

## Semaphore AR card: Interactive scout learning media

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### ABSTRACT

This development was triggered by issues related to the lack of interest and enthusiasm of students toward Scout extracurriculars, especially in the Semaphore material aspect. This research aims to produce and implement a Scout educational media design based on augmented reality (AR) Cards and evaluate the responses given by students and coaches. This research applies a Research and Development (R&D) method approach by following the ADDIE development model framework. Research subjects included class X students and extracurricular Scout teachers at Vocational High School 2 Singaraja. The final product of this development is an augmented reality application and Card that can be used on smartphone devices that use the Android operating system. The final results of the research showed very positive achievements, with the black box test producing a success rate of 100%. Validity testing by content experts and media experts Semaphore AR Card got a score of 1.00, indicating a very high level of validity. Likewise, an evaluation of users, which includes both students and trainers, using the UEQ assessment, resulted in a rating of "Excellence" in 6 aspects, including attractiveness, clarity, efficiency, accuracy, stimulation, and novelty. The recommendations from this research are expanding use to various school levels as well as user training to ensure effective use and in-depth understanding. Overall, the developed Scout Semaphore AR Card educational media can be considered a learning tool that is suitable for use in carrying out scouting activities.



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## INTRODUCTION

The Scout Movement is a form of informal education that is carried out voluntarily, is non-political, and is open to all groups regardless of racial, ethnic, or religious background (Panjaitan et al., 2020). To support the moral development of students through the Scout Movement Scouts, the government has stipulated the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 63 of 2014 concerning Scouting Education, which makes it a component that must be followed in a series of extracurricular activities at the elementary and secondary education levels.

State Vocational School 2 Singaraja is located on Jalan Srikandi, No. 9, Singaraja, and focuses on education in the tourism and beauty sectors. Grade X students are required to be involved in extracurricular activities as a requirement to participate in the Final Semester Assessment (Susanti,

2021). The principal (Kamabigus) and scoutmaster are responsible for organizing and implementing scouting education in the school environment (Arifin et al., 2018). Scout leaders can be class teachers or subject teachers who have a basic advanced course certificate, or individuals who meet the requirements as scout leaders according to the Minister of Education and Culture Regulation No. 63 of 2014.

In extracurricular Scouting activities, there are various teaching materials taught, including knowledge and skills called scouting techniques (Tekpram), which are an important part of the scouting education structure. One of the basic skills included in Tekpram is Semaphore (Syahrul et al., 2019). Semaphore is a communication method that involves the use of flags, paddles, sticks, hand gestures, or gloves to send and receive messages (Gumilang & Fachrie, 2020). In the context of current scouting education, generally using a pair of red and yellow flags is the main tool. This Semaphore skill is considered one of the basic competencies that must be mastered in scouting education.

Based on the results of preliminary interviews conducted by the researcher together with a Scouting extracurricular activity supervisor at Vocational High School 2 Singaraja, several findings obtained include 1) The involvement of all 505 grade X students in mandatory Scouting extracurricular activities, plus 32 students who took Scouting extracurricular activities as an option. 2) The teaching materials used in the teaching process are limited to the material contained in the Scout pocketbook or the Requirements. General Competence (SKU). 3) The process of delivering scouting materials still uses traditional (conventional) methods provided by instructors or students who participate in Scouting extracurricular activities, so that students' enthusiasm for involvement in Scouting extracurricular activities, both mandatory and optional, is not very high. 4) The short duration of time in delivering the material results in students not being able to understand and memorize the movements required in Semaphore, both letters and numbers, properly.

In addition to conducting interviews with instructors, researchers also distributed questionnaires regarding student needs through the Google Form platform, and the number of respondents reached 32 students. Data collected from the questionnaire showed that 83.7% of students experienced occasional boredom when instructors used learning media in delivering materials. As many as 56.3% of students expressed their happiness when learning materials were accompanied by images or animations that could facilitate the explanation of concepts. In addition, 90.6% of students felt it was important to have easy access to learning media via smartphones. Furthermore, as many as 85% of students stated that they already had devices such as computers, laptops, or smartphones. Based on the results of this questionnaire, it can be concluded that students felt less interested in learning Semaphore because the learning media used felt less entertaining and monotonous, with a large portion focused on text.

Referring to the problems that have been explained previously, one of the options that can be used as a solution is to utilize learning media as a supporting tool in the student education process, both when they are learning independently and when guided by teachers (Budiman, 2017). This idea is similar to the view expressed by Kamiana et al., (2019), which reflects the influence of the development of information and communication technology in the context of the teaching and learning process, which involves an increase in the variety of learning resources and learning tools. A similar opinion is also found in a study conducted by Widiyanti & Ansori (2020), which highlights that the use of learning media can increase students' enthusiasm for learning.

