E-Apron Movement Control (AMC) Course Module Based Web Using 4D RND Model

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ABSTRACT
This development research direct to determine the development process, feasibility, and responses of cadets and lecturers to electronic module-based learning media in the Apron Movement Control (AMC) course in the Air Transportation Management Diploma 3 Study Program and to produce teaching material products in the form of e-modules made using the Canva Application and distributed through the LMS or Learning Management System (LMS) of the Surabaya Aviation Polytechnic. The developed learning media can be used to increase the abilities and interests of cadets in the Apron Movement Control (AMC) Course. The research and development technique used is the RnD or Research and Development method with the Four-D model. This research went through four stages of development, namely Define, Design, Development and Disseminate. The subject matter expert in this study was the Apron Movement Control (AMC) Course Lecturer, while the media expert in this study was the research advisor. In addition to being tested by media experts and material experts, the authors conducted trials through development subjects, namely Diploma 3 Air Transportation Management cadets at both Level 2 and Level 3. As an instrument for data collection in the validation of cadets and lecturers, this the study used interviews and questionnaires which would later be tested using a Likert scale. Based on the analysis of the data collected by the researcher, the validity of the material contained in the Electronic Apron Movement Control Module is 62.4%, 73.5% validity for the media and 73% for students' validity which showed that usability measurement of this E-Module "Worthy". So that conclusion that can be drawn in this research that E-Apron Movement Control Module Based Web can be used to users.

Keywords: electronic modules, Apron Movement Control, Research and Development

INTRODUCTION

One type of technology-based learning media that can overcome this is learning media using Web Based Training (WBT). Along with the development of increasingly developing technology, the use of computer and internet technology is increasingly being used in the learning process. The progress and development of this technology is indicated by the existence of a learning system using electronics or often referred to as e-learning. According to previous research, [1][2[3][4][5] *E-learning*is one of evolution and almost assimilated into the world of education. E-learning is a form of technology and information that can be applied in the world of education through cyberspace. There are several examples used in education such as WebCT, Moodle, Edmodo, etc.

*moodle*is software that utilizes the Moodle web application as an Open Source Software (OSS) that can build online classes that have many features to facilitate the course of learning in class, where teachers/instructors can upload teaching materials, questions, assignments and create discussion forums. [6]. Students can enter in Moodle and can choose classes with enrolls that have been provided and activities carried out by students can be monitored by the admin progress system [7].

The problem that is present at the Surabaya Aviation Polytechnic, especially the Air Transportation Management study program at this time is that there is no e-learning-based learning media that supports student learning. Meanwhile, there are several courses that develop teaching materials in the Air Transportation Management (MTU) study program, especially in the Apron Movement Control (AMC) course. In the initial observations as students, the learning process in this course was still limited, such as using power point and word. This condition is a challenge for educators to adjust themselves in improving their competence as educators. In this case, educators can develop their competence by developing teaching materials using certain software which can later be used by all students and educators and can be accessed anywhere and anytime. One of the learning materials that can be developed according to

these problems is an electronic module (e-module). According to [8][9][10][11][12] *E-module* is a modification of conventional modules by combining the use of information technology, so that existing modules can be more interesting and interactive. Because with e-module we can add multimedia facilities (images, animation, audio and video) in it. According to [13],E-module is a combination of physical modules with the use of digital technology so that we can access modules that we usually only read through books on the internet anywhere and anytime.

Based on the description above, it is interesting to do research on the development of interactive teaching materials in the form of e-modules. The author conducted research in developing these interactive teaching materials using the RnD or Research and Development method and the model used was 4D. According to [14]; [15][16][17][18], the RnD (Research and Development) method is a research method used to produce and test the effectiveness of certain products. Development research is a series of processes or steps indeveloping an existing product so that it can be accountedfor. To be able to produce a product, the research must be of a needs analysis nature by testing the effectiveness of the product so that it can function in society. Therefore, development is needed through research and development.

