

## Design of Educational Game-Based Learning Media "Si Advent" on the Material of Growth and Development of Living Things in Grade III

Muhammad Rizky Saputra <sup>a,1,\*</sup>, Feri Faila Sufa <sup>b,2</sup>, Arif Sutikno <sup>c,3</sup>

<sup>a</sup> Slamet Riyadi University, Jl. Prof DR Suharso, Surakarta City and 57144, Indonesia

<sup>b</sup> Slamet Riyadi University, Pucangan, Sukoharjo and 57168, Indonesia

<sup>c</sup> Slamet Riyadi University, Potrokelasan, Surakarta City and 57148, Indonesia

<sup>1</sup> muhammadsaputra75@gmail.com \*; <sup>2</sup> ferifailasufa@unisri.ac.id; <sup>3</sup> arif.stk@gmail.com

\*E-mail Corresponding-author: muhammadsaputra75@gmail.com

### Abstrak

*This study aims to determine the feasibility of educational game-based learning media design as a science learning media on the material of growth and development of living things at SD N Tegalayn 96 Surakarta. Researchers use the Research and Development (R&D) method with the Dick and Carey research procedure model, namely the ADDIE model which has been simplified. Data collection uses interviews, questionnaires, and documentation methods and is combined with a Blackbox Testing system and validation of product feasibility by Expert Judgement and learner responses which are analysed using a Likert Scale. The results of this study also show that educational game-based learning media according to the assessment by material experts get a feasibility percentage of 94.54% with a very feasible category, by media experts get a feasibility percentage of 81.6% with a very feasible category, by educators get a feasibility percentage of 96.15% with a very feasible category, as well as an assessment response by students of 88.75% with a very feasible category.*

Keywords: Design, Learning Media, Educational Game, Science, R&D.

### A. Introduction

At this time, the advancement of information and communication technology is an important thing in this modern era and has been developed continuously and has touched almost all sectors, one sector that is important to pay attention to is the education sector, with the development of better technology and science, one of the innovations in the world of education is through the development of learning media to assist in the learning process and create a quality education system. Education is an important part of human life, because education can produce smart, creative, talented and noble humans who create a better future. (Primasari et al., 2019). In addition, education is a process needed to achieve balance and perfection in personal and social development (Sulianto et al., 2019). Learning is an interaction between a teacher and a student. Learning itself is the process of learning and teaching. Learning components include learning objectives, teachers, students, curriculum, learning strategies, learning materials, and learning assessment. The learning process is shaped by the relationship between learning factors. According to Wahyudin (2017: 3) in the context of learning, strategy refers to the approach to the distribution of learning materials.

The learning process is a communication process. A communication process always has three main components. namely the sender of the message (teacher), the receiver of the message (student), and the element of the message itself, usually in the form of a subject. Sometimes during the learning process communication errors occur. This means that the topic or message conveyed by the teacher cannot be maximally received by students and not all subjects can be understood properly by students. So there is miscommunication between the teacher as the sender of the message and the student as the recipient of the message. Problems that occur in learning can be overcome by teachers developing learning strategies using different media and learning resources.

In schools, teaching media is one that plays an important role in improving the quality of learning of a student. Educators are required to be more creative and create various new innovations by providing educational materials that can make learning activities more interesting and fun, so as to create interaction between teachers and students to create conditions conducive to achieving learning goals.

Based on the results of observations on Teaching Campus activities at SD N Tegalayu 96 Surakarta, in learning science subjects on the material of growth and development of living things, educators still use learning media in the form of simple learning media, educators usually explain learning one of them by using books and simple Microsoft PowerPoint. In addition, educators also still apply the lecture and assignment method, so that in the learning process students tend to listen rather than understand the content of the material presented and cause students to get bored easily.

