



### AIRFIELD LIGHTING VIRTUAL REALITY FOR EDUCATION IN MAKASSAR AVIATION POLYTECHNIC

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**Abstract.** Airport Technology encompasses learning outcomes including Airport Mechanical Technician, Building and Foundation Technician, and Airport Electrical Technician. Graduates are expected to operate and maintain electrical, mechanical, building, and runway equipment in accordance with standard operational procedures and applicable regulations, particularly mastering the Airfield Lighting System (ALS). This study was conducted at Makassar Aviation Polytechnic in 2023, utilizing a Likert scale to assess student satisfaction regarding the use of virtual reality devices for ALS. The assessment results indicated that the Application and Device indicators received a score of 409 out of 480, Appearance scored 412 out of 480, Language achieved 296 out of 360, Content received 694 out of 840, and Usage scored 885 out of 1080. All indicators demonstrated a calculated  $r$  value greater than 0.388. In conclusion, the application of virtual reality technology in airfield lighting is highly conducive to education and training, enhancing skills in this area.

*Keywords* : Virtual reality, Airfield Lighting, Education, Simulation

#### A.INTRODUCTION

Airport Technology has learning outcomes, namely: Airport Mechanical Technician, Building and Foundation Technician, and Airport Electrical Technician (Nugroho, 2021), where the graduate profile must be able to operate and maintain electrical, mechanical, building, and runway equipment according to standard operational procedures and applicable regulations, one of which is

equipment. The flight navigation that must be mastered is the Airfield Lighting System (ALS).

The Airfield Lighting System (ALS) is a visual landing aid that assists and serves aircraft taking off, landing, and taxiing so that they can move efficiently and safely (Purbo Wartoyo & Muhammad, 2023). In terms of AFL learning, students are less able to understand and master the skills of dismantling, assembling and placing runway lights according to their point and function.

In this research, the author created a virtual reality airfield lighting simulation where students can use and simulate the runway lighting system (Falk et al., 2020) so that they can know how students respond to the equipment..

### B.METHOD

This experiment was carried out at Makassar Aviation Polytechnic in 2023 where the author used a Likert scale to assess the level of satisfaction in terms of use by students

The Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. In research, this social phenomenon has been specifically determined by the researcher, which is hereinafter referred to as the research variable.

With a Likert scale, the variables to be measured are described into indicator variables, then the indicator variables are used as a starting point for compiling instrument items which can be in the form of statements or questions.

Table 1. cadet response instrument grid

NO	INDICATOR	ASSESSMENT ASPECTS	ITEM OF STATEMENT	AMOUNT
1	Applications and Devices	ease of use, interactivity, features and connectivity	1,2,3,4	4
2	Appearance	form of equipment, clarity, description and title as well as how to use it	5,6,7,8	4
3	Content	material accuracy, systematicity, depth, suitability to learning objectives	9,10,11,12,13,14,15	7
4	Language	clarity of the language used, and the explanation	16,17,18	3
5	Reaction to Use	Ability to support practical work on dismantling, assembling and placing airfilled lighting	19,20,21,22,23,24,25,26,27	9

The answer to each instrument item using a Likert scale has a gradation from very positive to very negative. In this study we used a checklist form.

Example of a check list form

Give a statement according to your opinion, by putting a mark (V) in the column provided

Table 2 example of a cadet response instrument

NO	ASSESSMENT ASPECT	ASSESSMENT SCORE				
		SD	NA	D	A	SA
1	I easily learned to use the Virtual Reality Airfield Lighting System				V	

SA = Strongly Agree Score 5

A = Agree Score 4

D = doubtful Score 3

NA = Not Agree Score 2

SD =strongly disagree Score 1

Then, using a questionnaire data collection technique, for example, the instrument is given to 100 cadets. Of the 100 cadets, after data collection, analysis is carried out, for example;

25 people answered SA, 40 people answered A, 5 people answered D, 20 people answered NA, 10 people answered SD