In this development research, the authors used the 4D development model. The 4D model can be used as a source of ideas and development procedures for developing learning tools [19]. The author chose to use the 4D model because according to the author, the 4D model is an easy development model to develop a product. The 4D model has structured and very clear stages in its implementation. In addition, the 4D model has a disseminate stage which is in accordance with the research objective, namely being able to measure the level of effectiveness of the product being developed, namely the Apron Movement Control (AMC) electronic module. With this development research it is hoped that it will be able to attract students' interest in learning and improve the quality of students in the Air Transportation Management Study Program.

To fulfill the objectives of this study, the following questions were asked:

1. How to design and compile a Moodle-based Electronic Module in the Apron Movement Control (AMC) course using the 4D model RnD research method?
2. How to compile the Electronic Module by combining theoretical and practical material, adjusted to the conditions that have been running at the airport?
3. How to test the feasibility of Electronic Modules?

METHOD

Research Design

This research includes Research and Development or RnD method development research. This methodology is used to produce a learning product and to test the effectiveness of learning products [20]. Research and Development or Research and Development is a research method to develop and test products that will later be developed in the world of education [21]. The model used in this development research is the 4D Model. According to [22] 4D model is a 4D development model that can be adapted to 4P, namely: definition, design, development, and deployment. The 4D model is divided into four stages, namely the define stage or also called the needs analysis stage, the design stage, namely preparing the conceptual framework of the model and learning tools, the development stage, namely the development stage which involves validation tests from parties related to assess the feasibility of the media and the stage of dissemination (disseminate), namely the implementationof the research subject.

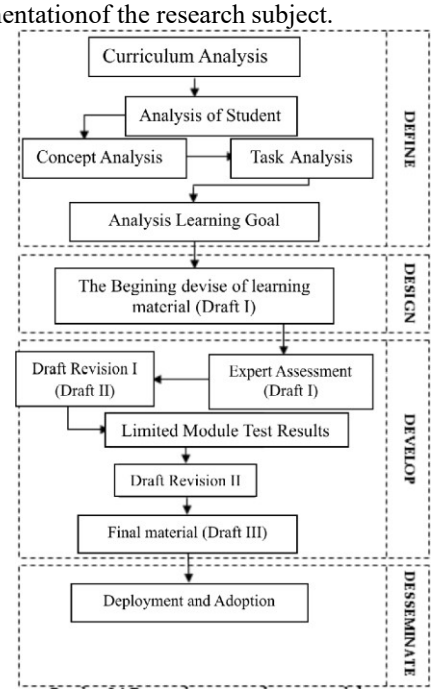

Figure 1 4D Development Steps

1) Define

At this stage, the authors analyze the background of the existing problems, the subject of learning media development, the concepts that will be used in developing learning media and development goals. At the define stage, the authors found the problem that there was not a lack of learning media that supported the learning of the Apron Movement Control (AMC) course at Diploma 3 Air Transportation Management at the Surabaya Aviation Polytechnic with research subjects namely Diploma 3 Air Transportation Management cadets both Level 2 and Level 3. Module This electronics is prepared based on Basic Competency and Core Competency adapted from CPMK Initial Apron Movement Control (AMC). In addition, the author uses learning resources such as learning instructor teaching

materials, previous journals and applicable laws and regulations.

2) Design
At this stage the author analyzes the material that will be presented in the development media based on the existing CPMK Initial Apron Movement Control. Then choose the format to be used in designing the content of learning media and learning resources. At the design stage, the author began preparing the learning media grid which was divided into 7 chapters along with the final exam at the end of the lesson as an evaluation of students after studying the module as a whole and started developing electronic modules using the Canva application version 2.410.0.

3) Development
In the development stage, the author submits electronic modules that have been developed to get validation through media experts and material experts. The subject matter expert in this study was the Apron Movement Control (AMC) Course Lecturer, while the media expert in this study was the research advisor. Furthermore, the development of learning media is improved according to the validator's lecturer suggestions. In addition to being tested by media experts and material experts, the authors conducted trials through development subjects, namely Diploma 3 Air Transportation Management cadets both Level 2 and Level 3.