Research with the same focus on the development of augmented reality learning media for the topic of Semaphore has been previously conducted (Azmi, 2020). The results of this research indicate that augmented reality technology can act as an effective teaching tool in introducing the use of Semaphore codes to students (Antriyanti, 2017). However, this study has several weaknesses, including the absence of practice questions that emphasize the content of the Semaphore material itself. A study with a similar focus was also realized in the research conducted by Hamdani & Hendriyani (2022), which produced learning media that can be accessed via smartphone devices and supports students' understanding of Semaphore. In addition, other research on the development of augmented reality-based learning media has been conducted by Harta et al., (2021), and received

positive responses from teachers and students. The media they developed was considered interesting and easy to use in the learning process.

This research contributes to the provision of independent learning media about scouting. Although this study has positive values, the researchers also provide recommendations for further research to expand the scope of Semaphore material and go deeper into understanding the concept, as well as to include exercises in composing words with Semaphore.

## METHOD

A study on the development of AR Card Scout Education Media Semaphore is done through a Research and Development approach, commonly known as the Research and Development (R&D) method. Furthermore, this study applies a development model known as the ADDIE model (Sadiman et al., 2009). As stated by Kamiana et al., (2019), the ADDIE development model refers to a system-based, efficient, and interactive learning design approach. This allows the evaluation results at each stage to guide the improvement and development of learning at the next stage so that the resulting product becomes more valid and reliable. The final result of this research is the creation of a product in the form of Scout learning media based on augmented reality technology aimed at understanding Semaphore material.

This research was conducted at Vocational High School 2 Singaraja, with research subjects involving students from class X of Vocational High School 2 Singaraja and also Scout extracurricular instructors. The process of compiling the Scout Semaphore AR Card educational media product in this study refers to the ADDIE development model framework structure. This ADDIE model has a structure that is divided into five main stages, namely analysis, design, development, implementation, and assessment (Sweller, 2021). It is important to note that in this ADDIE model, the evaluation process can be applied at every stage of product development (Sugiyono, 2015).

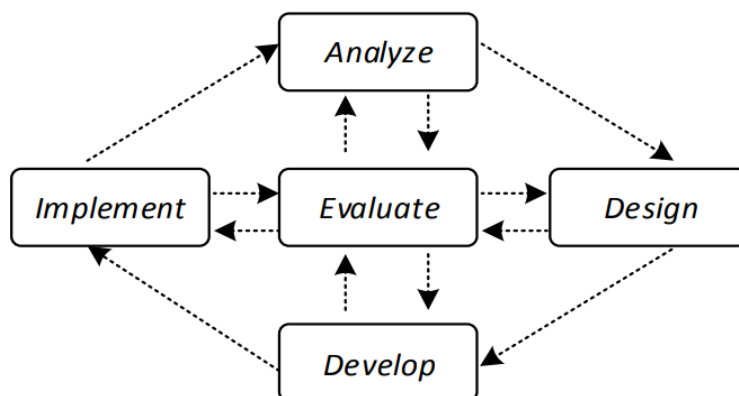


Figure 1. ADDIE Model (Dick & Carey, 1996)

In the ADDIE development model used in this study, the explanation of each stage of the ADDIE model is as follows.

### 1. Analysis

The analysis stage in the ADDIE model aims to collect information to ensure that the product being developed is in accordance with the needs and expectations of the target, with a focus on analyzing student characteristics, learning, learning resources, and student needs using appropriate and relevant data collection techniques.

### 2. Design

The design stage in the ADDIE development model involves creating a design for the appearance and functionality of a learning application that is easy to use, including creating flowcharts, software designs, architectures, and software interfaces that suit user needs.

### 3. Development

The development stage in the ADDIE model involves the creation of augmented reality-based educational media for Semaphore material, with steps such as 3D object modeling, marker

creation, and validity testing by content experts and media experts to ensure the validity and suitability of the content. Evaluation is carried out through black box testing to ensure the function of the software and questionnaires evaluated by Scout leaders and supervising lecturers, with a minimum of two experts in their respective fields to ensure the validity and effectiveness of the learning media.

4. Implementation

At the implementation stage of the ADDIE model, the augmented reality learning media product was tested in the field to obtain an overview of the experience of use in extracurricular Scout learning, with a focus on the practicality of the media and the responses of students and instructors which were evaluated through the User Experience Questionnaire (UEQ) in six main aspects.

