial revision, usage trial, usage revision, limited production. To facilitate the discussion, the research results will be presented at each stage of development. The procedural results of the Borg & Gall model are :

1). Potential & Problem results there are results of material selection, namely En-route Flight Information because it is the main subject of flight communication and the issuance of the FI rating. The selection of the location of the EFI laboratory of the Surabaya polytechnic has facilities that resemble real conditions in the field. The results of the needs analysis after observing and distributing questionnaires to 10 aeronautical communication cadets 6 results show that there is indeed a need for e-modules in supporting cadet learning, because at this time cadets only rely on learning material from lecturer explanations or flight documents for self-study given the absence of EFImodules.

2). The results of Data Collection are looking for various sources or references related to EFI books or documents. EFI e-module development process planning includes e-module design, learning materials tailored to the curriculum, midterm exam questions and end-of-semester exam questions.

3). The results of Product Design with the development stage are the results of the development of the LMS-based EFI e-module design at the Aviation Polytechnic of Surabaya, the results of the development of EFI learning materials used in learning in the KP study program, the results of the development of making practice questions for the midterm and final semester exams.

4). The results of Design Validation carried out by

media experts and material experts (lecturers teaching EFI courses) The results of validation from media

experts & material experts show that e-modules are valid and very easy to understand with revisions to the results of validation from material experts, namely changes in material in chapter 9 to generalize the previous manual FIC simulator Balikpapan to manual FIC simulator. The result of media validation is to include heyzine flipbook link in the description of each chapter on the LMS website.

5). Revision Result Design makes changes to the revisions given from material and media experts.

6). The results of the Product Trial this research uses the PIECES method and use skala likert with a percentage of 93.6% means Very (Agree, Good, Like) with revisions from respondents, namely the design can be more varied, the need to add current information on the condition of FIC in Indonesia, add mini tests for each chapter, improve typing, for example, if the sentence is too long, it can be continued on the next page, the arrangement of the text can be adjusted so that it is not too close.

7). Product Revision Results make changes to the revisions given from respondents.

8). The results of the Usage Trial with the same questionnaire and research objectives have improved with a percentage of 97.5% and there are no revisions. This research uses the PIECES method, namely:

a. Performance

The display design on the LMS-based e-module for the EFI Theory course is attractive, with a presentation index of trial 1 of 94% and an increase in trial 2 of 98%.

b. Information

The information obtained on the LMS-based e- module for the EFI Theory course is satisfied for learning media and participant literacy needs, with a trial 1 presentation index of 93% and an increase in trial 2 of 97%.

c. Economics

LMS-based e-modules for EFI Theory courses provide future benefits in learning Aeronautical communication Study Program, with a presentation index of trial 1 of 93% and an increase in trial 2 of 98%.

d. Control

The system contained in the LMS-based e-module for the EFI Theory course is easy to understand and use for cadets' information search, with a presentation index of trial 1 of 95% and an increase in trial 2 of 99%.

Efficiency

The data provided is in accordance with the participant's expectations in finding literacy material for EFI Theory, with a presentation index of trial 1 of 95% and an increase in trial 2 of 96%.

e. Service

After using the LMS-based e-module for the EFI Theory course, the participant is helped by the e- module that provides information, with a presentation index of trial 1 of 92% and an increase in trial 2 of 97%.

9). Final Product Revision no revisions were made.

10). Dissemination and Implementation Results convey the results of EFI e-module product development to experts through forums, and product dissemination. at this stage the author applies the results of the final product revision by uploading to the En-Route Flight Information course / course on e-learning https://courses.poltekbangsby.ac.id/

4 CONCLUSION

1. Designing LMS-based EFI e-modulesusing the borg and gall method, namely by developing the Aviation Polytechnic of Surabaya e- learning website with the addition of courses on the course menu to support the author's goals and with this development the author hopes that the Aviation Polytechnic of Surabaya e-learning website will develop more in terms of appearance and information provided. This LMS-based En-route Flight Information (EFI) e- module carries the characteristics of a complete learning resource, in which there are sources of information in the form of material tailored to the syllabus, images, and also learning videos. In addition, the electronic module is also equipped with quiz-based midterm and final exam features.

2. This research uses the Borg & Gall method, and the PIECES testing technique. From the results of the questionnaire distributed by the author to respondents 10 alumnus of the Aeronautical communication D3 Study Program and 10 cadets of the Aeronautical communication D3 Study Program Batch 6, the conclusion was obtained: The average value of the entire product trial

1 is 93.6%, meaning Very (Agree, Good, Like). Experiencing an increase of 97.5% means Very (Agree, Good, Like). So this EFI e-module is suitable for use.

REFERENCES

[1] Martin, David Lopez; Perez, Roi Piniero; Campos, Leticia Martinez; Alvarez, Josefa Ares; Cabrera, Teresa de la calle; Huerta, Ignacio Jimenez; Pardo,

[2] Parisa Khodayar; Catellanos, Pilar Lupiani; Artigao, Fernando Baquero;, "Update of the consensus document on the aetiology, diagnosis and treatment of acute otitis media and sinusitisActualización del documento de consenso sobre etiología, diagnóstico y tratamiento de la otitis media aguda y sinusitis," *Anales de Pediatria,* vol. 98, no. 5, pp. 362-372, 2023.

[3] Arqoub, Omar Abu; Dwikat, Hanadi;, "Shaping media relations scholarship: A systematic review," *Public Relations Review,* vol. 49, no. 2, p. 102322, 2023.

