

FUNCTIONALITY OF MOODLE E-AVIATION METEOROLOGY IN AVIATION POLYTECHNIC OF SURABAYA

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ABSTRACT

In learning Aviation Meteorology e-modules that specifically study it have not been facilitated in the Learning Management System of Surabaya Aviation Polytechnic. This research aims to develop a learning module for Aviation Meteorology. This Final Project uses a research method, namely Research and Development (R&D) by conducting data collection techniques in the form of interviews and questionnaires. From this study, it was found that the results of the Material Expert Validation Test obtained the category "Valid" and "Understandable". Then the Media Validation Test obtained the "Valid" and "Understandable" categories, and the Product Trial to the cadets obtained a correlation coefficient score of 0.85 in the "Very Strong" category because the results produced did not produce a minus score, meaning that the relationship was positive and the Aviation Meteorology E-Module was effective in helping cadets understand the Aviation Meteorology course.

Keywords: *Aviation Meteorology, Learning Management System (LMS), Moodle; E-Learning; Learning Module.*

1. INTRODUCTION

Higher education is an important stage in the educational process of a cadet. At Aviation Polytechnic of Surabaya, cadets are exposed to more complex and in-depth teaching materials offered by lecturers or instructors. One of the teaching materials used in learning in higher education is printed books or soft files distributed by lecturers or instructors to cadets. [1]

However, the use of teaching materials in the form of printed books and soft files in learning still has shortcomings. Some cadets still rely on teaching materials from lecturers or instructors in the form of printed books or soft files, even though information and communication technology (ICT) has developed rapidly and provides easy access to various online learning resources. There are advantages and disadvantages to using printed books and soft files as teaching materials in the learning process at Aviation Polytechnic of Surabaya. The advantage is that students or cadets can directly access teaching materials from lecturers or instructors and these teaching materials can be used as reliable references. However, the disadvantages are the limited accessibility and flexibility, as well as the lack of interaction and dynamism in the use of these teaching materials.

The use of appropriate learning methods can help students to understand the material and learn more effectively. Therefore, it is important for teachers to choose learning methods that suit the needs and characteristics of students [2]. In accordance with the title

of the final project that the author raised, the online learning method in the form of e-modules is a suitable method used in learning at the Aviation Polytechnic of Surabaya.

An e-module is an electronic or digital learning module designed to help students learn independently or in addition to classroom learning. e-modules usually contain various types of learning materials such as text, images, video, audio, and interactive that can be accessed online through a computer or smartphone device. e-modules can be used as a reference source to deepen students' understanding of a particular topic, as well as to facilitate distance learning or learning that is not bound by time and place [2].

Aviation Polytechnic of Surabaya is one of the universities that organizes education and training in the field of aviation. As an aviation education institution, Aviation Polytechnic of Surabaya has the task of preparing cadets to be able to face challenges in the world of aviation properly. One of the courses that is very important and must be mastered by cadets is Aviation Meteorology.

An understanding of Aviation Meteorology is very important to ensure flight safety. In relation to that, the Aviation Communication Study Program has Aviation Meteorology in its curriculum. However, in its implementation, e-modules that specifically study Aviation Meteorology have not been facilitated in the

Learning Management System Aviation Polytechnic of Surabaya. According to the author, if the e-module exists, it will be very helpful in supporting learning. This e-module can be accessed anywhere, anytime, and can be seen directly about the current aviation meteorological conditions. Its use is not limited to cadets but can also be used by people who work in the world of aviation and participants who are taking flight safety training.

Based on the main background description above, the author plans to:

1. How is the process of designing and building interactive e-modules in the Aviation Meteorology Course at Aviation Polytechnic of Surabaya?
2. How to find out whether e-modules are effective in helping cadets understand the Aviation Meteorology Course at the Aviation Polytechnic of Surabaya?

2. METHOD

The research method used in this research is Research & Development (R&D), this research has the aim of creating a product and then testing its effectiveness. It is hoped that using this research method can produce new innovations in the world of education [4].

This development research process has 10 stages, namely 1) Research and Information Collecting, 2) Planning, 3) Develop Preliminary Form of Product, 4) Preliminary Field Testing, 5) Main Product Revision, 6) Main Field Testing, 7) Operational Product Revision, 8) Operational Field Testing, 9) Final Product Revision, 10) Dissemination and Implementation [5]. The author uses the research stages from Borg & Gall and then adjusts them to the needs of the research. Below the author describes the stages. The author uses the research stages from Borg & Gall and then adjusts them to the needs of the research by simplifying the stages to seven [6]; [7].