5. Evaluation

The evaluation stage in the ADDIE model is carried out in stages, including expert testing for the validity of the design and product of learning media and user response testing to ensure that the learning media is in accordance with the learning objectives and needs that have been designed. This evaluation ensures that each stage in the development of learning media is to the plan that has been set.

The data collection process using interview techniques aims to explore information on learning resources currently being used by Scout extracurricular instructors as learning resources and teaching materials. Content experts and media experts carry out the use of questionnaires to ensure the validity of learning content, then continue with user response tests, namely instructors and students. Then for the analysis of student and instructor response data using UEQ (User Experience Questionnaire). The tabulation of content and media validity test data using the Gregory formula can be seen in Table 1.

Table 1. Gregory Test Matrix

No.	Expert 1		Expert 2	
	Not Relevant	Relevant	Not Relevant	Relevant
1	A	B	A	B
2	C	D	C	D

After the validation process using the Gregory formula, the level of validity is then determined by referring to the criteria or validity coefficients listed in Table 2 below.

Table 2. Media Validation Criteria

No.	Validity Coefficient	Validity Level
1	0.91 – 1.00	Very High
2	0.71 – 0.90	High
3	0.41 – 0.70	Enough
4	0.21 – 0.40	Low
5	0.00 – 0.20	Very Low

Next, in order to evaluate user responses, predefined categories were used for each aspect of the UEQ, which can be found in Table 3.

Table 3. UEQ Aspect Category

Aspect	Category				
	Excellent	Good	Above Average	Below Average	Bad
Attractiveness	$\bar{X} \geq 1.75$	$1.52 \leq \bar{X} < 1.75$	$1.17 \leq \bar{X} < 1.52$	$0.7 \leq \bar{X} < 1.17$	$\bar{X} \leq 0.7$
Clarity	$\bar{X} \geq 1.9$	$1.56 \leq \bar{X} < 1.9$	$1.08 \leq \bar{X} < 1.56$	$0.64 \leq \bar{X} < 1.08$	$\bar{X} \leq 0.64$
Efficiency	$\bar{X} \geq 1.78$	$1.47 \leq \bar{X} < 1.78$	$0.98 \leq \bar{X} < 1.47$	$0.54 \leq \bar{X} < 0.98$	$\bar{X} \leq 0.54$
Accuracy	$\bar{X} \geq 1.65$	$1.48 \leq \bar{X} < 1.65$	$1.14 \leq \bar{X} < 1.48$	$0.78 \leq \bar{X} < 1.14$	$\bar{X} \leq 0.78$
Stimulation	$\bar{X} \geq 1.55$	$1.31 \leq \bar{X} < 1.55$	$0.99 \leq \bar{X} < 1.31$	$0.5 \leq \bar{X} < 0.99$	$\bar{X} \leq 0.5$
Novelty	$\bar{X} \geq 1.4$	$1.05 \leq \bar{X} < 1.4$	$0.71 \leq \bar{X} < 1.05$	$0.3 \leq \bar{X} < 0.71$	$\bar{X} \leq 0.3$

## RESULTS AND DISCUSSION

### Results

Study (research) on the Development of Scout Educational Media Semaphore AR Card following the ADDIE research and development model (Analysis-Design-Development-Implementation-Evaluation) and creating results in the form of a Scout education application based on Semaphore AR cards. Below, we present the results of research related to the development process using the ADDIE model.

### Analysis Stage

The first stage in the ADDIE development model is analysis. In the context of this research, researchers conducted an analysis to identify problems and potential solutions related to students, including an analysis of student characteristics, characteristics of learning processes, learning resources, and student needs.

The results of the analysis of student characteristics show that students often feel bored when participating in extracurricular Scout learning, especially Semaphore material, which of course has an impact on the learning process when students do not pay attention to what is conveyed by the instructor. Then the results of the learning analysis are that learning on Semaphore material is difficult to understand if explained with theory alone. Students also have difficulty demonstrating Semaphore movements if they do not understand and memorize the movements that have been explained by the instructor. Furthermore, the data obtained from the analysis of teaching materials refers to the learning sources used in the Scout extracurricular learning process, especially on Semaphore material. These sources consist of Scout pocketbooks or SKU (General Proficiency Requirements) and Boyman's Book (Sunardi, 2016). Finally, an analysis of student needs was also carried out, namely that students need a learning media that can introduce letters and numbers in Semaphores using AR technology.

