

## Development of Interactive Learning Media Based on the Aleis (ATC License Exam Information System) Website for Air Traffic Controllers at Makassar Aviation Polytechnic

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**ABSTRACT:** The Air Traffic Management study program has graduate learning outcomes level 5 SKKNI flight traffic guides and Aeronautical information lighting, graduate learning outcomes are realized in the issuance of licenses tested by the directorate of flight navigation. The material tested is knowledge related to the field and science. The purpose of the research is to develop interactive learning media with website-based for license exam preparation and explain how to operate the website called "ALEIS" (Air Traffic Controller License Exam Information System). In this study, using R&D (Research and Development) research with the development of the Plomp model, the results of validation testing on the application show the usability level value of the "ALEIS" (Air Traffic Controller License Exam Information System) application shows that 96% of the "ALEIS" application makes it easier for users. This is in line with the research objectives, namely developing interactive learning media based on the ALEIS (ATC License Exam Information System) website where the website can be used properly and plays a very important role in preparing for the license exam in the air traffic management program.

**KEYWORDS:** ALEIS, License, Learning, website, ATC.

### I. INTRODUCTION

Technology is constantly evolving, changing the lives of humans as individuals, communities, and even nations, even though it is inseparable from global changes. Therefore, humans try to update technology in the education process in order to interact with an ever-changing world. In this day and age, the internet is something that can be said to follow the times and is quite easy to use, the use of the internet in making interactive media for this research is a website. Web-based learning, also called e-learning, is a teaching method carried out with the use of internet networks and it is hoped that web-based learning can help educators and students in achieving a better level of learning.

Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 22 of 2020 concerning the Ministry of Education and Culture's strategic plan states that one of the priorities for education development is increasing the relevance of graduates. Improving the quality of the teaching and learning process and the quality of the output of education programs, and compulsory training and adjusting the role of teaching staff in an education system that implements a darling learning system. The government, the community and education providers/managers must prioritize the education sector.

The Air Traffic Management Study Program is a study program that has graduate learning outcomes focused on

producing graduates with the Air Traffic Controller (ATC) profession and has competence in the field of air traffic management. ATC is a profession in the field of work that functions in providing flight traffic services, such as airplanes, helicopters and others. Aircraft must go through the flight routes (airways) that have been given and are not allowed to deviate from the airways unless they get clearance from ATC, there are navigation aids on the ground and navigation equipment on the aircraft that can be used as a guide so that the aircraft is on the right route, ATC supervision by using radio communication between ATC and pilots or aviators and also assisted by the use of radar, so that the process in aircraft navigation can be helped from the point of departure to the destination.

Cadets as learning subjects have the right to acquire skills that are in accordance with the development of the world of aviation so that graduates of the Makassar aviation polytechnic have competitiveness and can directly implement their knowledge and skills in the world of work. Various ways can be done to improve the quality of education, either by improving the teaching and learning process or providing new concepts and insights. Along with the rapid development of technological science, learning in schools has emerged and developed. As people responsible for the development of human resources (HR), lecturers must keep abreast of new ideas in education.

Learning media is a tool used to assist student and teacher learning (Kosasih and Sumarna, 2013). By conveying learning messages, clarifying the presentation of messages, and overcoming the limitations of space and time, this learning media can enable more varied and encouraging teaching and learning interactions, further Arsyad (2014) states that the use of learning media has a very positive impact on student achievement in achieving the goals of the learning process.

During this time when the license exam will be carried out cadets will re-learn related material that has been obtained. Therefore, it is important to learn by doing practice questions and opening material that has been obtained, so it is necessary to develop interactive learning media based on the ALEIS website (ATC License Exam Information System) at Makassar Aviation Polytechnic where the advantages of the website to be designed are that it can be accessed online via cellphones, computers, and laptops.