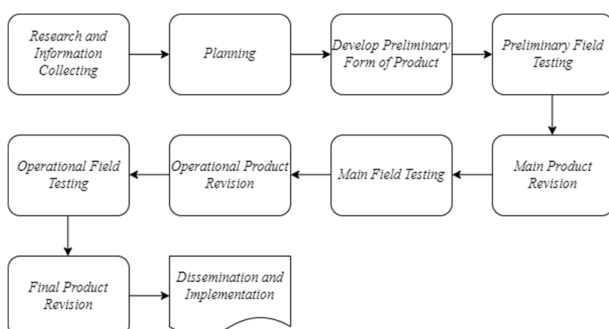


Figure 1 Research Flowchart Borg & Gall

1. Research and Information Collecting Stage
This stage includes collecting data and information about the problem to be solved, user needs, and other information relevant to product development.
2. Planning Stage

This stage includes product development planning, including goals, objectives, and development strategies.

3. Develop Preliminary Form of Product Stage
This stage includes the development of initial products based on the results of preliminary studies and planning.
4. Preliminary Field Testing Stage
This stage includes testing the initial product on a small number of users to evaluate the feasibility and effectiveness of the product.
5. Main Product Revision Stage
This stage includes revising the initial product based on the results of the initial product validation.
6. Main Field Testing Stage
This stage includes product trials on a larger scale to evaluate the feasibility and effectiveness of the product as a whole.
7. Operational Product Revision Stage
This stage includes revising the main product based on the results of the revised product trial.

2.1 Instrument Design

In this final project, the author made an e-module of Aviation Meteorology material according to the syllabus in the Aviation Communication study program. It contains 2 credits (Semester Credit System) consisting of 14 meetings, 12 face-to-face meetings, assignments, and practice as well as UTS and UAS. The content of this e-module includes PowerPoint, pictures, and exam questions. Then this e-module will be implemented and uploaded to the Learning Management System website.



Figure 2 Research Instrument Design

From the flowchart image above, the stages can be explained, namely:

- 1) First, it starts by choosing a course that will be used as an e-module [9];[10], namely Aviation Meteorology, then designing a content chart in the

Learning Management System of Aviation Polytechnic of Surabaya.

- 2) Designing the content chart has been done, so the next step is to conduct validation tests for media and material experts [11]. If accepted, then it will continue to design e-module practice material, practice questions and continue validation to the lecturer. At this stage of validation to the lecturer, the design of the material, and practice questions will be assessed whether it is in accordance with the syllabus or not, if not, it will return to the initial stage of choosing the course.
- 3) Validation of the lecturer has been carried out and is in accordance with the syllabus, then the next stage is to install the e-module on the Learning Management [12] System of the Aviation Polytechnic of Surabaya and conduct user trials for the cadets. If there are obstacles, it will be repeated again to the reinstallation stage, otherwise, it will continue with the launching and feasibility testing of the e-module in order to obtain the test results which are also the final stage of research.

2.2 Instrument Component

Based on the description of the design of a website-based information system application [8]. Several supporting components are needed besides the Internet.

1. Hardware

Hardware or Hardware is all physical parts of the computer and is distinguished by the data inside such as motherboard, power supply, processor, RAM, hard drive, CD drive, battery, CMOS, RAM, hard disk, CD drive, battery, CMOS, CMOS, and CMOS: Motherboard, Power Supply, Processor, RAM, hard disk, CD Drive, Battery, CMOS, VGA Card, Sound Card, etc. (Zainal Ansori, Yulmaini: 2019)

- Operating System: Windows 10
- Processor: AMD A9-9420
- RAM: 4 GB
- Hard Disk Drive: 500 GB HDD

2. Software

This device is a basic program on a computer that connects users with computer devices. the operating systems used are Linux, Windows, and Mac OS. Software functions to give commands to the computer so that it can function optimally. The software that the author uses, namely Learning Management Software, Canva, Heyzine Flipbook, and Quizziz.

2.3 Testing Techniques

This testing program is carried out when making an e-module design and using a research instrument as a tool to measure a research variable [13]. Below the author includes the variables to be measured, namely:

1. Material Validation

The process of assessing or evaluating learning materials to ensure the material is in accordance with the learning objectives, easy to learn, arranged coherently, and discussed in detail [14]. Of course, this test is carried out by experts who have mastered the Aviation Meteorology material.