4) Disseminate
The dissemination stage is the dissemination stage by promoting the product as a result of development so that it is accepted individually, in groups or in a limited system, namely by entering the e-module into the LMS (Learning Management System) of the Surabaya Aviation Polytechnic.

Data Collection Techniques

In this e-module development media research, researchers used a questionnaire or questionnaire technique. According to [20], a questionnaire is a data collection technique by providing a list of questions or written statements to be answered by respondents. In this study data was collected using a questionnaire given directly to students. The questionnaire is used to determine the feasibility of the e-module on students' understanding. Later, this questionnaire contains statements about the ease of understanding the material after using the e-module, students' understanding of the material after using the e-module, and responses including student criticism and suggestions after or while using the e-module.

Data Analysis Techniques

Data analysis techniques in quantitative research use statistics. So this study uses statistical inference. Which statistical inference is a part of statistics that studies the interpretation and drawing conclusions that apply in general from the available data [23]. Likert scale according to [24] is a scale used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena.

Validity Test

Validity test was carried out to ensure the feasibility of the instrument used. In testing the validity of the questionnaire, the authors used the Pearson Correlation Moment.

Reliability Test

Reliability is actually a tool for measuring a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if one's answers to statements are consistent or stable from time to time [28]. In this study, the authors used the Cronbach Alpha formula technique using the Excel application. According to [29], this formula is used to find the reliability of instruments whose scores are not 1

or 0, for example questionnaires or questions in the form of descriptions.

$$r_{11} = \left[\frac{k}{(k-1)}\right]\left[1 - \frac{\sum \sigma^2 b}{\sigma^2 t}\right]$$

Figure 2 Cronbach Alpha formula

Content Validity Test

Testing the validity of the research instrument can be done based on content, criteria, and concepts (construct). The validity of the content (content) is testing the feasibility of research instruments by experts [30]. Content validity ensures that the measurement includes an adequate and representative set of items that reveal the concept. The more the scale items reflect the area or overall concept being measured, the greater the content validity. In this study, the authors used a simple sample size by calculating the percentage using the Average Congruency Percentage (ACP) which was calculated from the item score of each expert's item assessment.

RESULTS AND DISCUSSION

Research Results

This research was carried out from seeing the potential for Surabaya Aviation Polytechnic Cadets, especially in the Air Transportation Management Study Program which did not yet have an electronic module in the Apron Movement Control (AMC) Course. Knowing this, the author has a suggestion to develop an electronic module that is used as a means to support learning.

Data collection

The results of data collection carried out are:

a) Material Expert Validation

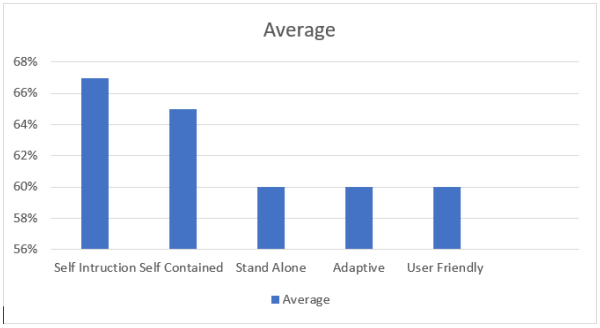

Figure 3 Material Expert Validation Results

After collecting data related to responses and testing the validation of material experts and media experts, the following is the conclusion of the data from the author. Referring to the test images carried out by the author, overall it shows a value of 62.4% in terms of material so that it is categorized as "decent enough" in terms of material used for the teaching process later. The feasibility level of the contents of the module in terms of material uses four factors, namely, aspects of Self Instruction, Self Contained, Stand Alone, Adaptive, User Friendly. All aspects in terms of material are classified in the category of "reasonable enough". So that related to the validity of the material used for the learning process which will be disseminated to students can be categorized as good.