Therefore, the lack of use of interactive and current learning media causes students' interest in learning to tend to be small and easily bored and it is difficult to absorb the material provided, especially the current post-pandemic learning causes students to play smartphones more often as a result of learning during the co-19 pandemic and SDN Tegalayu 96 Surakarta has not utilized smartphones to the fullest and educators have not implemented educational game-based learning media in the learning process, especially in science subjects on the growth and development of living things. Researchers concluded that to increase the effectiveness and efficiency of learning, it is necessary to design innovative and creative learning media.

Efforts that can be made to overcome these problems are by designing fun learning media that can teach certain materials and can provide literacy for students to learn. Jean Piaget's theory states that children's cognitive development will generally refer to the stage where children are able to absorb meaning, and also knowledge, from the experiences and information they acquire. In the early stages of adolescence, there will be a major cognitive shift towards thinking that is more conceptual, abstract, and forward-looking. In adolescence, children will begin to show interest and ability in art, writing, music, sports, and religion. children between the ages of 2 to 7 are in the preoperational stage, meaning that at this stage, children can think about things symbolically or visual examples are used in the development process. Their use of language will become more fluent. In addition, they also develop memory and imagination which allows them to understand the difference between the past and the future. But their thinking is based on intuition and is still not fully logical (Anditiasari & Dewi, 2021).

Based on the observations that have been made at SD N Tegalayu 96 Surakarta, Educators have not implemented learning media based on android educational games in the learning process. In classroom learning, the delivery of material for SD N Tegalayu 96 Surakarta educators still uses learning media that are less interesting or less varied. There is no learning media based on android educational games applied at SD N Tegalayu 96 Surakarta on the material of growth and development of living things. Therefore, learning media that is more diverse and fun for students is needed. The purpose of researchers conducting this study is to determine the feasibility of the design of educational game-based learning media "Si Advent" as a science learning media on the material of growth and development of living things at SD N Tegalayu 96 Surakarta.

## **B. Research Methods**

In this study, the type of research method that uses the Research and Development method is often referred to as Research and Development or R&D. This method is an operational process of collecting data used for research for the purposes of making a product and checking the validity of a product produced (Sugiyono, 2019).

In essence, development research has the function of validation and product development. Product validation if it already exists and researchers only test the effectiveness or validity of the product. Meanwhile, product development updates existing products to make them easier, more efficient, or create new products that already exist (Sugiyono, 2019).

This research and design produces an educational game-based learning media on the material of growth and development of living things made using construct 2 and other supporting programs. This research uses the ADDIE research and development model developed by Dick and Carey to design a learning system consisting of 5 phases including analysis, design, development, implementation and evaluation (Sugiyono, 2019). Because the product was only used on a small scale, namely class III at SD N Tegalayu 96 Surakarta. So the researcher simplified this research model into 3 phases including analysis, design, development.

Data collection used interview techniques, distributing questionnaires and documentation. The tool used for data collection was a product feasibility assessment instrument developed by material experts, media experts and educators from SD N Tegalayu 96 Surakarta. The data obtained were quantitative and descriptive. The data was then validated using a Likert scale (range 1 to 5) and recalculated and calculated based on the percentage of all aspects reported. (Abdullah & Yuniarta, 2018).

The formula in the total assessment of respondents' answers is as follows:

$$P = \frac{JS}{JI} \times 100\%$$

**Description:**

P : Percentage

JS : The number of respondents' scores from each item

JI : The maximum number of scores that can be obtained

In addition to using a Likert scale, black box testing techniques were also used to analyze the data in this study. Blackbox testing is a technique for testing software from a functional perspective, bypassing design and program testing. This technique focuses only on software in terms of the requirements and specifications specified during design (Roger, 2012).

### C. Results and Discussion

#### 1. Educational Game-based Learning Media

Educational game-based learning media is designed based on increasingly sophisticated technological developments and requires the development of education in order to create learning that is in accordance with the times. Educators can easily receive and understand learning materials through the use of technology in the learning process contained in a learning media (Habib et al, 2020).

