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Development of Educational Game for Introduction Animal Types Using the ADDIE Method Smart Apps Creator in Improving Knowledge Students

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Abstract

The development of technology in education opens up opportunities for innovation to create interactive learning media, especially for early childhood. This research aims to develop educational games based on Smart Apps Creator using the ADDIE method to introduce animal species to Al-Washliyah kindergarten students. The method used is ADDIE, consisting of five stages, namely: Analysis, Design, Development, Implementation, and Evaluation. in this study conducted validity, reliability, normality, homogeneity, and anova tests to measure the effectiveness of this learning media. The results showed that this animal species recognition educational game succeeded in improving student understanding with an average score before the use of learning media of 59.2% increasing to 87.73% after using learning media. Validity and reliability tests show that this learning media meets the criteria of effective, easy-to-use, and interesting learning media.

Keywords: ADDIE Method, Smart Apps Creator, Educational Game, Animal Recognition, Early Childhood Education.

1. Introduction

The development of technology is currently very rapid, which is characterized by the use of technology in various fields of life, one of which is in the field of education. The utilization of information and communication technology in the field of education can provide solutions and convenience in carrying out the learning process [1]. The main purpose of using media in an educational context is to ensure that the message or information conveyed is comprehensively understood by learners. During the early developmental stages, it is especially more effective to enhance cognitive growth through the utilization of games or interactive media. Within this framework, children are more adept at retaining the information presented to them, thus enhancing their cognitive abilities. The educational process that produces high-quality human resources is intrinsically linked to the learning activities carried out. Learning activities are interactions between individuals and their environment that result in changes in behavior and are permanent [2].

Currently, there are still many teachers who use manual learning systems or only use learning media with guidebooks. This is easier to make children bored, thus inhibiting their cognitive development [3]. Therefore, it is important to use teaching materials that can stimulate children's creativity during the learning process. In contemporary society, children are increasingly utilizing technology in their daily activities. With digital games, children have the opportunity to explore so that the sense of curiosity that exists in them can be achieved. Thus, teachers must carry out the learning process with technology-based media such as educational games, especially on animal recognition material. As articulated by Panggayudi, educational games are interesting activities that include educational and entertainment elements, carefully designed to improve cognitive processes, including increased concentration and problem-solving skills. The material relating to animal recognition has significant relevance in everyday life. This content seeks to provide children with knowledge about animals. In the learning process using gamification or a learning approach that utilizes games, is able to create more interesting, fun, and effective learning [4].

The purpose of this research is to develop an educational game based on Smart Apps Creator that is effective in providing education while playing to early childhood. In its use, educational games are highly recommended, especially in providing learning that is not monotonous. In addition to this visually by utilizing educational games, the learning provided will be more varied and with educational games students can develop their cognitive, emotional, social, psychomotor, and physical powers [5]. Through the utilization of this interactive game, it can help children know about various types of animals. Children can know the names of animals, as well as the physical form of animals, which can increase their vocabulary. The development of an educational gaming experience through Smart Apps Creator makes this resource more accessible and functional for caregivers and educators. It is anticipated that this effort will facilitate the advancement of educational games that serve to introduce various animals to early childhood learners.

The methodological framework or method used is the ADDIE model, which includes the phases of Analysis, Design, Development, Implementation, and Evaluation. The development path in the ADDIE framework consists of five separate stages, namely Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model was formulated by Reiser and Mollenda in the 1990s. The data collected

through observations, interviews, and questionnaires in this study will undergo systematic processing to facilitate the design of educational games as remedial interventions for the identified problems.
Al-Washliyah Kindergarten is a privately operated educational institution located in Cirebon district. The institution enrolls children in the age range of 4 to 6 years. In teaching and learning activities, Al-Washliyah Kindergarten still relies on books and pictures, and has not utilized technology-based learning media. Therefore, the researcher wishes to design an educational game for children with the title "ADDIE Smart Apps Creator Method for Developing Animal Type Recognition Educational Games in Improving Student Knowledge". This application aims to be the first technology-based learning media at Al-Washliyah Kindergarten. It is hoped that this educational game will help children understand about animals and increase their interest in learning. In addition, this research is expected to provide positive results and be well received by teachers and students at Al-Washliyah Kindergarten as the first technology-based learning tool.

2. Research Methodology

The method used in this research is the research and development method, with the ADDIE model. The stages in the ADDIE method consist of five steps, namely Analysis, Design, Development, Implementation, and Evaluation.

Fig. 1: Stages of the Research Method

2.1. Analysis

At this stage, an analysis of learning needs and problems is carried out such as determining the needs of both software and hardware that must be prepared. Learning objectives are determined, and information about children's characteristics is collected through observation and interviews with teachers.

2.2. Design

At this stage, creating an interesting and interactive educational game with an emphasis on animal species recognition. A storyboard is developed to determine the flow of the game and the visual elements to be used.

2.3. Development

This stage develops learning materials to design the interface with blue schemes using Illustrator, so that the appearance of the game becomes more interactive.

