

Development of Educational Game Media Based on Android Animal Life Cycle Materials in 4th Grade Elementary School

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Abstract—Android-based educational games are interactive, innovative learning media by utilizing games in learning, so that students are interested in fun learning activities. The purpose of this development research is to produce an Android-based educational game media to foster the curiosity character of grade IV students on science material theme 6 sub-theme 1 which is valid according to material experts, media experts, teachers, as well as practical and interesting according to students. Development research uses the ADDIE model, namely analysis, design, development, implementation, evaluation. The results of the study show that Android-based educational games are feasible to use. Material expert product validity reaches 96% meaning the product is very valid. The media expert's product validity reached 93.33% which means the product is very valid. The teacher's product validity reaches 90%, which means the product is very valid. Furthermore, the practicality and attractiveness of the product to students in the limited trial reached 95.23%, the field trial reached 96.42%, which means the product is very practical and attractive. Based on the results of the assessment, Android-based educational games are very valid, very practical and interesting to use as learning media.

Keywords—learning media, android-based educational games, curiosity characters, IPA theme 6 sub-theme 1.

I. INTRODUCTION

Learning media is a learning tool that becomes a core point in supporting the process of teaching and learning activities. In line with Daryanto's opinion [1] learning media is everything whether it is objects, people, or the environment, useful to convey messages or information related to learning materials for students, so that students feel interested and happy with learning activities and

able to achieve learning goals. Thus, to facilitate students in the learning process more interested, more accepting and understanding learning materials, teachers must be able to innovate in learning activities. These innovations can be in the form of teachers utilizing learning technology to develop a variety of interactive learning media for students [2]. The innovation of teachers related to interactive learning media, is very important, especially in science learning in elementary school. Because, basically science learning in elementary school requires learning media to help students understand science materials that are difficult to explain if only using thematic books. Science in elementary school learns about natural sciences and natural symptoms, trains and develops three areas in students, namely knowledge, attitudes, and skills, so that students are able to apply them in their daily lives [3]. In order for students to be able to develop 3 areas in the process of learning science, it takes a varied and interesting IPA media. This is in line with the opinion of [4], that it is necessary for teachers' skills to develop a variety of interactive, innovative media, so as to create a fun learning atmosphere. SDN Nglinggis Trenggalek is one of the schools in Trenggalek district that has implemented the 2013 curriculum and conducted online learning during the COVID-19 pandemic. Therefore, researchers are interested to find out how to implement online learning at SDN Nglinggis by conducting research at SDN Nglinggis. In addition, the research was conducted based on the discovery of problems, especially in grade IV.

On December 23, 2020, an interview was conducted with grade IV teachers at SDN Nglinggis Trenggalek with the results of an interview between them, the learning was conducted online by the method of delivering materials and tasks through

Grub Whatsapp and Google Form. There are problems in learning, especially science learning, namely IPA media used less effectively and interestingly so that the understanding of materials by students is still lacking, students use mobile phones to play games rather than used to read assignments given by teachers, students rely on gur explanations and less actively ask questions, students are happy with audiovisual materials but the use of media such as video is rarely used, the undeveloped curiosity of students when studying, and the science material of grade IV in theme 6 sub-theme 1 about animal life cycle only 25% of students master. As a solution to the problem, audiovisual-based media such as the development of android-based educational games to foster the curiosity character of grade IV students on the IPA content of theme 6 sub-theme 1. The media can motivate students' learning, provide pleasure in learning, and make it easier for students to understand the material. In line with the opinion [5], that learning with android-assisted at this time makes it easy for students to relearn material that has not been understood anytime and anywhere.

Research that has been done about the learning process assisted by learning media in the form of android-based educational games that is by [6] with the title "Development of Astrodent Educational Game Media Based on Android Application to Improve The Results of Learning SCIENCE Material Solar System Class VI SD" is stated to be very valid and practical to use with validation results from material experts by 95.37%, and validation results from media experts by 90.21%, as well as practical results from small-scale trials of 96.29% and large-scale trials of 98.62%. While [7] with the title "Development of Android Educational Games with Self-Directed Learning as a Support for Learning Media Basic Subjects graphic design" is declared very valid and worth using with validation results from material experts by 91%, validation results from media experts by 90%, feasibility results from individual trials by 88%, feasibility results from small group trials by 90%, and the feasibility of a large group trial of 90%.

Based on the description above, shows that media in the form of android-based educational games are effectively used in learning. Thus, it can be used as the basis for development research with the title "Development of Android-Based Educational Game Media to Grow The Character of Curiosity of Grade IV Students in IPA Content Theme 6 Sub-theme 1 at SDN Nglingsis Trenggalek Regency".