Based on this data, 65 people (40+25) or 65% of cadets answered agree and strongly agree, so the conclusion is that the majority of employees agree with the new learning method

The interval data can also be analyzed by calculating the average answer based on the suspension of each answer from the respondent, based on the predetermined score it can be calculated as follows

Total score for 25 people who answered SA =  $25 \times 5 = 125$

Total score for 40 people who answered A =  $40 \times 4 = 160$

Total score for 5 people who answered D =  $5 \times 3 = 15$

Total score for 20 people who answered NA =  $20 \times 2 = 20$

Total score for 10 people who answered the SD =  $10 \times 1 = 10$

Total Ideal Score (Criteria for all of item =  $5 \times 100 = 500$  (if everyone answered SA), the total score obtained from the research = 350, so based on that data the level of approval for the new learning method is determined =  $(350) \times 100\% = 70\%$  than expected (100%)

The continuum can be described as follows

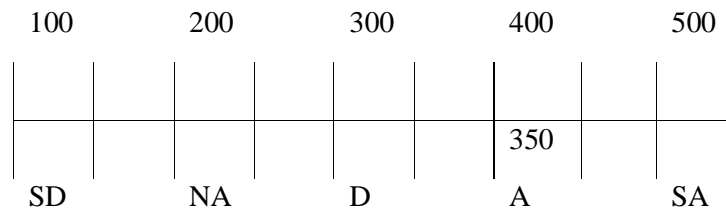


Figure 1. example of assessment scheme

So based on data obtained from 100 respondents, the average is in the agree area (Sugiyono, 2018)

### C.RESULT AND DISCUSSION

#### Result

From the results of the cadet responses it was found that

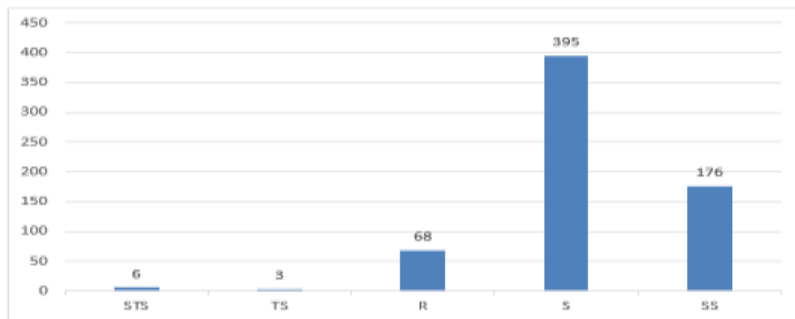


Figure 1. Results of Cadet Responses

In terms of applications and devices Aspect

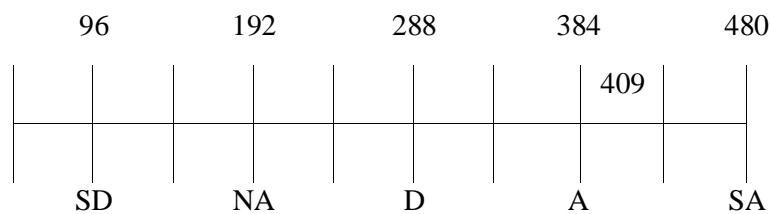


Figure 2. Device and application rating scale

Table 3. device and application assessment results

NO	INDICATOR	ASSESSMENT ASPECT	ASSESSMENT SCORE	MAXIMUM SCORE	ZONE
1	Applications and Devices	Ease of use, interactiveness, features and connectivity	409	480	Strongly Agree

In Term Appearance Aspect

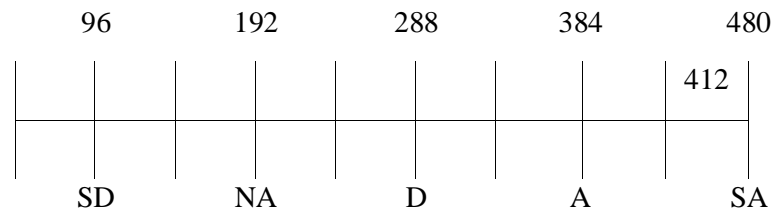


Figure. 3 Appearance aspect rating scale

Table 4. Appearance Assesment Result

NO	INDICATOR	ASSESSMENT ASPECT	ASSESSMENT SCORE	MAXIMUM SCORE	ZONE
2	appearance	Form of equipment, clarity, description and title and how to use it	412	480	Strongly Agree