## II. RESEARCH METHOD

This research uses the R&D (Research and Development) method, which is a research method that aims to develop and test products that will be used in education (Amali et al., 2019). In R&D, there are various research models that can be used as a reference. In this study, Plomp's development model was used. Plomp (1997: 5) states: "we characterized educational design in short as a method within which one is working in a systematic way towards the solving of a "make" problem." That is, characterizing educational design in short as a method within which one is working in a systematic way towards the solving of a "made" problem." Researchers use Plomp's model for development research.

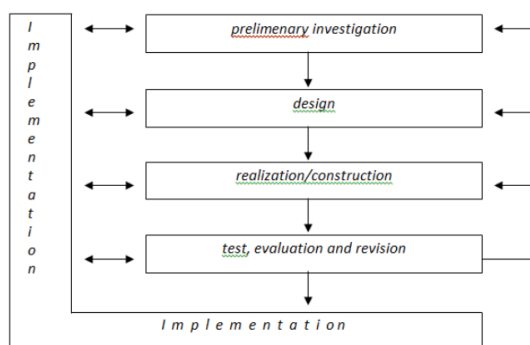


Figure. 1. General Model for Solving Problems in the Education Sector  
Source: Plomp, 1997

Plomp's model consists of preliminary investigation, design, realization/construction, test, evaluation and revision, and implementation phases. The explanation of each phase is as follows:

### A. Preliminary Investigation

Defining the problem is an important part of the design process (defining the problem). In cases where there is a difference between what is happening and the desired situation, the cause must be carefully investigated and explained. The term "preliminary investigation" is also called needs analysis or problem analysis. Plomp and van de Wolde (1992:8) state: "in this investigation important elements are the gathering and analysis of information, the definition of the problem and the planning of the possible continuation of the project." Gathering and analyzing information, defining the problem, and making plans for the continuation of the project are all important parts of the research.

### B. Design

This phase involves the solution in the design, starting from the problem definition. The purpose of the actions in this phase is to design a solution to the problem proposed in the initial investigation phase. The blueprint of the solution is the result of the design. According to Ploom (1997:6) : "characteristic activities in this phase are the generation of alternative (part)solutions and comparing and evaluating these alternatives, resulting in the choice of the most promising design or blue print for the solution." This phase includes the generation of all component solutions, comparing and evaluating the various options, and resulting in the choice of the most promising design or blueprint for the solution.

### C. Realization/Construction

Design is a work plan or blueprint that must be done to achieve a solution in the realization or construction phase. As Plomp (1997:6) states: "in fact, the design is a written out or worked out plan which forms the departure point for the phase in which the solution is being realized or made. This often entails construction or production activities such as curriculum development or the production of audio-visual materials." That is, The written plan or work plan is called design, the departure point for this phase is the solution being realized or made. This stage usually ends with construction or production activities such as curriculum development or the production of audio-visual materials.

### D. Test, Evaluation and Revision

A solution must be tested and evaluated in practice. Evaluation is the process of collecting, processing and analyzing data to determine the value of realizing the solution. Plomp and van den Wolde (1992: 11) state:"without evaluation it can not be determined whether a problem has been solved satisfactorily, in other words, whether the desired situation, as described in the definite formulation of the problem, has been reached."Meaning, A problem cannot be solved satisfactorily without making an evaluation. In other words, has the desired situation been reached as described in the definite formulation of the problem? According to the

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data collected, it can be decided which types of solutions meet the standards and which types of solutions still need to be developed. This indicates that additional activities may be required in the previous phase. This is called a feedback cycle, and is repeated until the desired solution is achieved.

### E. Implementation

The product can be used in a wider unit after evaluation and is called valid, practical, and effective. Plomp (1997: 6) states that: "Solutions have to be introduced, in other words, have to be implemented." Solutions must be introduced. In other words, it needs to be promoted. By conducting follow-up research on the use of the product, this implementation can be done.

Application design is to enter the data that has been collected and enter it into the application so that it makes access to cadets to study material and questions about preparing for the license exam after that data analysis is carried out in the form of matching the contents of the material to be entered into the website, and testing the website online, as well as the entire system contained in the website.