II. METHOD

The development of android-based educational game media to foster the curiosity character of

grade IV students in the IPA content of theme 6 sub-theme 1 at SDN Nglingsis Trenggalek regency uses ADDIE development model. ADDIE development model consists of five stages, namely analysis, design, development, implementation, and evaluation [8]. The subjects in this study were grade IV students at SDN Nglingsis In Trenggalek. In the limited trial, the subject of the study was a grade IV student consisting of 6 children. While in the field trials, the subject of the study was grade IV students consisting of 12 children.

Types of data collected as much as 2 data, namely quantitative data and qualitative data. Quantitative data is obtained from the percentage of questionnaire filling scores filled by material expert validators, media expert validators, users/teachers, and assessment of student response questionnaires when testing products. While qualitative data obtained from interview activities with grade IV teachers, responses and suggestions of improvement from material expert validators, media expert validators, users/teachers, and grade IV students.

Data collection techniques include interviews, questionnaires, and documentation. Then, data analysis is divided into 2 qualitative and quantitative analysis. Qualitative analysis is used to analyze data collection from interview results, criticisms and suggestions from material experts, media experts, teachers, and grade IV students. While quantitative analysis is used to analyze the collection of data from the results of the percentage of scores filled in the questionnaire validation of material experts, media experts, teachers, as well as student response questionnaires. The data analysis is done as follows.

- a. The results of the validation questionnaire of material experts, media experts, and teachers were analyzed using formulas from [9]:

$$Vah = \frac{Tse}{Tsh} \times 100\%$$

Information:

Vah = expert validation

Tse = total empirical score achieved

Tsh = total expected maximum score

- b. The results of the student response questionnaire were analyzed using a formula that is:

$$P = \frac{\sum X}{N} \times 100\%$$

Information:

P = percentage score

$\sum X$ = number of scores earned

N = maximum number of score

Then, the conclusion is that the product of android-based educational game media development is

declared feasible and practical and interesting to use when the validation results of material experts, media experts, and teachers, as well as student response results reach a percentage of >61%.

III. RESULTS

After the development research was conducted in accordance with the development research method using the ADDIE model, validation questionnaires were obtained from material experts, media experts, users/teachers, as well as the response questionnaires of grade IV students at SDN Nglinggis Trenggalek Regency. The results of the assessment of the questionnaire are presented in table 1 below.

TABLE I DATA RESULTS ASSESSMENT OF ANDROID-BASED EDUCATIONAL GAME DEVELOPMENT

Questionnaire Assessment	Percentage	Category
Material Expert Validation Questionnaire	96%	Very Valid
Media Expert Validation Questionnaire	93,33%	Very Valid
Teacher Validation Questionnaire	90%	Very Valid
Limited Trial Questionnaire	95,23%	Very Practical and Very Interesting
Field Trial Questionnaire	96,42%	Very Practical and Very Interesting

IV. DISCUSSIONS

The feasibility assessment of android-based educational game products to foster the curiosity character of grade IV students in the IPA content of theme 6 sub-theme 1 at SDN Nglinggis, conducted by material experts, media experts, and users/teachers. The material expert validates three aspects of the assessment, namely the feasibility aspect of the material content, the presentation aspect of the material, and the language rule aspect. Material expert assessment reaches 96% with very valid categories according to [9] with product decisions can be used without revision. The percentage produced is better than the research [10] where the percentage obtained is 89.5%. Criticism and suggestions of the material validator used for product perfection, such suggestions in the aspect of presentation of the material should include the source of the video taken.

Furthermore, media experts validate three aspects of assessment, namely aspects of material presentation, aspects of language rules, and aspects of media presentation. Media expert assessment on the first validation reached 80% with a fairly valid category according to [9], with product decisions can be used with minor revisions. Criticism and

suggestions from media validators are used for product perfection, the advice is in the form of improvement of questions in the quiz menu to make it more varied and more interesting by being given pictures. This is in line with the opinion of [11] that the type of learning media that is visual is considered to attract the attention of students. In addition, suggestions in the form of improvement of reward words in the game to further motivate students' learning. In accordance with Hurd and Jenuings opinion [12] that the criteria for designing a good educational game one of which is the feedback of students after playing the game in the form of words or sound effects and animations. Thus, revalidation reached 93.33% with a very valid category according to [9], with product decisions can be used without revision. The percentage produced is better than the research [10] where the percentage obtained is 91.7%.