In term Of Content Aspect

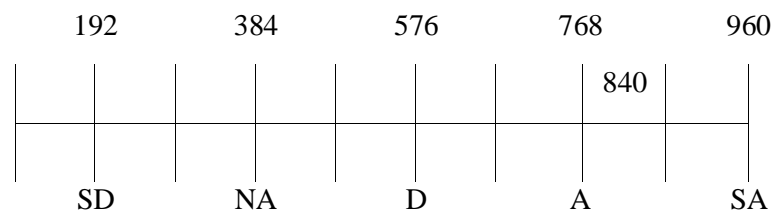


Figure 4. Content aspect assessment scale

Table 5. Content Aspect Assesment Result

NO	INDICATOR	ASSESMENT ASPECT	ASSESMENT SCORE	MAXIMUM SCORE	ZONE
3	Content	Material accuracy, systematicity, depth, suitability with learning objectives	694	840	Strongly Agree

In terms of language Aspect

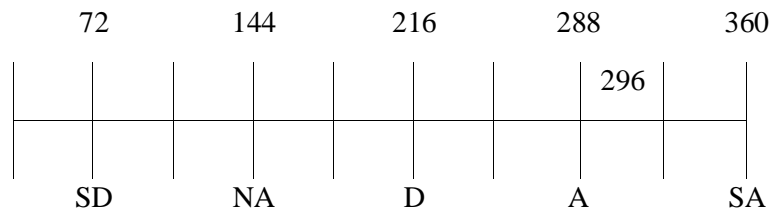


Figure 5. Language Aspect Assesment Scale

Table 6. Language Aspect Assesment Result

NO	INDICATOR	ASSESMENT ASPECT	ASSESMENT SCORE	MAXIMUM SCORE	ZONE
4	Language	Clarity of the language used and its explanation	296	360	Strongly Agree

In terms of reaction to use Aspect

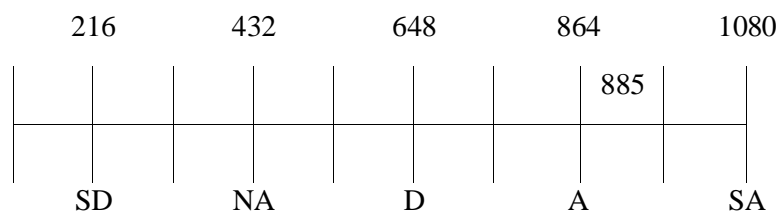


Figure 6. Reaction to use aspect Scale

Table 8. Reaction to use assessment result

NO	INDICATOR	ASSESSMENT ASPECT	ASSESSMENT SCORE	MAXIMUM SCORE	ZONE
5	Reaction to Use	Ability to support practical work on dismantling, assembling and placing airfield lights	885	1080	Strongly Agree

SA	= Strongly Agree	= skor 5 x (181 responden)
A	= Agree	= skor 4 x (395 responden)
D	= Doubtful	= skor 3 x (68 responden)
NA	= No Agree	= skor 2 x (3 responden)
SD	= Strongly Disagree	= skor 1 x (6 responden)
Total		= 2696, expected total 3240

So, based on this data, the level of approval for learning media in the form of virtual reality =  $(2696:3240) \times 100\% = 83.21\%$  of what was expected (100%)

The continuum can be described as follows:

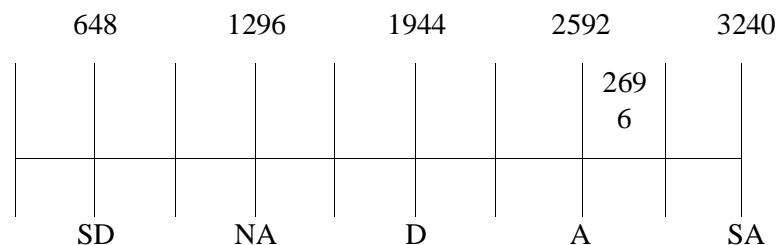


Figure 7. Scale Level Approval for Learning media Virtual Reality

So, based on the data obtained, the average is in the strongly agree area

### Discussion

From the lecturer response instrument table above, the learning media in Virtual Reality for the Airfield Lighting System course received a very good response from cadets as the main learning object.

It can be seen from the Application and Device indicators, where the assessment results obtained an assessment score of 409 out of a maximum score of 480, which is in the strongly agree zone which proves that applications and devices can be connected well, easy to use, simple to operate (Mardoyo et al., 2022), high



level of interactivity and available features(Wang, 2023). On the Airfield Lighting System supporting equipment clearly (explanation of each program in detail).

From the appearance aspect, it received an assessment score of 412 out of a maximum score of 480, which is in the strongly agree zone, indicating that the appearance of the Airfield Lighting System supporting equipment is attractive and easy to carry or move, the shape of the equipment is precise and clear, the media has titles and descriptions and there are ways to use the media(Setiawan et al., 2022).

From the content aspect, it got an assessment score of 694 out of a maximum score of 840, which is in the strongly agree zone, which shows that the selection of the right material, the order of the material is consistent and systematic, the material is discussed in depth, the material can be understood easily(Putrilan Adinda et al., 2016), the practice questions are easy to access, Suitability of practice questions to the material, consistent learning objectives.

From the language aspect, it got a score of 296 out of a maximum score of 360, which is in the strongly agree zone, which explains that the instructions in working on the practice questions are presented, the language used in the material is clear, there is motivation to learn in the appearance and material(Lavoie et al., 2021).

From the usage aspect, it got a score of 885 out of a maximum score of 1080, which is in the strongly agree zone, which states that the cadets are motivated to practice using the Virtual Reality Airfield Lighting System(Garduño et al., 2021), which can disassemble, assemble, and know the placement points for Runway Light, taxiway light, approach light, inset light in the Airfield Lighting System after using virtual reality practicum media, cadets can solve practical problems found, cadets can present practice results well, can evaluate practice results together, and personal knowledge increases as a result of learning using the Virtual Reality Airfield Lighting System(Papanastasiou et al., 2019).

From all aspects and indicators, the assessment received a total score of 2696 out of 3240, namely 83.21% of what was expected, proving that the application and device, appearance, content, language, and reactions to using this virtual reality media were very well received and increased the skills of the cadets(Magister et al., 2024). In carrying out practicums and causing cadets to be motivated to practice using learning media in the form of Virtual Reality.

Based on the results of the validity test on the Cadet Response Instrument, it is known that all indicators of the Cadet Response Instrument have a calculated r value  $> 0.388$ . So that all indicators are declared feasible or valid.





### D.CONCLUSION

The student assessment results found that from the Application and Device indicators, the assessment results got an assessment score of 409 out of a maximum score of 480, which was in the strongly agree zone. From the appearance aspect, they got an assessment score of 412 out of a maximum score of 480, which was in the strongly agree zone. From the language, aspect receives a score of 296 out of a maximum score of 360, which is in the strongly agree zone; from the content aspect, it gets an assessment score of 694 out of a maximum score of 840, which is in the strongly agree zone, from the usage aspect it receives a score of 885 out of a maximum score of 1080 which is in the strongly agree zone and all indicators of the Cadet Response Instrument have a calculated  $r$  value  $> 0.388$ . Based on the research results, it was found that virtual reality airfield lighting in terms of application and enhancement, in terms of appearance, in terms of language, in terms of aspects/content, and terms of usage is very amenable to its use and can be used in education and training to improve skills, especially in terms of airfield lighting

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