2. Media Validation

Testing on this learning media is carried out to ensure that the media is in accordance with learning objectives, easy to use, and effective in helping to achieve learning objectives [15]. This media validation assesses aspects of the functions and benefits of the e-module cover display, e-module material, and selection of learning media [5]. This media feasibility test is certainly carried out by media experts who are experienced in the field of media design or technical.

3. Usage Trial

After the assessment is carried out by material and media experts and then revisions are made, the next stage is the initial stage trial in a limited group according to the research model that the author took.

3. RESULT & DISCUSSION

In this section there is a discussion of the results of the research that the author conducted which has been simplified into 7 stages [16], namely:

3.1 Results of Research and Information Collecting

At the Research and Information Collecting stage, the authors conducted a needs analysis with small-scale research, namely interviews.

3.2 Results of Planning

After conducting a needs analysis, the author conducts planning to support research activities by collecting data such as RPS (Semester Learning Plan) Aviation Meteorology and Syllabus as guidelines for making e-modules.

3.3 Results of Develop Preliminary Form of Product

This stage is the initial stage in the development of product design and will affect the entire subsequent product development process.

1. Cover Page

When accessing the e-module, the first page will contain a cover with the e-module title. On the

next page about the subject matter, Sub-Course Competency Outcomes and Foreword.

2. Topic Material Page

The topic material page will contain the topic title per material according to the topic that has been selected. In it there will be material, video reference material, text, and images. The reference video will immediately play when the students press the click button.

3. Quiz Page

This page contains questions at the end of each material topic according to the title per topic. This quiz will be a measuring tool for students' understanding of the Aviation Meteorology EModule material.

3.4 Results of Preliminary Field Testing

This stage is carried out after the initial product design development stage is completed and the author validates the media and e-module material that has been made. as for the aspects assessed, namely aspects of e-module design, appearance, material and writing.

3.5 Results of Main Product Revision 9

Media and material revisions were made by the author in early July 2023 based on criticisms and suggestions that had been given by media and material expert lecturers. This revision is a stage that must be done so that the research results can become a perfect product. As for the material revisions made by the author, namely by adding material and changing some material that is not in accordance with the sub-points of discussion. As for the media revisions made by the author, namely by adding Course Descriptions, Course Learning Outcomes, emodule links, and Bibliography to the Learning Management System Aviation Polytechnic of Surabaya.

3.6 Results of Main Field Testing

At this stage of product testing, the author conducts testing by distributing Google Form questionnaires to respondents. The respondents who will be taken in this case are the cadets of Aeronautical Communication VI and Air Traffic XIII, totaling 38 cadets. This test was carried out in the time span from July 07, 2023 - July 11, 2023. In this study, the authors used a Likert Scale research instrument to obtain data on each questionnaire question by measuring variable indicators that have been made into instrument items in the form of statements with answer choices.

3.7 Results of Operational Product Revision

This revision was carried out based on the results of criticism and suggestions from the Product Trial Questionnaire which became a stage in this study. As for the revisions made by adding descriptive images and then the author also shortened the material so that it was easy to use by cadets.

4. CONCLUSION

Based on the results of the design and research of the Aviation Meteorology E-Module that has been carried out, the following conclusions can be drawn:

1. The design of the Aviation Meteorology E-Module implemented into the Learning Management System (LMS) Aviation Polytechnic of Surabaya is designed to help and facilitate lecturers and cadets in the teaching and learning process [17]. With this Moodlebased E-Module, the material presented is more interesting because there are videos, images, QR codes, and also quizzes on each topic of material. Of course, this E-Module can also be accessed directly and anytime anywhere.
2. With the Learning Management System (LMS) developed by the Aviation Polytechnic of Surabaya, this E-learning is a learning media that helps to support the learning of material that has been given by lecturers or instructors [18]. To test the effectiveness of the Aviation Meteorology (AVMET) E-Module Design, researchers used the Likert Scale method with the results of correlation coefficient obtained of 0.85 which shows that the design of this e-module is very strong against the level of relationship between the effectiveness of the e-module in helping cadets understand the Aviation Meteorology Course at Aviation Polytechnic of Surabaya.

