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Development of Android-Based Digital Teaching Materials Using Articulate Storyline 3 to Increase Student Motivation and Learning Outcomes in Natural and Social Science Subjects

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Abstract: Natural and Social Sciences (IPAS) is one of the main subjects at the elementary school level, where to achieve maximum results in learning IPAS, it requires active student involvement during learning activities. However, the low understanding of teachers about current technology makes it difficult for students to understand the subject matter due to the limited use of learning media. Therefore, researchers want to develop an android-based digital teaching material that can be used by students wherever they are and can be used repeatedly. Researchers used the Research and Development (RnD) research type using the ADDIE model. This study aims to produce android-based digital teaching materials assisted by articulate storyline 3 on the subject matter of IPAS material oh environment so damaged for Class V Elementary School with valid, practical and effective qualifications. The validation results of android-based digital teaching materials obtained a material validation percentage of 95% with very feasible qualifications, 75% media validation with feasible qualifications, and obtained practitioner validation of 100% with very feasible qualifications. The practicality of android-based digital teaching materials obtained a student response questionnaire percentage value of 88% with very good qualifications. The effectiveness of the media is reviewed from the results of students' pretests and postests with a medium N-gain value so that it can be concluded that android-based digital teaching materials are effective.

Keywords: Articulate storyline 3; IPAS; Theaching Material

Introduction

Education is the only way to achieve the glory of mankind not only that education is also an antidote to ignorance so that it can overcome all problems in life and human life both personal and social. Astuty & Suharto (2021), stated that primary school education has great goals that are useful for the country and the students themselves Primary school education aims as the main foundation in building knowledge, intelligence and personality so that students can live independently and can continue their education at a higher level so that it is hoped that students who have good character are formed.Teachers must be knowledgeable about technology and how it is used in teaching and learning in order to keep up with the latest advancements in science, technology, and the arts in education (Darling-Hammond et al., 2024). Claimed that Indonesia has a highly developed use of information technology in the sphere of education, particularly in the creation of learning media (Wahyuni et al., 2022).

One of the relevant learning components to be used in 21st century learning is in the form of android-based digital teaching materials (Hakim et al., 2019; Handoyono & Rabiman, 2020; Rofi'i & Susilo, 2023). One of the learning content that requires digital teaching resources based on Android is the content of the IPAS lesson material oh environment so damaged. Science

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teaching in primary schools in particular should focus on providing children with hands-on knowledge to help them build the skills they need to explore and understand the environment scientifically (Muhardini et al., 2023; Strat et al., 2023; Murphy et al., 2021). Therefore, the use of education media in the form of android-based digital teaching materials is very important in learning. But in reality, the use of digital technology in supporting the learning process in class V SDN Ngaliyan 02 has not been applied optimally due to several obstacles such as choosing or designing learning media that are suitable for learning materials, operating IT-based learning media, and others. This results in a deficiency of of interest in the learning process, culminating in a lack of student learning experience, learning objectives cannot be fulfilled in the best possible way.

Based on the findings of observations and conversations with SDN Ngaliyan 02's fifth-grade teacher, the school has implemented the independent curriculum, obtained information that the learning resources used by teachers in the learning process are still in the form of printed teaching materials and the media used by teachers are only conventional media, this is due to the lack of teacher ability to provide digitally based educational resources like as presentation media, videos, animations or interactive multimedia in order for pupils to get disinterested in participating in learning plus learning that is abstract. If educators are not innovative in supporting the learning process, it will have an impact on increasing student motivation and learning outcomes. Motivation is the term most often used to explain the success or failure of almost any complex task. According to Fortus & Touitou (2021), Hornstra et al. (2023), this a student's learning motivation determines how successful their learning will be; those with great motivation for learning typically achieve at a high level, while those with low motivation for learning will likewise perform poorly in their studies.

Students that are highly motivated and engaged in their studies typically exhibit strong academic performance, well-organized study habits, and a thorough comprehension of all assigned readings (Anggraini, 2021; Cavite & Gonzaga, 2023). One way to assess if a learning process is successful is to look for good learning outcomes. Based on the background of these problems, one solution that can be offered to enhance student learning results by drawing students' attention to the material and fostering a positive learning environment is to develop android-based digital teaching materials.

Referring to the description, in learning IPAS material of the environment is damaged, teachers need to develop learning media that is close to the world of childrend, such as making Android-based Digital Teaching Materials. It is hoped that using digital teaching materials based on Android will boost student motivation and learning outcomes. This is consistent with earlier studies, specifically on learning media (Handayani et al., 2022). This research further develops Android-based Digital Teaching Material media with the help of the articulate storyline 3 application so that it is different from previous research. In order to present information with a specific goal, Articulate Storyline is a software that is used as a communication or presentation medium. Its expertise lies in creating presentations that combine technical and artistic skills to create engaging presentations (Moeis & Harmin, 2022; Dwivedi et al., 2022). In addition, Articulate Storyline is an e-learning application that aims as a tool in designing media that will be used as teaching materials (Fatihaturahmi, 2022; Daryanes et al., 2023; Rokhim et al., 2023).