This research and design produced an interactive learning media based on Educational Games, and to determine the feasibility of the media when used as a teaching medium for teachers of subjects for growth and development of living things in class III SD Negeri Tegalayu 96 Surakarta. This research uses the Research and Development (R&D) method with products designed in the form of interactive learning media based on educational games. This research uses the ADDIE development model with the stages of Analysis,

Design, Development, Implementation, and Evaluation, which has been simplified into Analysis, Design, Development.

Research and needs analysis in this study researchers conducted interviews with third grade teachers at SD Negeri Tegalayu 96 Surakarta to strengthen and add information. Based on observations and interviews, it shows that students need a new learning media that can be interesting and easy to use by students and easy to understand the material of growth and development of living things in class III.

a. Analysis

Needs analysis activities, learner analysis, task analysis are reviewed learning media contained in class III, then formulated into game-based learning media from the analysis. It takes a hardware builder in the form of a Smartphone with a minimum specification of Android OS 5.0+, 512 MB RAM and 1 GB internal memory so that it can run the Si Advent software properly and smoothly.

b. Design

In the design stage, product design is carried out. This design activity begins with the creation of a media content project then continues to the stages of compiling material descriptions, making flowcharts, and making storyboards. This flowchart shows the flow of educational game-based learning media, and the stages in the media. Then the story board contains the design of educational game-based learning media, writing design, application background design, and menu display design. Suggestions from the media expert assessment questionnaire are for buttons that still have no information, it is hoped that the button design can be directly added to the information.

c. Development

The development stage is the production stage of educational game-based learning media products "Si Advent" which are produced and packaged in the form of expansion files (\*.apk). This learning material is designed in a standalone format, which can be installed and run offline (without an internet connection) and online on an Android smartphone. The construction of game-based teaching materials is carried out using Construct 2 software which is compiled based on the diagrams and storyboards that have been prepared in the previous step.

The following are the results of the learning media design carried out by researchers presented on the Construct 2 application screen as in Figure 1.

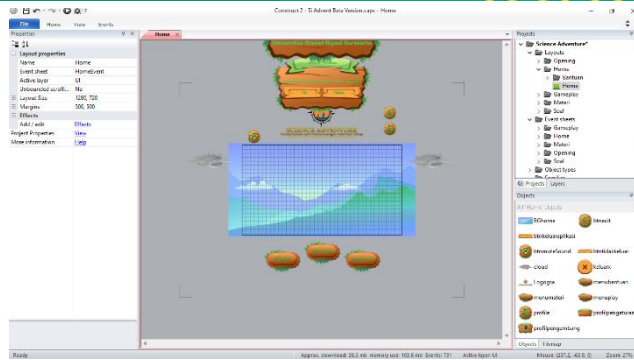


Figure 1.  
Construct 2 Application View

Then, the following is the display of educational game-based learning materials using the developed construct 2.



Figure 2.  
Display of Educational Game-Based Learning Media

Then, here is the Play display in the developed "Si Advent" learning media.

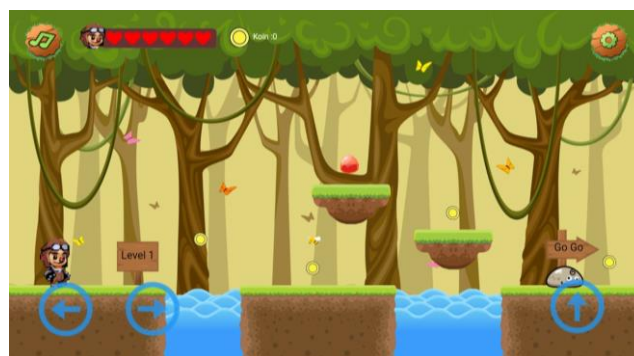


Figure 3.  
Game View

Then, the following is the appearance of the Material in the developed "Si Advent" learning media.