REFERENCES

- [1] D. M. M.-E. M. M. C. N. T. Andrei DAVID, "Scalability through Distributed Deployment for Moodle Learning Management System," *Procedia Computer Science*, vol. 214, pp. 3441, 2022.
- [2] B. G. D. B. H. Ö. H. Y. M. A. T. Sevcin Özöztürk, "The effect of online and face-toface active learning methods on learning attitudes,," *Nurse Education Today*, vol. 129, 2023.
- [3] I. Y. Alyoussef, "Acceptance of e-learning in higher education: The role of," *Heliyon*, vol. 9, no. 3, 2023.

- [4] P. D. Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif dan R&D*, Bandung: CV.Alfabeta, 2016.
- [5] A. N, "Pengembangan Modul Pembelajaran Inventor Berbasis Contextual Teaching and Learning (CTL) di SMK Muhammadiyah 1 Bantul," *Jurnal Pendidikan Vokasional Teknik Mesin*, vol. 4, pp. 131-136, 2016.
- [6] S. G.A, "Pengujian Validitas Konten Media Pembelajaran Interaktif Berorientasi Model Creative Problem Solving," *Jurnal Penelitian dan Pengembangan Pendidikan*, vol. 2, pp. 8895, 2018.
- [7] Aka, K. A. (2019). Integration borg & gall (1983) and lee & owen (2004) models as an alternative model of design-based research of interactive multimedia in elementary school. *Journal of Physics: Conference Series*, 1318(1) doi:<https://doi.org/10.1088/1742-6596/1318/1/012022>
- [8] Rochmawati L, Fatmawati F, MaharaniSukma M and Sonhaji I, "Online learning motivation for AviationEnglish: Attitude, readiness, anddemographic factors," *Journal of English Educators Society*, 2021.
- [9] Sawarynski KE, Baxa DM. Utilization of an online module bank for a research training curriculum: development, implementation, evolution, evaluation, and lessons learned. *Med Educ Online*. 2019 Dec;24(1):1611297. doi: 10.1080/10872981.2019.1611297. PMID: 31072278; PMCID: PMC6522953.
- [10] Olvet, D.M., Sadigh, K. Comparing the effectiveness of asynchronous e-modules and didactic lectures to teach electrocardiogram interpretation to first year US medical students. *BMC Med Educ* **23**, 360 (2023). <https://doi.org/10.1186/s12909-023-04338-6>
- [11] Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. *Front Public Health*. 2018 Jun 11;6:149. doi: 10.3389/fpubh.2018.00149. PMID: 29942800; PMCID: PMC6004510.
- [12] B. B. Wiyono et al. (Eds.): ICEMT 2022, ASSEHR 727, pp. 285–294, 2023. https://doi.org/10.2991/978-2-494069-95-4_34
- [13] Duong Huu Tong, Bui Phuong Uyen, Lu Kim Ngan, The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane, *Heliyon*, Volume 8, Issue 12, 2022, e12657, ISSN 2405-8440, <https://doi.org/10.1016/j.heliyon.2022.e12657>.
- [14] Orr RB, Csikari MM, Freeman S, Rodriguez MC. Writing and Using Learning Objectives. *CBE Life Sci Educ*. 2022 Sep;21(3):fe3. doi: 10.1187/cbe.22-04-0073. PMID: 35998163; PMCID: PMC9582829.
- [15] Abid Haleem, Mohd Javaid, Mohd Asim Qadri, Rajiv Suman, Understanding the role of digital technologies in education: A review, *Sustainable Operations and Computers*, Volume 3, 2022, Pages 275-285, ISSN 2666-4127, <https://doi.org/10.1016/j.susoc.2022.05.004>.
- [16] Gold, N., Watson, R., Weston, D. et al. A randomized controlled trial to test the effect of simplified guidance with visuals on comprehension of COVID-19 guidelines and intention to stay home if symptomatic. *BMC Public Health* **21**, 892 (2021). <https://doi.org/10.1186/s12889-021-10787-9>
- [17] Coman C, Țiru LG, Meseșan-Schmitz L, Stanciu C, Bularca MC. Online Teaching and Learning in Higher Education during the Coronavirus Pandemic: Students' Perspective. *Sustainability*. 2020; 12(24):10367. <https://doi.org/10.3390/su122410367>
- [18] Lange, C., Costley, J. Improving online video lectures: learning challenges created by media. *Int J Educ Technol High Educ* **17**, 16 (2020). <https://doi.org/10.1186/s41239-020-00190-6>