Based on the background, the researcher wants to innovate in this study by raising the title "Development of Android-Based Digital Teaching Materials (Apoljar) to Increase Motivation and Learning Outcomes of Grade V IPAS Subject Students at SDN Ngaliyan 02". The goal of the project is to create instructional materials for Grade V Elementary School students in the Sciences of Nature and Society (IPAS) based on reliable, useful, and efficient categories.

Method

Using the ADDIE paradigm as a guide, this study is a development inquiry (Research and Development) (which stands for Analysis, Development, Implementation, Design, and Assessment). Priya (2021) claimed that the research and development approach (Research and Development) is a research technique used to create specific goods and evaluate their efficacy.

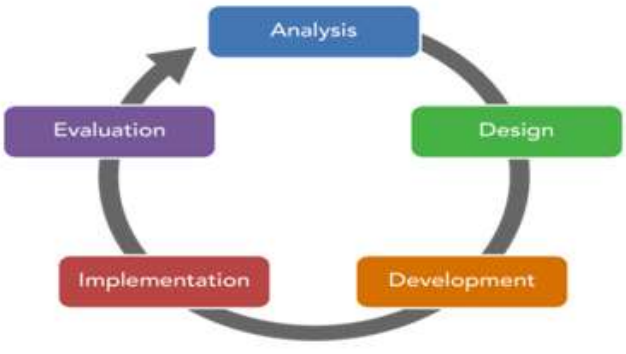

Figure 1. The ADDIE development model's stages

Analysis is the initial step (Analyze). Based on the analysis stage results, a number of actions were conducted, including examining research sites, learning resources, IPAS subjects, and student characteristics.

The findings of the examination of the traits of pupils predicated on the responses to the survey given to pupils in the class, it is known that students feel happy if in the learning process of IPAS material Oh the environment is damaged the teacher gives examples of material directly, either in the form of video, audio, images, or text. Students are very motivated if the media used by the teacher varies and can be used repeatedly, and can improve the learning atmosphere until there is a question and answers activity between teachers or between students. The researchers created digital teaching resources for Android based on the findings of the aforementioned analysis assisted by the articulate storyline 3 application which can be accessed anywhere using a computer, laptop, or smartphone that has an internet connection.

The second stage is planning (Design). In the design stage, learning objectives are set, learning scenarios are designed, learning tools are designed, as well as materials and learning evaluations. Furthermore, the results of the design are carried out designing learning media in the Rticulate storyline 3 application. The mapping of material on the learning media for android-based digital teaching materials assisted by the articulate storyline 3 application is the material in the even semester in the IPAS subject then poured into the articulate storyline 3 application by adding material, images, animations, backsound, quizzes, games and worksheets for students (LKPD), and utilizing the features available in the articulate storyline 3 application. The design stage of the learning media content is carried out by designing teaching materials for material oh environment so damaged in IPAS subjects that researchers have adjusted to the analysis of learning needs through student needs questionnaires and teacher needs questionnaires that researchers have spread at the stage of analysis.

Development is the third phase. The results at the development stage were adjusted to the design stage, namely the development of learning content implemented using the articulate storyline 3 application. After media development, product validity testing was carried out by material experts and media experts, as well as product trials using a sample of nine students used for small group trial activities. The expert validity test itself is carried out to improve the quality of learning on the learning media developed. The expert test stage that researchers conducted was the material expert test, and the learning media expert test. After conducting the product validity test, the test results were then analyzed and improvements were made to the theaching materials developed according to suggestions from experts, practitioners and students.

Some of the participants in this development are material experts, learning media experts, practitioners, 9 students used for small group trial activities, and 18 students for large-scale trials. While the object of this development research is the validity of the theaching materials oh environment so damaged. Both qualitative and quantitative data were employed in this investigation. These data are obtained based on the evaluation findings conducted by media and material experts, as well as teacher responses as learning practitioners and responses obtained from the results of trials to grade V students. The grids for the research instruments are displayed in Tables 1, 2, 3, and 4.