### Design Stage

The application display design and its contents are designed according to the needs at the analysis stage. In addition, the design stage also focuses more on creating a system that is easy to use and understand by users. This design stage consists of the stages of creating an application design (flowchart), software functional design, software architecture design, and software interface design. The application design aims to present the logical flow and process of the application visually and easily understood. Then continued with the creation of a functional design of the software consisting of a use case diagram that functions to describe the interaction between actors and functions of a system that can be seen in Figure 2.

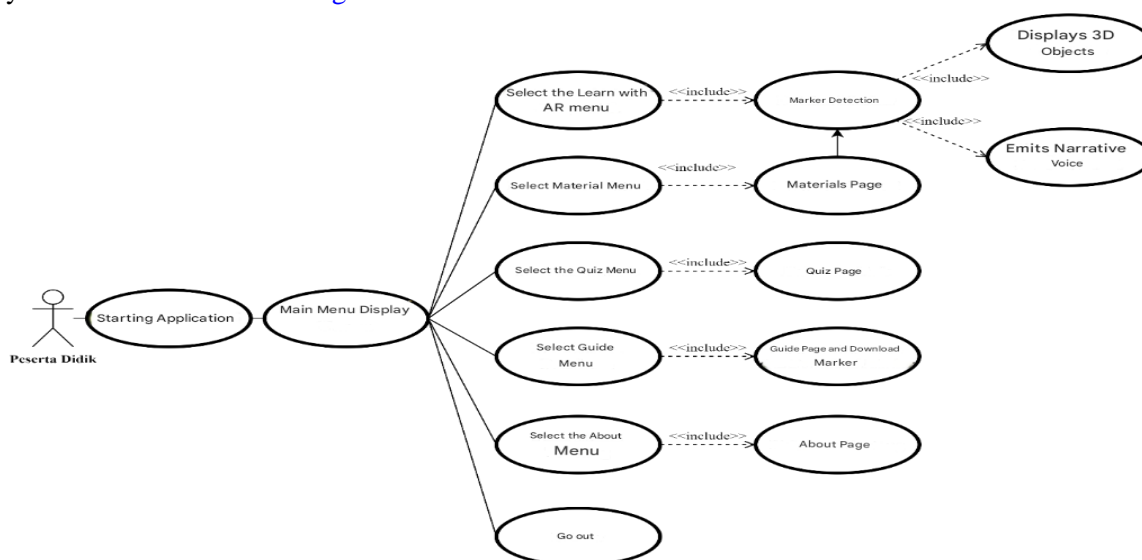


Figure 2. Use Case Diagram Media Augmented reality Semaphore

After the use case diagram is complete, the next step is to create a use case scenario for each case or feature. A Use Case scenario is a sequence of steps or interactions between actors and systems that explain how use cases are run (Jannah, 2009). Then, after the use case scenario is completed, the next step is to re-create the design of the activity diagram which is used to describe in more detail the interactions or activities carried out between the system and the actor or user. The interface design has also been created at this design stage. The goal is to create an interface that is easy to use, intuitive, efficient, and attractive to users. The appearance of the interface design of this application can be seen in Figure 3.



Figure 3. Main Menu Page Interface Design

In addition to designing the main menu page interface, the researcher also designed the main feature page of this application, namely the AR menu page, which can be seen in Figure 4.