b) Media Expert Validation

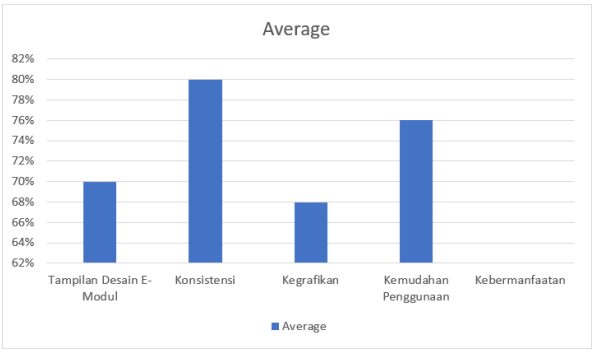

Figure 4 Results of Media Expert Validation

Referring to the test images carried out by the author, overall it shows a value of 73.5% in terms of media experts so that it is categorized as "proper" in terms of the media used for the teaching process later. The feasibility level of the contents of the module in terms of material uses five factors namely, aspects of the appearance of the e-module design, consistency, graphics, ease of use, and usability.

c) Student Response Validation

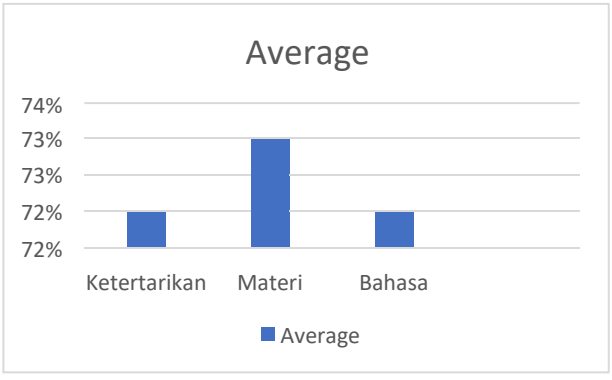

Figure 5 Student Response Validation Results

Based on the validation results of student questionnaires, which collected 28 responses from a sample of 28 cadets of the Diploma 3 Air Transportation Management Study

Program, the authors got good results of 73% in the "decent" category. The author's assessment of student responses includes three aspects, namely aspects of interest, material and language. This testing process was carried out with the aim of knowing the responses and assessments given in terms of material, media and student responses.

Discussion of Research Results

Product Design

The following is a flowchart of learning media design for electronic modules Apron Movement Control (AMC) in product design to the display of electronic modules in the Learning Management System (LMS) of the Surabaya Aviation Polytechnic.

a) Flowcharts

The flowchart in the development of learning media explains the process flow from analyzing the background, analyzing concepts, designing the content of learning media to deploying electronic modules to learning subjects.