[4] D. Bindiya, "Social media wellbeing: Perceived wellbeing amidst social media use in Norway," *Social Sciences & Humanities Open,* vol. 7, no. 1, p. 100436, 2023.

[5] Strakos, Joshua K.; Douglas, Matthew A.; McCormick, Blaine; Wright, Michael;, "A learning management system-based approach to assess learning outcomes in operations management courses," *The International Journal of Management Education,* vol. 21, no. 2, p. 100802, 2023.

[6] H. Toring, G. Legaspi, J. Omolon, R. Amadeo, E. Amadeo, Q. Opolentisima, V. Barina, T. Cacho, H. Illustrimo and S. Cortes, "Evaluation of students' satisfaction toward an adopted learning management system at Indiana Aerospace University: A structural equation modelling approach," *Asia Pacific Management Review,* 28 December 2022.

[7] Al-mamary, Yaser Hasan Salim;, "Understanding the use of learning management systems by undergraduate university students using the UTAUT model: Credible evidence from Saudi Arabia," *International Journal of Information Management Data Insights,* vol. 2, no. 2, p. 100092, 2022.

[8] A. A. Alfalah, "Factors influencing students' adoption and use of mobile learning management systems (m-LMSs): A quantitative study of Saudi Arabia," *International Journal of Information Management Data Insights,* vol. 3, no. 1, p. 100143, 2023.

[9] BaoHuy, Truong Hoang; Dinh, Huy Troung; Vo, Dieu Ngoc; Kim, Daehee;, "Real-time energy scheduling for home energy management systems with an energy storage system and electric vehicle based on a supervised-learning-based strategy," *Energy Conversion and Management,* vol. 292, p. 117340, 2023.

[10] Lwande, Charles; Muchemi, Lawrence; Oboko, Robert;, "Identifying learning styles and cognitive traits in a learning management system," *Heliyon,* vol. 7, no. 8, p. e07701, 2021.

[11] Wang, Jieyu; Li, Ruyi; Chen, Yiming; Wang, Xiahui; Shi, Qiaofang; Du, Kebing; Zheng, Bo; Shi, Xueping;, "Expressing a Short Tandem Target Mimic (STTM) of miR164b/e-3p enhances poplar leaf serration by co-regulating the miR164–NAC module," *Plant Physiology and Biochemistry,* vol. 201, p. 107790, 2023.

[12] Wasiluk, Tomasz; Osman, Cynthia So-; Burg, Peter van den; Hercezenik, Eszter; Al-riyami, Arwa Z.;, "The ISBT e-learning module in transfusion reaction: An initiative for a global outreach," *Transfusion and Apheresis Science,* vol. 62, no. 1, p. 103633, 2023.

[13] Rohr, Joseph M.; Mukherjee, Maheswari; Donnelly, Amber; Sprinkle, Sarah; Duarte, Ernesto Martinez; Valdes, Ana Yuil;, "Successful integration of thyroid cytopathology and surgical pathology education in an E-module format," *Journal of Pathology Informatics,* vol. 13, p. 100124, 2022.

[14] Atkinson, A. M.; Ven, K. van de; Cunningham, M.; Zeeuw, T. de.; Hibbert, E.; Forlini, C.; Barkouis, V.; Sumnall, H. R.;, "Performance and image enhancing drug interventions aimed at increasing knowledge among healthcare professionals (HCP): reflections on the implementation of the Dopinglinkki e-module in Europe and Australia in the HCP workforce," *International Journal of Drug Policy,* vol. 95, p. 103141, 2021.

[15] Jung, Martin; Grimme, Wolfgang;, "Availability of en-route alternate aerodromes as potential limitation in flight planning for hybrid-electric regional aircraft," *Transportation Research Procedia,* vol. 65, pp. 44-51, 2022.

[16] Liu, Yulin; Hansen, Mark; Ball, Michael O.; Lovell, David J.;, "Causal analysis of flight en route inefficiency," *Transportation Research Part B: Methodological,* vol. 151, pp. 91-115, 2021.

[17] Lin, Yu; Li, Lishuai; Ren, Pan; Wang, Yanjun; Szeto, W. Y.;, "From aircraft tracking data to network delay model: A data-driven approach considering en-route congestion," *Transportation Research Part C: Emerging Technologies,* vol. 131, p. 103329, 2021.

[18] Skultety, Filip; Jarosova, Miriam; Rostas, Jan;, "Dangerous weather phenomena and their effect on en-route flight delays in Europe," *Transportation Research Procedia,* vol. 59, pp. 174-182, 2021.

[19] Liu, Ziang; Xiao, Gang; Mao, Jizhi;, "A framework

for strategic online en-route operations: Integrating traffic flow and strategic conflict managements," *Transportation Research Part C: Emerging Technologies,* vol. 147, p. 103996, 2023.

[20] Li, Qing; Zhang, Yicheng; Su, Rong;, "A Flow- based Flight Scheduler for En-route Air Traffic Management," *IFAC-PapersOnLine,* vol. 49, no. 3, pp. 353-358, 2016.

[21] Edwards, Mark B.; Fuller, Dana K.; Vortac, O. U.; Manning, Carol A.;, "The role of flight progress strips in en route air traffic control: a time-series analysis," *International Journal of Human- Computer Studies,* vol. 43, no. 1, pp. 1-13, 1995.