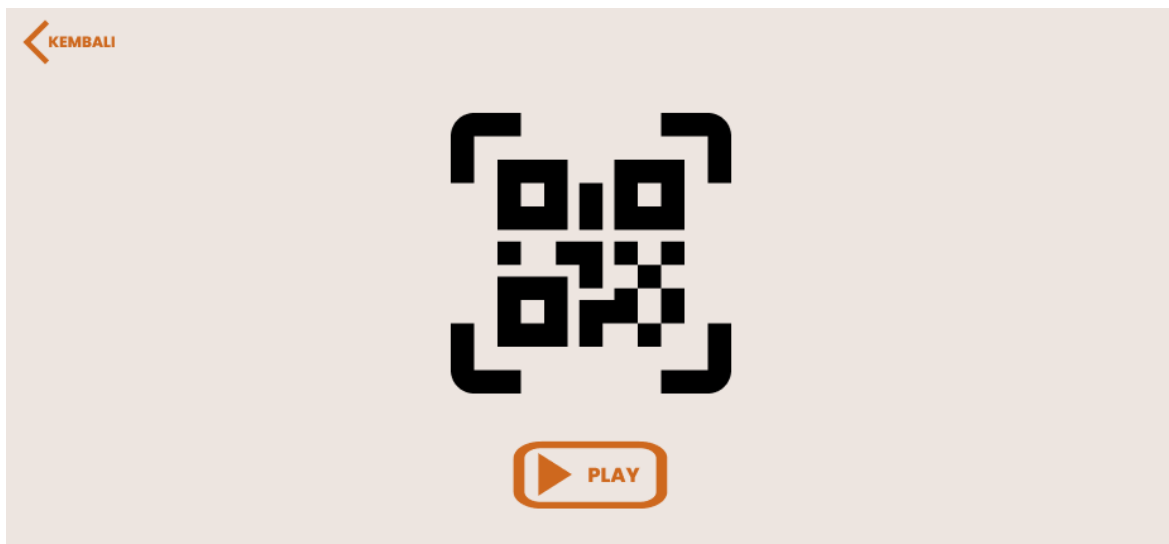


Figure 4. AR Menu Display Design

### Development Stage

In the third stage in the ADDIE model, called the development stage (Pegi, 2020), the design previously made in the design stage will be run and implemented into an augmented reality media that focuses on Semaphore material. This process is carried out by utilizing development tools such as Unity 3D, Vuforia, Blender, and other development tools. For more details, see the description below.

- a) Creating a User Interface for an Application. The purpose of creating a user interface is to create a positive and efficient user experience in using an application or system.
- b) Marker Creation. AR (Augmented reality) markers are used as references or markers that help the AR system track and recognize objects in the real world.
- c) Character Creation. Character creation is done using the Blender application. This character is the main object in augmented reality media. Semaphore.
- d) Semaphore Flag Object Creation. Semaphore flag creation is done using the Blender application. The flag colors that researchers use are red and yellow which are called Oscar flags.
- e) Making Animation of Letter and Number Movements on Semaphore. In the process of making animation of letter and number movements on Semaphore, researchers use the Blender application, starting from rigging to making animations per letter or number.
- f) Database Creation Marker with Vuforia Engine. In the process of creating a marker database, the author uses the help of the website from the Vuforia Engine, then the researcher uploads the markers that have been created into the database.
- g) Merging All Assets Into An Application Using Unity 3D. In the process of building an augmented reality application Semaphore, researchers use the help of the Unity 3D application. In the Unity 3D application, researchers combine assets, create features of the application, add back sound, add sound effects, and provide functions or commands using the C# programming language.

The results of the development process that has been carried out have produced educational media for Scouts Semaphore AR Card. In the initial format of this opener or main page, users will wait for 5 seconds before they can enter the main menu display. When they can enter the main display, the main menu page will appear which can be seen in [Figure 5](#). On the main menu, there are several buttons such as the Learn with AR button, the Semaphore Material button, the Semaphore Quiz button, the Exit button, the Guide button, the About button, and the Background sound.



[Figure 5](#). Main Menu Page View

The main feature of this application is located on the "Learn with AR" button, which when clicked will display the option to choose the "Recognizing Letters and Numbers" menu or the "Compiling Words" menu. The recognizing letters and numbers menu is used to introduce the shape of letters and numbers in Semaphore using AR. The composing words menu is used to find out the Semaphore movement in the form of words. However, before using this feature, users must scan the marker provided on the instructions page located on the main menu. The appearance of the marker from this application can be seen in [Figure 6](#) and [Figure 7](#). Meanwhile, the appearance of these two main features can be seen in [Figure 8](#), [Figure 9](#) for the recognizing letters and numbers feature, and in [Figure 10](#), [Figure 11](#) for the composing words feature.



Figure 6. Marker Display for Recognizing Letters and Numbers



Figure 7. Word Arrangement Marker Display



Figure 8. Display of the Letter or Number Input Menu in the Recognizing Letters and Numbers Menu



Figure 9. 3D Animated View of Recognizing Letters and Numbers



Figure 10. Word Input Display on the Word Composing Menu



Figure 11. 3D View of Word Formation Animation

After the development process is complete, tests are carried out to ensure that the developed application is appropriate and runs well (Wiharto & Budihartanti, 2017). The tests carried out include black box testing, evaluation by content experts, and evaluation by media experts. The following is an explanation of each of these tests.

Testing of Case Study 1 aims to test the validity of the journey of the Semaphore AR Card Scout educational media process, while testing of Case Study 2 is carried out to assess whether the Semaphore educational media application that has been developed runs well and can be used by other users. The results of this black box test obtained a success percentage of 100%.