2.4. Implementation

At this stage, implementing it into the application making software by utilizing Smart Apps Creator software. The game prototype is then tested using the black-box method to ensure that all features function properly and in accordance with the set learning objectives. Furthermore, this educational game was implemented at Al-Washliyah Kindergarten, involving teachers and students in the use of the game during the learning process.

2.5. Evaluation

This evaluation stage is conducted to assess the results of the implementation, focusing on the educational game software, including identifying its shortcomings and strengths. The results of this evaluation will be used as a basis for revising and improving the educational game.

3. Result and Discussion

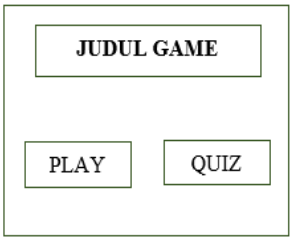
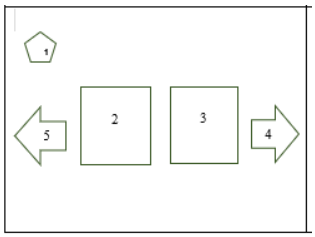
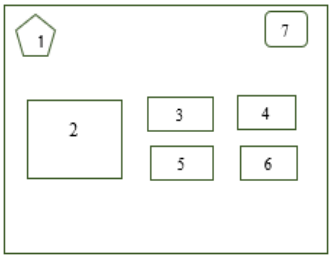
Through a comprehensive needs analysis, conducted through interviews and observations, it is seen that there is a need for interesting technology-based learning so that students are not bored with conventional learning methods, especially in animal recognition. Educators face significant barriers in effectively transmitting knowledge to young learners, mainly due to the constraints imposed by instructional media, which usually only present one or two printed images for classroom explanations. Given that the method of conveying information regarding animals in an educational context remains relatively uninspired, children exhibit diminished interest, loss of focus, and rapid boredom. Empirical observations suggest that early childhood learners exhibit substantial curiosity and show proactive engagement in their educational experiences. Consequently, to stimulate children's knowledge acquisition, diverse educational media such as interactive games are essential to captivate children's interest and enthusiasm during the learning process. This ultimately facilitates the achievement of learning objectives more effectively. This statement is in line with previous research that the application of the concept of learning through play is able to develop children's experience in receiving knowledge, influence learning behavior, and increase their imagination [6].

The researcher decided to develop an educational game as a pedagogical tool to introduce animals, given that early childhood education mainly uses a game-based curriculum in its instruction methodology. Therefore, this educational game is designed to provide children with a new learning experience using an effective and fun approach.

3.1. Storyboard

The storyboard serves as a visual representation of the conceptual framework of the application under development, thus facilitating the depiction of the anticipated application. The storyboard is meticulously crafted to assist the analyst in comprehensive planning of the application.

Table 1: Storyboard

Design	Description
	The initial view of the game which contains a 'Play button' to start the game and a 'Quiz button' to start the quiz.
	The Play menu contains: 1. Home button 2. Animal Picture 3. Animal Picture 4. Next button 5. Back button
	The Quiz menu contains: 1. Home button 2. Question 3. Answer Options 4. Answer Options 5. Choice Answer 6. Choice Answer 7. Score
	After completing the quiz, you will be notified of the final score. Then there will be a button: 1. Home button 2. Button to repeat the quiz from the beginning

The storyboard that has been created will be developed using Smart Apps Creator and Illustrator software. Smart Apps Creator is an application that allows the creation of mobile applications for Android and iOS without the need for programming code. Meanwhile, Illustrator is used to edit every object in the game.

Table 2 : Result

Hasil	**Function**
	The initial screen or the first background in the animal recognition educational game application before going to the home page.

	The home page display is where the animal recognition educational game application starts. Here children can choose to learn or play quiz.
	One of the learning displays in the animal recognition educational game, which displays various animals in the surrounding environment.
	Quiz menu
	After completing the quiz, the child will be notified of the overall score they obtained.

3.2. Black-Box Testing

Black-box testing is done by testing every activity contained in the application that has been made by the author. The test that the author uses is a BlackBox Testing strategy that focuses on usability testing without investigating the details of the framework used in the application. The following are the results of the tests carried out with the black-box test.

Table 3: Black-Box Testing

Testing Menu		Result
The initial menu when opening the animal recognition educational game		Success
Home Menu		Success

Play menu		Success
Quiz Menu		Success
The final display menu after completing the quiz		Success

3.3. Questionnaire Results

Based on the initial data obtained, the results of the questionnaire before the learning media is introduced can be calculated using excel with the formula total divided by the number of respondents. Then the average questionnaire before knowing the learning media is 59.20%. While the results of the questionnaire after the introduction of learning media can be averaged using the formula total divided by the number of respondents using excel. Then the average questionnaire obtained after recognizing the learning media is 87.73%.