Analysis activities are carried out by collecting information related to questions and license exam materials. Information related to the learning process and learning media development was obtained from the observation activities carried out. Based on the results of the observation activities, the development of interactive learning media using the website. The next activity is to collect documents in the form of questions needed in the development of learning media.

## III. RESULT AND DISCUSSION

This research produces online or website-based license exam preparation learning media products. The product is packaged in the form of a website given to cadets of the Makassar Aviation Polytechnic air traffic management study program which can be used to prepare for the license exam. The readiness of Makassar Aviation Polytechnic cadets in facing the license exam is still lacking due to the lack of material obtained and there is also no benchmark or success rate in taking the license exam.

Analysis activities are carried out by collecting information related to questions and license exam materials. Information about the learning process and learning media development is obtained from observation activities. Based on the results of observation activities, the development of interactive learning media is used in the teaching and learning process of cadets majoring in aviation traffic. The next activity is to collect documents in the form of questions needed in the development of learning media.

### A. Preliminary Investigation.

Identifying the objectives and information requirements of the system to be built is the task performed at this stage. Analyzing user needs will provide information on the

requirements needed to build the calculation system estimation process. In addition, this analysis also serves as a standard in evaluating the success of the system, because the system is considered a failure if it cannot meet user needs (Yufita & Andriani, 2016).

### B. Design

At this stage, the design process and improvements if there are design discrepancies between users and analysts. A user can directly comment if there is a design mismatch and design the system with reference to the user requirements documentation created in the previous stage. This determines the activeness of the users involved to achieve the goal. The software specification stage of the overall system organization, data structure, and other elements. Programming the application with a programming language (visual basic) in accordance with the design that has been made. The following is a system view of the ALEIS (Air Traffic Controller License Exam Information System) website for users as shown in figure 2.



Figure. 2. ALEIS Website For Users

Source: Primary Data

While the ALEIS (ATC License Exam Information System) website system display for the admin is as follows :

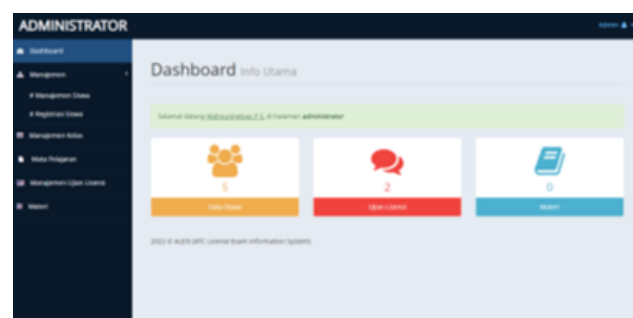


Figure. 3. ALEIS Website for Admin

Source: Primary Data

### C. Realization/Construction

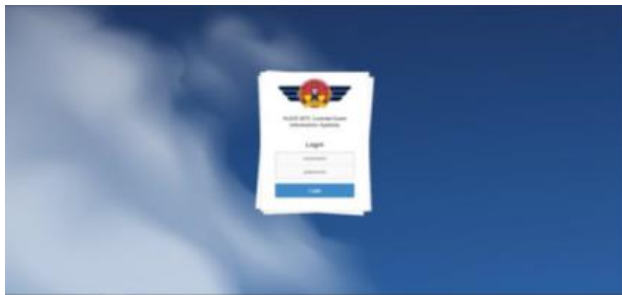
The ALEIS (Air Traffic Controller license exam information system) website has (two) users, namely: Admin and User and each user has several different website menu. On the login page, users are required to fill in their username and password to enter the dashboard as shown in figure 4.

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**Figure. 4. Login User**  
Source: Primary Data

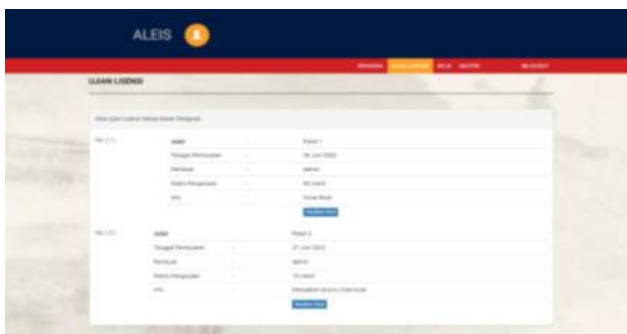
On the login page, the admin must fill in the username and password to enter the dashboard as shown in figure 5.