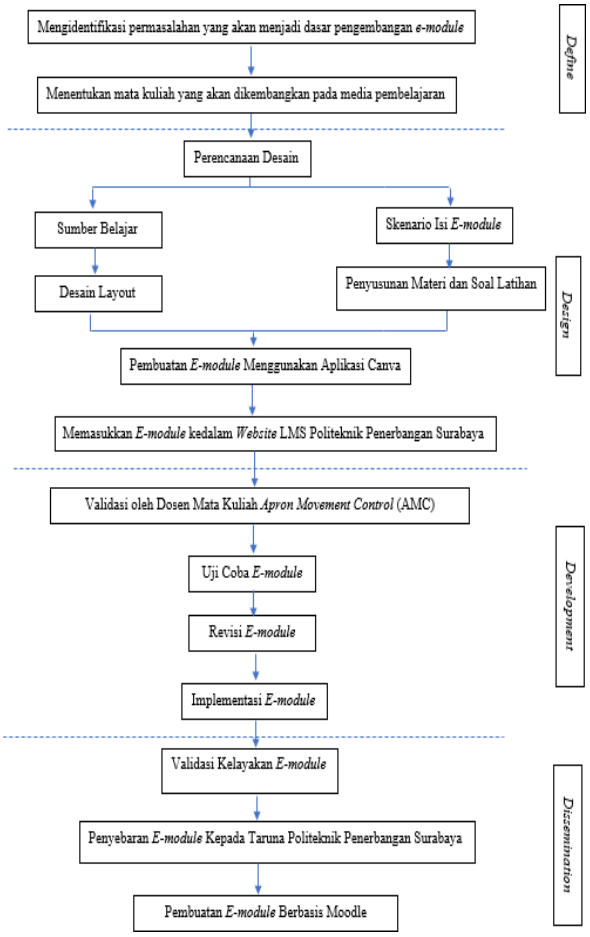

Figure 6 Electronic Module Design Flowchart

b) Electronic Module Display

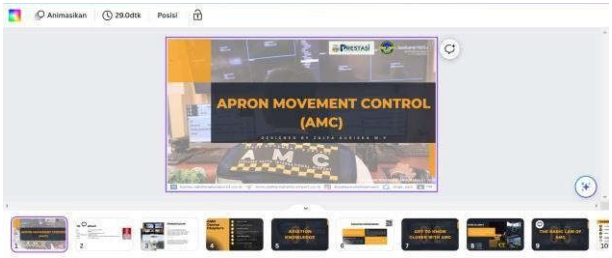

Figure 7 Module Display in Canva

In the image below is a display of the electronic module in the Canva application version 1.214.0.

c) Display of Electronic Modules in LMS

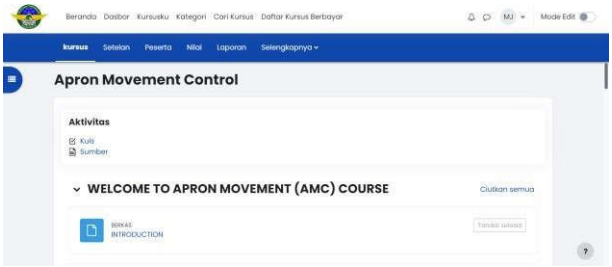

Figure 8 Module Display in LMS

In the picture below is a display of the electronic module in the Surabaya Aviation Polytechnic Learning Management System (LMS) which contains learning material based on the chapters to be studied and the final exam used to test cadets after studying the entire material.

CONCLUSION

In this section, the author briefly explains the conclusions of the development research results that have been carried out.

4. The author compiled an Electronic Apron Movement Control (AMC) Module based on Moodle using the RnD Model 4D research method, namely define, design, developmentand disseminate. At the define stage, the authors found the problem that there was not a lack of learning media that supported the learning of the Apron Movement Control (AMC) course at Diploma 3 Air Transportation Management at the Surabaya Aviation Polytechnic with research subjects namely Diploma 3 Air Transportation Management cadets both Level 2 and Level 3. Module This electronics is prepared based on Basic Competency and Core Competency adapted from CPMK Initial Apron Movement Control (AMC). In addition, the author uses learning resources such as learning instructor teaching materials, previous journals and applicable laws and regulations. At the design stage, the author begins to prepare the learning media grid which is divided into 7 chapters along with the final exam at the end of the lesson as an

evaluation of students after studying the module as a whole and starting the development of electronic modules carried out using the Canva Application version 2.410.0. Furthermore, at the development stage, the authors submit electronic modules that have been developed to get validation through media experts and material experts. The subject matter expert in this study was the Apron Movement Control (AMC) Course Lecturer, while the media expert in this study was the research advisor. Furthermore, the development of learning media is improved according to the validator's lecturer suggestions. Apart from being tested by media experts and material experts,

5. The author compiled an electronic module by combining the theory obtained through learning instructor teaching materials, previous journals and applicable laws and regulations. Then in practice, the author uses a number of cases that occur at airports as a reference for cadets in conducting learning which the author then translates into the electronic Apron Movement Control (AMC) module.
6. Based on the analysis of data collected by researchers regarding the validity of the material contained in the Electronic Apron Movement Control Module, 62.4% agreed with the statements in the questionnaire, so that it could be categorized as "feasible enough" to be used in the learning process of students.
7. Based on the analysis of data collected by researchers regarding the validity of the media in the Electronic Apron Movement Control Module, 73.5% agree with the statements in the questionnaire, so that it can be categorized as "appropriate", for use in the learning process of students.
8. Based on the analysis of data collected by researchers regarding the validity of student responses in the Electronic Apron Movement Control Module, 73% agreed with the statements in the questionnaire, so that it could be categorized as "appropriate", for use in the learning process of students.

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