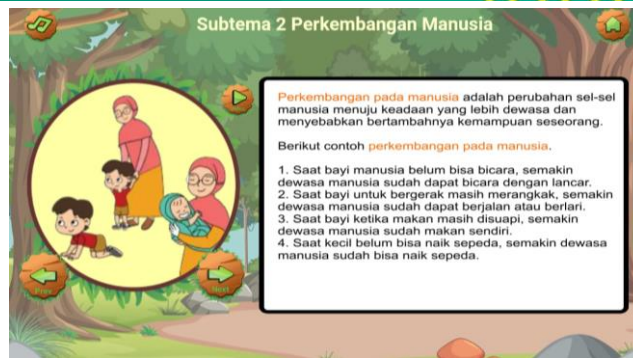


Figure 4.  
Material Display

2. Product Testing

The product testing stage is carried out after the interactive learning media based on educational games has been designed. Product testing was carried out twice using the Blackbox testing method and validation questionnaires given to experts in their fields (Expert Judgement) and third grade students at SD Negeri Tegalayu 96 Surakarta at the time of testing.

a. Blackbox Testing

Is the first testing stage before interactive learning media can be validated by experts (Expert Judgement). The blackbox testing stage tests how the product works and functionality is carried out as a reference to be able to proceed to the next testing stage.

The results of testing interactive learning media can be seen in the test table below:

Table 1. Blackbox testing results

Component	Expected Results	Results
Open the learning media by pressing the Science Adventure app icon	The application opens and displays the loading screen, then enters the main menu	Successful
Pressing the material button	The page moves to the material view	Successful
Pressing the play button	The page moves to the how to play view	Successful
Pressing the help button	The page moves to the help view	Successful
Pressing the profile button	The page displays a pop-out of developer profile information	Successful

Source: Research Data

The conclusion from the application testing table is that the buttons in the application function properly and in accordance with the expected results. Researchers draw the conclusion that interactive learning media based on Educational Games is ready and can be continued for feasibility testing by experts (Expert Judgement) and students.

b. Product Validation by Expert Judgement and Student Response

At this stage the product is then validated and tested to experts, so that the shortcomings of this learning media can be known and can be corrected. In addition to knowing the shortcomings, this validation also aims to determine the feasibility of learning media.

1) Material Expert Validation

In the material expert validation of educational game-based learning media, there are 3 aspects, namely the Learning Presentation Aspect, the Material / Content Integration Aspect, and the Learning Media Update Aspect with a total of 22 statements that must be validated. On testing by material experts, this interactive learning media obtained a score of 104 out of a maximum score of 110. Then, this score is converted into a Likert scale calculation so that it gets a percentage of 94.54% which is in the 81% - 100% score interval.

**Tabel 2.** Material Expert Validation Results

No	Assessment Aspect	JS	JI	Percentage (P)	Criteria
1.	Presentation Learning	51	55	92,27%	Very Feasible
2.	Integrity Material and Content	39	40	97,5%	Very Feasible
3.	Media Updates Learning	14	15	93,3%	Very Feasible
<b>Total</b>		<b>104</b>	<b>110</b>	<b>94,54%</b>	<b>Very Feasible</b>

Source: Research Data

Based on these data, it can be concluded that there is no need for product testing again because this learning media gets very feasible criteria for use as teaching materials for science subject teachers on the Growth and Development of Living Things class III at Tegalayu 96 Surakarta State Elementary School with a percentage of 94.54% in accordance with the eligibility criteria based on (Asyhari & Silvia, 2016).

2) Median Expert Validation

In the median expert validation of educational game-based learning media, there are 3 aspects, namely Visual Aspects, Accessibility Aspects, and Audio Aspects with a total of 25 statements that must be validated. On testing by media experts, this interactive learning media obtained a score of 102 out of a maximum score of 125. Then, this score is converted into a Likert scale calculation so that it gets a percentage of 81.6% which is in the 81% - 100% score interval.