The user/teacher validates four aspects, namely the feasibility aspect of the material content, the presentation aspect of the material, the aspect of language rules, and the media presentation aspect. User/teacher rating reaches 90% with very valid category according to [9] with product decisions can be used without revision. Criticism and suggestions from teachers are used for product perfection, the suggestions are in the menu of materials preferably KI, KD, and indicators removed to be more precise with the target of learning/students. This is in line with the opinion of [13] that teachers in choosing learning media to be on target should pay attention to the principle of effectiveness and efficiency where the media is in accordance with the objectives by utilizing the smallest possible resources, the principle of relevance where the media must match the objectives/content/strategies/evaluation of learning achieved by students, and the principle of productivity where the media facilitates students in achieving optimal learning results in accordance with the objectives.

Assessment of the practicality and attractiveness of android-based educational game products to foster the curiosity character of grade IV students on the IPA content of theme 6 sub-theme 1 at SDN Nglinggis is based on the results of filling out student response questionnaires when trials are limited and field trials. Data from the student's practicality and attractiveness response questionnaire were analyzed using the Guttman scale. The Guttman scale contains a "yes-no" answer with a score of 1 in the answer "yes" and a score of 0 on the answer "no" [14]. The results of the questionnaire from the limited trial to 6 students reached 95.23% with a very practical and very interesting category according to Riduwan [15], with the decision of the product can be used without revision. While the results of the questionnaire from the field trials to 12 students reached 96.42% with a very practical category and very interesting

according to Riduwan [15], with the decision of the product can be used without revision. As for the response of students related to the product is very good and positive, students feel enthusiastic about the presence of pictures and videos in the game. Learning with the help of audiovisual media will increase students' interest, attention, and curiosity [16]–[19]. Students also feel happy learning with educational games marked with students actively asking questions regarding materials or assignments and playing games through whatsapp. In line with Daryanto's opinion [20] that the indicator of the appearance of curiosity of students in learning is characterized by students actively asking questions regarding the material being studied. In addition, in accordance with Ghea's opinion [21] students also find it easy to understand the material presented in educational games because the game is easy to use and provides students with other knowledge about animal life cycle materials.

Android-based educational game media packs IPA material theme 6 sub-theme 1 about animal life cycle in an interesting and interactive way. Android-based educational games contain menus, images, sounds, and videos that draw students' attention to animal life cycle materials. The menus in android-based educational games include a menu of instructions that contain instructions for learning materials, playing games, and taking quizzes.

Then, the material menu containing the purpose and material of the animal's life cycle comes with interesting images, videos, and tasks. The game menu consists of 3 levels by correctly arranging images of animal life cycle, quiz menus doing 20 questions with a working time of 1 minute each question, an info menu containing a profile from the developer and an exit menu to exit the game. Android-based educational game media was developed with construct 2 application, images and videos to complete animal life cycle materials taken from Google and Youtube sources. The game is 50.22 MB in size and can be run on students' smartphones offline.



Fig. 1. Menu in Android-Based Educational Games

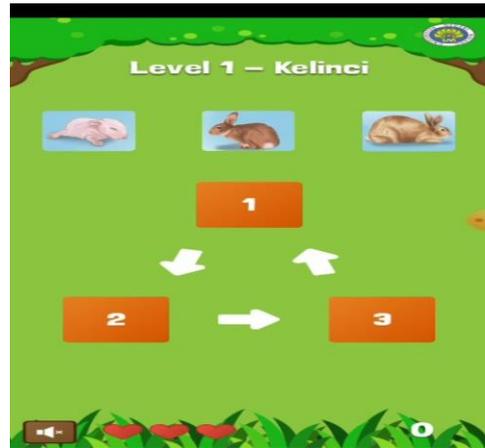


Fig. 2. Game Composing Images of Animal Life Cycle

V. CONCLUSION

The product of android-based educational game development to foster the curiosity character of grade IV students in the IPA content of theme 6 sub-theme 1 at SDN Nglingsis can be used by teachers and students well, as well as according to research objectives. Android-based educational game products make it easier for teachers to deliver materials, and make students more happy and enthusiastic about learning science materials theme 6 sub-theme 1. Android-based educational games have been validated by material experts, media experts, teachers, and have been tested to grade IV students at SDN Nglingsis In Trenggalek. Material expert validation results reached 96% with a very valid category. Then, the first media validation result reached 80% with a fairly valid category, and revalidation of the second media validation reached 93.33% with a very valid category. While the teacher validation results reached 90% with a very valid category.

Android-based educational games have also been assessed for practicality and attractiveness through product trials to grade IV students at SDN Nglingsis. The trial results were limited to 6 students reaching 95.23% with a very practical and very interesting category. While the results of the field trial kepada a 12 students reached 96.42% with a very practical category and very interesting. Based on the validation results and the results of practicality and attractiveness of the product, android-based educational games can be declared worthy of use, practical and interesting to use as a learning medium in the teaching and learning process.

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