The content expert test was conducted on July 11-12, 2023. This testing activity was carried out by experts or content experts who aimed to ensure the suitability of the content of the material implemented in the Semaphore AR Card Scout educational media based on what had been determined or was by related sources. This evaluation was carried out by two experts in their fields, namely Mr. I Kadek Suputra Ekajana, S.Pd.SD., M.Pd., who also serves as a member of the Bina Muda Kwartir Karangasem Branch and serves as the first content expert, and Mr. I Gede Tangkas



Dyana Jatinegara, S.Pd., M.Pd., who is one of the Scout extracurricular instructors at Vocational High School 2 Singaraja and acts as the second content expert in this assessment. The testing carried out was by directly operating the Semaphore Scout educational media AR Card and content experts provided assessments related to the appropriateness of the content, language, and presentation of information using a questionnaire instrument. By referring to the results of data processing from the assessment by content experts, the Gregory formula can be used to measure the level of validity of the Semaphore AR Card Scout educational media. Then get the results as in [Formula 1](#).

$$Validity_{of\ Content} = \frac{D}{A + B + C + D} = \frac{12}{0 + 0 + 0 + 12} = 1.00 \quad (1)$$

Based on the assessment results from content experts that have been explained in the calculation above, it is then continued by converting using the table of content validity level criteria in [Table 2](#), so it is known that the level of validity of the Semaphore AR Card Scout educational media is in the "Very High" category.

Furthermore, the media expert test was carried out on July 13-14, 2023. This media expert test activity aims to assess the Semaphore AR Card Scout educational media in terms of content and appearance in order to determine whether the Semaphore AR Card Scout learning media is worthy of being field tested or not. The results of the media expert test are based on a questionnaire that has been filled out by 2 media experts, namely Mr. I Nengah Eka Mertayasa, S.Pd., M.Pd. from the Informatics Engineering Education study program as media expert 1 and Mr. Gede Ari Adnyana, S.Pd. from Ganesha Inovasi Teknologi as media expert 2. Based on data from the tabulation results of the media expert test assessment, the Gregory formula can be used to obtain the level of validity of the Semaphore AR Card Scout educational media. Then get the results as in [Formula 2](#).

$$Validity_{of\ Content} = \frac{D}{A + B + C + D} = \frac{16}{0 + 0 + 0 + 16} = 1.00 \quad (2)$$

By referring to the evaluation that has been explained by the media expert in the previous calculation, it is then continued by converting using the table of content validity level criteria in [Table 2](#), so that it is known that the level of validity of the Semaphore AR Card Scout educational media is in the "Very High" category. Thus, the Semaphore AR Card Scout educational media can be declared very valid and suitable for use in scouting activities.

### **Implementation Stage**

The fourth stage in the ADDIE model is to implement. In this case, the Semaphore augmented reality media has been developed and has been tested black box, and expert tests and has been improved according to input and suggestions from the experts, then the user response test will be carried out.

The result of the implementation stage is an augmented reality media product. Semaphore that has been applied to class X students as part of the Scout extracurricular activities. During the implementation, instructors and students use their smartphone devices to access and run augmented reality media. Semaphore that has been developed by researchers. After the implementation process of the Semaphore augmented reality media, the researcher then gave a questionnaire to find out the responses of students and instructors regarding the Semaphore augmented reality media that the researcher had developed. The evaluation questionnaire used was the User Experience Questionnaire (UEQ). The users in this study were class X students of Vocational High School 2 Singaraja. The response test of instructors and students was only carried out once, namely on July 16, 2023, involving 30 students and 2 instructors. After changing the respondent data into the appropriate form and calculating the average value, variance, and standard deviation, the next step was to determine the standard data as a reference. The benchmark standard for the User Experience Questionnaire (UEQ) is based on data that has been previously collected and processed using UEQ. The average results for all statement items as in [Figure 12](#) and the UEQ scale measurement can be seen in [Table 4](#).