**Tabel 3.** Media Expert Validation Results

No	Assessment Aspect	JS	JI	Percentage (P)	Criteria
1.	Visual	45	55	81,81%	Very Feasible
2.	Accessibility	45	55	81,81%	Very Feasible
3.	Audio	12	15	80%	Worth
<b>Total</b>		<b>102</b>	<b>125</b>	<b>81,6%</b>	<b>Very Feasible</b>

Source: Research Data

Based on these data, it can be concluded that there is no need for product testing again because this learning media gets very feasible criteria for use as teaching materials for science teachers on the Growth and Development of Living Things class III at Tegalayu 96 Surakarta State Elementary School with a percentage of 81.6% in accordance with the eligibility criteria based on (Asyhari & Silvia, 2016).

3) Educator Validation

In the educator validation of educational game-based learning media, there are 3 aspects, namely Appearance Aspect, Visual Communication Accessibility Aspect, and nLearning Media Update Aspect with a total of 26 statements that must be validated. On testing by educators, this interactive learning media obtained a score of 125 out of a maximum score of 130. Then, this score was converted into a Likert scale calculation to get a percentage of 96.15% which was in the 81% - 100% score interval.

**Tabel 4.** Educator Validation Results

No	Assessment Aspect	JS	JI	Percentage (P)	Criteria
1.	View Accessibility	30	30	100%	Very Feasible
2.	Visual Communication	61	65	93,84%	Very Feasible
3.	Up-to-date Learning Media	34	35	97,14%	Very Feasible
<b>Total</b>		<b>125</b>	<b>130</b>	<b>96,15%</b>	<b>Very Feasible</b>

Source: Research Data

Based on these data, it can be concluded that there is no need for product testing again because this learning media gets very feasible criteria to be used as teaching materials for teachers of science subjects on the Growth and Development of Living Things class III at Tegalayu 96 Surakarta State Elementary School with a



percentage of 96.15% in accordance with the eligibility criteria based on (Asyhari & Silvia, 2016).

#### 4) Student Response

The results of student responses are presented in tabular form, there are 3 aspects, namely the use of learning media, the impact of using learning media, the supporting facilities aspect. The results of student responses are used to determine the feasibility of educational game-based learning media.

Based on the test by 8 students, this interactive learning media obtained a score of 426 out of a maximum score of 480. Then, this score is converted into a Likert scale calculation to get a percentage of 88.75% which is in the 81% - 100% score interval.

**Tabel 5.** Student Response Results

No	Assessment Aspect	JS	JI	Percentage (P)	Criteria
1.	Use of Learning Media	135	160	84,37%	Very Feasible
2.	Impact of using teaching media	145	160	90,62%	Very Feasible
3.	Supporting Facilities	146	160	91,25%	Very Feasible
<b>Total</b>		<b>426</b>	<b>480</b>	<b>88,75 %</b>	<b>Very Feasible</b>

Source: Research Data

Based on these data, it can be concluded that there is no need for product testing again because this learning media gets very feasible criteria for use as teaching materials for teachers of the Growth and Development of Living Things class III at Tegalayu 96 Surakarta State Elementary School with a percentage of 88.75% in accordance with the eligibility criteria based on (Asyhari & Silvia, 2016).

The results of research on learning media design are in accordance with the results of research conducted by :

- Sari et al., (2020) Based on his research, he concluded that Educational Games are a collection of data in the form of sources and materials about knowledge about living things in the form of images downloaded on the internet and videos, making game flowcharts, making game designs, installing construct 2, testing games.
- Ira, (2016) Based on his research, he concluded that the Android-based science learning game application using uConstruct 2 was successfully designed. There are interesting learning support functions that help the science learning process in the classroom.
- Adiwijaya et al., (2015) Based on his research, he concluded that this educational game application can run on a minimum system requirement of 1 GB Ram

memory, and this educational game already includes the concept of making developers.

- d. Saputra, (2019) Based on his research, he concluded that the existence of learning media in the learning process can increase students' interest in learning and have a positive impact on educators and students in the learning process.
- e. Abdullah & Yunianta, (2018) Based on his research, he concluded that the existence of educational game learning media is practical and valid or can be used by students.
- f.