**Figure. 5. Admin Login**  
Source: Primary Data

## D. Test, Evaluation and Revision

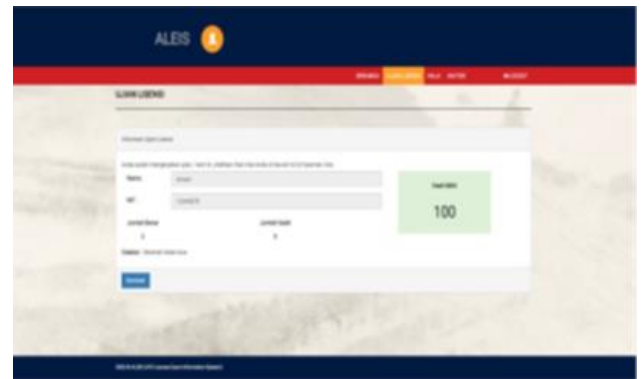
This phase is a stage modified by the researcher from the research method used. At this stage, the researcher will evaluate the license exam website based on the data obtained by the researcher and then analyze it for implementation, whether it is in accordance with the research objectives or not. The license exam menu will display 3 different question packages and consists of 50 questions in each package, users can choose the available package if they want to start the license exam as shown in figure 6.



**Figure. 6. License Exam**  
Source: Primary Data

The value menu will display the test results of participants who have taken the license exam, the number of correct and incorrect data, and notes that will appear automatically if the value is below the standard then it is declared not to pass but

if the value is above the standard then it is declared to pass which is as shown in figure 7.



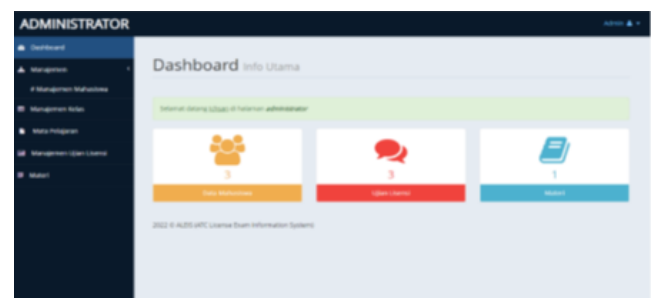
**Figure. 7. Test Score Dashboard**  
Source: Primary Data

## E. Implementation

At this stage, program design development is carried out after the user and analyst are carried out. Before the application is used, the program testing process is carried out for errors. At this stage, users can give their feedback on the system that has been created and approved.

This website is a dynamic website that can be used anywhere, it does not have to be done on campus or in a certain place. This license exam website is used for level 3 air traffic management cadets who want to learn about questions or understanding license exam material or license exam questions. As an admin on the website when successfully logged in, several menus will appear such as the admin dashboard menu, student management, class management, subjects, license exam management, and materials. If you log in as a user, the menu that is displayed on the website will be different from the admin menu.

One of the functions of this license exam website is to make it easier for cadets to relearn questions and materials in preparation for the ATC license exam which will be held at the Makassar Aviation Polytechnic. There are many advantages possessed by this license exam website, one of which is the exam questions which are questions sourced from seniors who have taken the license exam and material sourced from aviation documents.



**Figure. 8. Dashboard Main Menu**  
Source: Primary Data



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The dashboard menu will display student data, license exams, and materials but this dashboard only displays student data, license exams, and materials that are available or that have been entered by the admin as shown in figure 8.