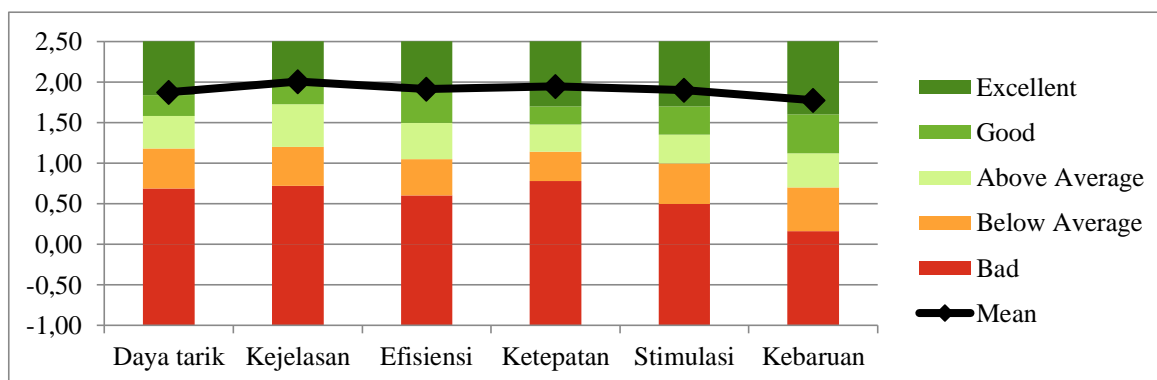


Figure 12. Graph of Average Group Impression Values

Table 4. UEQ Scale Measurement Results

No.	Aspect	Average	Category
1	Attractiveness	1.88	Excellent
2	Perspicuity	2.01	Excellent
3	Efficiency	1.91	Excellent
4	Dependability	1.95	Excellent
5	Stimulation	1.90	Excellent
6	Novelty	1.77	Excellent

From the data in Table 4, it can be seen that based on the results of the User Experience Questionnaire (UEQ), students and instructors gave high average scores for each aspect of the evaluation. The average score for the Attractiveness aspect was 1.88, Clarity was 2.01, Efficiency was 1.91, Accuracy was 1.95, Stimulation was 1.90, and Novelty was 1.77, with all categories showing very good ratings. In other words, the overall evaluation results show that the responses of students and instructors can be described as very good or "Excellent."

### Evaluation Stage

The last stage in the ADDIE development model is the evaluation stage (Cahyadi, 2019). The evaluation stage is used to evaluate each stage of analysis, design, development, and implementation to ensure that each stage has run properly and there are no obstacles. The following is an evaluation of each ADDIE stage which can be seen in Table 5 for the analysis stage evaluation, Table 6 for the design stage evaluation, Table 7 for the development stage evaluation, and Table 8 for the implementation stage evaluation.

Table 5. Results of Analysis Phase Evaluation

No.	Statement	Information	
		Yes (Already)	No (Not Yet)
1	Conducting an Interview Process with Instructors and Distributing Questionnaires to Students aims to Gather Information about Student Profiles, Learning Attributes, Learning Resources Used, and Students' Special Needs.	✓	
2	Functional and Non-Functional Requirements Designed Software.	✓	

Table 6. Design Phase Evaluation Results

No.	Statement	Information	
		Yes (Already)	No (Not Yet)
1	Functional Model of Software or Often Called Use Case and Activity Diagram.	✓	
2	Design/Creation of Application Architecture.	✓	

No.	Statement	Information	
		Yes (Already)	No (Not Yet)
3	Design/Creation of Application Interfaces.	✓	

Table 7. Development Phase Evaluation Results

No.	Statement	Information	
		Yes (Already)	No (Not Yet)
1	Developing Semaphore AR Card Educational Media According to the Design.	✓	
2	Searching and Collecting all the Resources Needed for Software Development.	✓	
3	Semaphore Augmented Reality Development.	✓	
4	Semaphore Augmented Reality Media has Undergone Black Box Testing.	✓	
5	Conduct an Evaluation of Augmented Reality Media by Involving Content Experts and Media Experts to Obtain Recommendations and Input that can Improve the Quality of the Product so that it is Ready for Implementation.	✓	
6	All the Review Results of Content Experts and Media Experts have been Revised so that the Semaphore Augmented Reality Media is Completely Finished and Ready to be Implemented.	✓	

Table 8. Results of the Implementation Phase Evaluation

No.	Statement	Information	
		Yes (Already)	No (Not Yet)
1	Semaphore Augmented Reality Media has Undergone User Response Testing.	✓	

## Discussion

The Scout educational media "Semaphore AR Card" was developed as a response to problems identified after conducting a series of interviews with instructors and also a survey via a questionnaire to class X students at Vocational High School 2 Singaraja (Susilana & Riyana, 2012). The results of interviews with instructors indicate that the learning resources used in delivering the material are limited to the Scout pocket book or SKU (General Proficiency Requirements), and the method of teaching scouting material still uses a conventional approach, so that students' interest in participating in Scout extracurricular activities, both mandatory and elective, is less enthusiastic. From the results of distributing questionnaires to students, it is also seen that students feel bored with the learning method that only relies on the general proficiency requirements book as the main source, and they express the need for learning media that can be easily accessed via their smartphone devices.