#### **D. Conclusion**

Based on the results of research and discussion on the design of educational game-based learning media on the material of growth and development of living things in class III at SD Negeri Tegalayu 96 Surakarta, it can be concluded that:

1. The resulting product is an educational game-based learning media application on the material of growth and development of living things in class III.
2. The android-based learning media has been tested for feasibility using the media assessment Feasibility Test System, obtained a Material Expert Feasibility Percentage Score of 94.54% with a very feasible item rating of 94.54%, from the media expert getting a feasibility percentage score of 81.6% for the very feasible category, from the Tegalayu 96 Surakarta State Elementary School teacher getting a feasibility percentage score of 96.15% for the very feasible category, very good and students got a feasibility percentage score of 88.75% with a very good category.

## References

- Abdullah, F. S., & Yunianta, T. N. H. (2018). PENGEMBANGAN MEDIA PEMBELAJARAN MATEMATIKA TRIGO FUN BERBASIS GAME EDUKASI MENGGUNAKAN ADOBE ANIMATE PADA MATERI TRIGONOMETRI. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 7(3), 434. <https://doi.org/10.24127/ajpm.v7i3.1586>
- Adiwijaya, M., S, K. I., & Christyono, Y. (2015). Perancangan Game Edukasi Platform Belajar Matematika Berbasis Android Menggunakan Construct 2. *Transient*, 4(1), 128–133.
- Anditiasari, N., & Dewi, N. R. (2021). Analisis Teori Perkembangan Kognitif Piaget Pada Anak Usia 11 Tahun Di Brebes. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, 6(1), 97–108. <https://doi.org/10.31943/mathline.v6i1.177>
- Asyhari, A., & Silvia, H. (2016). Pengembangan Media Pembelajaran Berupa Buletin dalam Bentuk Buku Saku untuk Pembelajaran IPA Terpadu. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 5(1), 1–13. <https://doi.org/10.24042/jpifalbiruni.v5i1.100>
- Habib, A, Astra, I. M., & Utomo, E. (2020). Media Pembelajaran Abad 21: Kebutuhan Multimedia Interaktif Bagi Guru dan Siswa Sekolah Dasar. *JARTIKA : Jurnal Riset Teknologi Dan Inovasi Pendidikan*.
- Ira, N. S. (2016). *APLIKASI GAME EDUKASI PEMBELAJARAN PENGENALAN DAN PENGELOMPOKAN HEWAN UNTUK MATA PELAJARAN IPA KELAS 4 THE LEARNING APPLICATION OF EDUCATIONAL GAME FOR INTRODUCING AND GROUPING ANIMALS FFOR GRADE 4 th OF Ar-Rafi ELEMENTRY SCHOOL USING CONSTRUCT 2*. 2(3), 1081–1089. <https://libraryproceeding.telkomuniversity.ac.id/index.php/appliedscience/article/view/3467/3290>
- Primasari, D. A. G., Dencik, & Imansyah, M. (2019). Pendidikan Karakter Bagi Generasi Masa Kini. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgris Palembang 12 Januari 2019*, 1100–1118.
- Roger, S. P. (2012). Rekayasa Perangkat Lunak Pendekatan Praktisi. In *ANDI. Yogyakarta: Vol. Edisi 7*.
- Saputra, R. E. (2019). Penerapan Media Pembelajaran Interaktif Dalam Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran PPKn Kelas VII Di SMP N 1 Salatiga. *Skripsi*, 1–46.
- Sari, D. A., Yulianto, & Fadhlina, N. R. (2020). “Kebunku” Educational Game Using Construct 2. *Tepian*, 1(3), 84–91. <https://doi.org/10.51967/tepian.v1i3.172>
- Sulianto, J., Purnamasari, V., & Febriarianto, B. (2019). Pengaruh Model Pembelajaran Think-Pair-Share terhadap Hasil Belajar Siswa Kelas V (Lima) Materi Organ Tubuh Manusia dan Hewan. *International Journal of Elementary Education*, 3(2), 124. <https://doi.org/10.23887/ijee.v3i2.18515>