The first analysis carried out through data sourced from questionnaire results is as follows:

1. Does the license exam website have an attractive look and design?

**Table. 1. Website Appearance And Design**

No	Answer	Respondent	Percentage
1	Yes	20	90 %
2	No	2	10 %
Amount		22	100 %

In the table above, there are 90% of respondents who stated that the display design on the website is attractive while 10% of respondents stated that the display design on the website is not attractive.

2. Are the features on the website good?

**Table. 2. Website Features**

No	Answer	Respondent	Percentage
1	Yes	21	95 %
2	No	1	5 %
Amount		22	100 %

The percentage value obtained is  $(21/22) \times 100\% = 95\%$  stated the answer yes to the question above. Respondents' responses to this statement were that the existing website features were classified as good and only 1% stated that the existing website features were not good.

3. Are the questions on the website questions that have been learned before and are easy to understand?

**Table. 3. Understanding of Exam Questions**

No	Answer	Respondent	Percentage
1	Yes	17	77 %
2	No	5	23 %
Amount		22	100 %

In the table above, there are  $(17/22) \times 100\% = 77\%$  of respondents who stated that the questions contained on the website are questions that have been studied before and are easy to understand, while  $(5/22) \times 100\% = 23\%$  stated that the questions contained on the website are questions that have not been studied before and are difficult to understand.

4. Are all features on the website functioning properly?

**Table. 4. Website Appearance And Design**

No	Answer	Respondent	Percentage
1	Yes	21	95 %
2	No	2	5 %
Amount		22	100 %

In the table above, there are  $(21/22) \times 100\% = 95\%$  of respondents who stated that all features on the website work properly while  $(1/22) \times 100\% = 5\%$  of respondents stated that all features on the website do not work.

5. Is the operation of this website easy to understand and not confusing?

**Table. 5. Website Operation**

No	Answer	Respondent	Percentage
1	Yes	20	90 %
2	No	2	10 %
Amount		22	100 %

In the table above, there are  $(18/22) \times 100\% = 82\%$  of respondents who stated that the operation of this website is easy to understand and not confusing while  $(4/22) \times 100\% = 18\%$  of respondents stated that the website operation is difficult to understand.

In questionnaire research, researchers collect data on usability test results according to aspects of usefulness, ease to learn, ease to use, and satisfaction with the "ALEIS" website.

**Table. 6. Recapitulation Of Respondents' Answer**

Assessment Items	Answer	
	Yes	No
1	20	2
2	21	1
3	17	5
4	21	1
5	18	4
Amount	97	13

To find out the position of the percentage of "YES" and "NO" answers from the questionnaire, it can be placed in the following percentage scale range:

Answer value. "Yes" : 1

Answer value. "No" : 0

Converted in percentage :

Average answer value "Yes"

$$\frac{97}{110} \times 100\% = 88\%$$

110

Average answer value... "No"

$$\frac{13}{110} \times 100\% = 12\%$$

110

Based on the results of the Guttman scale questionnaire, it can be said that the suitability point above is 88%, so it can be concluded that this license exam website is needed by cadets to help understand license questions and materials.

## CONCLUSIONS

According to the results and previous discussion, it can be concluded:

1. The design of interactive learning media "ALEIS" as an alternative that utilizes website-based information technology features a license exam designed using programming languages and applications.
2. When opening the website, the initial display will be shown in the form of a dashboard, license exam, value, material, and logout. If you want to enter "ALEIS" then you need to register an account on the register menu. After successfully registering an account, you can then log in so that you can access the "ALEIS" application and can carry out the license exam and download the available materials.
3. The results of validation testing on the application show the usability level value of the "ALEIS" application based on aspects of usefulness, ease to learn, ease to use and satisfaction, indicating that 96% of the "ALEIS" (ATC License Exam Information System) application makes it easier for users.
4. The development of interactive learning media based on the ALEIS website (ATC License Exam Information System) for air traffic controllers at the Makassar aviation polytechnic is dynamic, it can be used anywhere, it does not have to be done on campus or in a certain place. This license exam website is very helpful for cadets, especially air traffic management study programs who want to take a license exam.

## ACKNOWLEDGMENT

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