From these problems, the researcher conducted further research on the right solution to deal with these problems. The solution obtained was to develop interesting Scout educational media that could increase students' interest and motivation in learning. From the results of this study, it can be seen that the development of the Scout educational media "Semaphore AR Card" aims to overcome the problem of students' interest and enthusiasm for Scout extracurricular activities, especially in Semaphore learning. The theories underlying this approach include the views of Kamiana et al., (2019) which state that information and communication technology (ICT) plays an important role in enriching learning resources and learning aids. In this context, the development of technology-based media such as the Semaphore AR Card is expected to increase students' interest in learning. Furthermore, previous similar studies have also reported positive results that support this view.

The conclusion of this study shows very satisfactory results, with the black box test achieving a success rate of 100%. Validity evaluation by content experts and media experts for the Semaphore AR Card reached a value of 1.00, indicating that its validity level is very high. Moreover, the UEQ assessment of users, both students, and instructors, showed results that reached the category "Excellent" in 6 aspects, including the level of appeal: 1.88, the level of clarity: 2.01, the level of efficiency: 1.91, the level of accuracy: 1.95, the level of stimulation: 1.90, and the level of novelty:

1.77. Thus, overall, the development of the Semaphore AR Card Scout educational media can be considered suitable for use as a learning aid in the context of Scout activities.

The results of this study are in line with several previous studies conducted by [Azmi \(2020\)](#) which stated that it is true that the existence of augmented reality-based learning media can be used as a learning medium to introduce semaphore code to students. In addition, research conducted by [Hamdani & Hendriyani \(2022\)](#) in the study produced a learning media that can be accessed via smartphones and can help students get to know Semaphore. Then research on AR-based learning media has also been conducted by [Harta et al., \(2021\)](#) obtained positive responses from teachers and students, the media developed was also interesting and easy to use.

From the discussion above, this research can overcome problems related to Scout learning media, and less interesting learning resources, and with this research, problems related to students' interest and boredom in learning Semaphore can be overcome according to the results of the tests that have been carried out. The final result of this development research is the development of Semaphore AR Card Scout educational media in the form of an Android application. The advantages of this educational media are 1) This Scout educational media can be accessed anytime and anywhere, 2) this application there are also interesting features such as learning with AR, Semaphore material, and Semaphore quizzes, 3) this application can also make it easier for instructors to deliver Scouting material, especially Semaphore and for students it can also be a media that can attract their interest in learning by using the AR feature to recognize letters or compose words. In addition to advantages, every development will always have shortcomings, including the development of Semaphore AR Card Scout educational media that researchers carried out. The disadvantages of this Scout educational media are: 1) This media can only run on mobile phones that have an Android operating system, 2) Sometimes there are bugs when running the AR camera which is purely caused by the Unity 3D software, 3) This educational media is still focused on introducing Semaphore, not yet at the stage of exploring it further, and 4) The media developed is still static, in the future it is hoped that dynamic media can be developed using a database.

## CONCLUSION

The Semaphore AR Card Scout educational media uses the ADDIE (Analyze-Design-Development-Implementation-Evaluation) development model. It has succeeded in developing and implementing the Semaphore AR Card Scout educational media by the application development model, namely the ADDIE model, which starts from the analysis stage to evaluation. The results of the tests that have been carried out indicate very positive achievements, with the results of the black box test reaching a success rate of 100%. The validity test by content experts and media experts for the Semaphore AR Card produced a score of 1.00, indicating a very high level of validity. Furthermore, the evaluation of users, including students and instructors, used the UEQ assessment method, and the results showed an assessment that was classified as "Very Good" in 6 categories, including the level of appeal: 1.88, the level of clarity: 2.01, the level of efficiency: 1.91, the level of accuracy: 1.95, the level of stimulation: 1.90, and the level of novelty: 1.77. Overall, the results of the development of the Semaphore AR Card Scout educational media show strong suitability for use as an educational tool in Scout activities.

Innovative database usage features to the application being developed so that the development of application usage can be saved and the application size can be lighter. In addition, the application being developed is still in the scope of introducing Semaphore letters and numbers and composing words by displaying animated 3D objects that focus on the success of bringing up 3D animated objects. For further researchers, it is hoped that they can develop Scout education media on other Scouting materials by the Scouting materials applied to Scout extracurricular activities.

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