3.4. Validity Test

Validity basically means “measuring what you want to measure”. Indicators in the questionnaire can be said to be valid if the r value of the results is greater than r table (r count> r table). Validity is an index that shows the measuring instrument actually measures what it is intended to measure [7]. To assess the accuracy of the measurement instrument or its validity, it is usually done through Pearson's bivariate correlation (simple correlation, product moment correlation, measured moment correlation) with the significance level set at 0.05. Given that this test was applied across multiple items in the research questionnaire, the statistical calculation of the correlation coefficient was performed using SPSS software. In this procedure, each item will be examined or tested with respect to the total score of the corresponding variable. Validity testing uses the following criteria :

a. If R Count > Table R, then the item is considered valid
b. If R Count < Table R, then the item is considered invalid

Calculations made through SPSS produce the following results:

Table 4: Validation Test Results

QUESTIONS	R Count	R Table	Description
X1	0,611	0,5919	VALID
X2	0,657	0,5919	VALID
X3	0,621	0,5919	VALID
X4	0,667	0,5919	VALID
X5	0,620	0,5919	VALID
X6	0,675	0,5919	VALID
X7	0,620	0,5919	VALID
X8	0,630	0,5919	VALID
X9	0,756	0,5919	VALID
X10	0,609	0,5919	VALID

Based on the results of the validation test above, it can be concluded that with a total of 10 items, all question items in the questionnaire are valid with an r table value of 0.5919 using a sample of 30 respondents.

3.5. Reliability Test

Reliability assessment is used to evaluate questionnaires that function as indicators or variable markers. In this study, the reliability assessment was carried out using the Cronbach Alpha test, where the questionnaire is considered reliable if the Cronbach Alpha value exceeds 0.60, thus making the questionnaire reliable. The results of the SPSS calculation are as follows :

Table 5 : Reliability Test Results

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Exluded[a]	0	0
	Total	30	100.0

Reliability Statistics

Cronbach's Alpha	N of Items
.841	10

From the reliability test, the Alpha Cronbach value is 0.841 which shows 0.841> 0.60. Therefore, the questionnaire compiled in this study can be considered very reliable or declared high reliability.

3.6. Normality Test

Normality assessment is carried out to ascertain whether the data follows a normal distribution or shows abnormal characteristics, achieved by comparing significance values. The applicable criteria are outlined as follows :

a. If the Sig value> 0.05 then the data is considered normally distributed
b. If the Sig value is <0.05 then the data is considered to be abnormally distributed

The results obtained from calculations through SPSS software are presented as follows :

Table 6: Normality Test Results

Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total	.151	30	.079	.954	30	.221

Since the number of questionnaire sample data is less than 50, the appropriate method to use is the Shapiro-Wilk test in testing the normality of this study. From the normality test results above, the Sig value in the Shapiro-Wilk column is recorded at 0.221. Therefore, it can be concluded that the Sig value of 0.221> 0.05, which means that the data in this study can be considered normally distributed.

3.7. Homogeneity Test

Homogeneity testing is a statistical evaluation used to ascertain whether two or more data sets come from populations that show uniform variance (homogeneous). This evaluation is an important preliminary measure before carrying out further statistical analysis, such as T-Test or Anova.

Table 7: Homogeneity Test Results

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Questionnaire Results	Based on Mean	.838	9	290	.582
	Based on Median	.550	9	290	.837
	Based on Median and with adjusted df	.550	9	249.278	.837
	Based on trimmed mean	.853	9	290	.568

In the homogeneity test results mentioned above, the Levene test was used. The table results show that the Sig value is 0.582. Thus, it can be concluded that the Sig value of 0.582 > 0.05, indicating that the data in this study can be categorized as homogeneously distributed.

3.8. Anova Test

Previously, the author has ensured that the requirements for carrying out the anova test have been met, namely that the data must be normally distributed and homogeneous. Thus, the author can proceed to conduct the anova test by setting the following criteria :

a. If Sig > 0.05 then there is no average difference (Same)
b. If Sig < 0.05 then there is a difference in average (Unequal)

Then the results obtained through the calculation of SPSS software are as follows:

Table 8: Anova Test Results

ANOVA					
Questionnaire Results	Sum of Squaresd	df	Mean Square	F	Sig.
Between Groups	3.413	9	.379	.984	.453
Within Groups	111.733	290	.385		
Total	115.147	299			

Based on the table results obtained from the anova test, for the Sig value it can be seen that the Sig value is 0.453> 0.05. This indicates that there is no difference in average. Because the results of this anova test show no difference, there is no need to do the analysis after anova.

4. Conclusion

The conclusion of this study shows that the application of educational game-based learning media for the purpose of familiarizing kindergarten students with various animal species has been proven effective in increasing their engagement in learning, especially in contrast to traditional pedagogical methods. This statement is supported by the results of the investigation which showed that the developed educational game significantly improved students' understanding of animal species, with the average score increasing from 59.2% before the introduction of the learning media to 87.73% after its implementation. In the context of learning, students showed high activity and enthusiasm when utilizing this educational medium. Furthermore, the results obtained from the validity and reliability assessment of the instrument, along with other statistical evaluations, yielded valid and reliable results, thus confirming the educational game application for animal type recognition is feasible to implement. Future research could focus on adding more varied content, such as adding more animal types or additional interactive features.

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