Table 1. Material Expert Instrument Grid

Aspect		Indicator	Number of Items
Appropriateness	1)	Content suitability for learning objectives (CP).	1
Material/content	2)	Content appropriateness for learning goals	1
	3)	Completeness of learning materials in a systematic sequence and arrangement	1
	4)	The material Oh the environment has become damaged in the module is easy for students to understand	1
Suitability of material to student development	5)	The material presented is appropriate to the level of cognitive development of class V students	1
	6)	Presenting the material can foster children's enthusiasm for learning the material because the environment is damaged	1
Aspects of Linguistic Feasibility	7)	The use of language used in learning media can be understood by students	1
	8)	The language used in the media is communicative.	1
	9)	The language used in learning media is appropriate to the language of class V children.	1
Suitability of learning media using images.	10)	Image used in learning media can be understood	1
Amount			10

Table 2. Learning Media Expert Instrument Grid

Aspect		Indicator	Number of Items
Appropriateness Material/content	1)	The title of the teaching material is in accordance with the material I chose	1
	2)	Teaching materials are made in accordance with CP and TP.	1
	3)	The Articulate Storyline 3-based teaching materials that I made are in accordance with the learning objectives.	1
	4)	The content of the material presented in theaching materials is adjusted	1
	5)	to CP, TP and material. The presentation is equipped with clear reading texts that are appropriate to the material. the module is easy for students to understand	
Display Aspects	6)	The display design of teaching materials can foster student motivation to learn.	1
	7)	The display design presented in the teaching materials is interesting students' attention to increase learning motivation.	1
	8)	Selection and use of font types in theaching material articlate storyline according to student needs.	1
	9)	The images presented are varied so they attract students' attention	1
Ease of Use Aspect	10)	Use of images according to the material.	1
	11)	The combination of text, colors and images is harmonious, making it easier to convey the message.	1
	12)	Teaching materials can be used repeatedly anywhere and anytime.	1
	13)	Teaching materials is easy to use in science learning oh the environment is so damaged.	1
	14)	Instructions for use in teaching materials are clear and easy to understand.	1
	15)	Teaching materials is easy to use because it is adapted to the level of development and character of fifth grade elementary school students.	1
Amount			15

Table 3. Teacher instrument grid

Aspect		Indicator	Number of Items
Aspects of suitability of Apoljalearning materials	1)	The title of the theacing learning media is appropriate to the material presented.	1
	2)	The teaching Learning Media based on Articulate Storyline 3 which was developed is in accordance with the Social Science Learning Outcomes material oh the environment is damaged.	1
	3)	The teaching Learning Media based on Articulate Storyline 3 which was created is compliant with the objectives of science and science learning material oh the environment is being damaged.	1
	4)	The teaching material based on Articulate Storyline 3 which has been presented and arranged in learning media is appropriate to the ability level of class V students	1
	5)	The delivery of science and science subject learning media material about the environment being damaged using Articulate Storyline 3 is equipped with reading texts that are clear and appropriate to the learning material.	1
Media Aspect	6)	Digital teaching materials with learning media using Articulate Storyline 3 science subjects material oh the environment is can energize pupils and boost their desire to learn in order to enhance science learning results.	1

Aspect		Indicator	Number of Items
	7)	The combination of colors used in digital teaching materials with learning media using Articulate Storyline 3 can attract the attention of students' interest in learning and motivation in learning activities.	1
	8)	The images displayed in the teaching learning media are in accordance with the material discussed.	1
	9)	The picture illustrations presented are interesting and in accordance with the content of the material oh the environment is being damaged.	1
Language Aspects	10)	The music in the teaching learning media using Articulate Storyline 3 can be heard clearly by class V students	1
	11)	Students can easily grasp the terminology used in teaching learning materials	1
	12)	The wording is simple, succinct, and straightforward	1
Amount			12

Table 4. Small Group Trial Instrument Grid

Indicator	Number of Items
Learning with digital teaching materials based on articulate storyline 3 social Science Subjects material about the environment being damaged is more interesting and not boring.	1
Learning with digital teaching materials based on articulate storyline 3 Social Science Subjects material oh the environment is damaged can create a more enjoyable learning atmosphere.	1
Learning with digital teaching materials based on articulate storyline 3 Social Science Subjects material oh the environment has become damaged can encourage me to be enthusiastic about learning	1
Learning with digital teaching materials based on articulate storyline 3 Social Science Learning Subjects, oh then environment has become damaged, encouraging me to be active in learning activities by asking questions to the teacher	1
Learning with digital teaching materials based on articulate storyline 3 environment has become damaged can encourage me to get motivation and achieve my learning results	1
Learning with digital teaching materials based on articulate storyline 3 in the IPAS subject matter oh a damaged environment can encourage me to complete tasks in group work	1
Learning with digital teaching materials based on articulate storyline 3 Social science Subjects material oh the environment has become damaged has made the atmosphere in the class active in learning	1
Learning with digital teaching materials based on articulate storyline 3 Social Science Subjects, the material oh the environment has become damaged is suitable for use in classroom learning	1
Amount	8

Table 5. Percentage Range and Product Feasibility Criteria

Score Range	Classification/Predicate
81 <$\underline{X}$ < 100 %	Very Feasible
61 <$\underline{X}$ < 80 %	Feasible
41 <$\underline{X}$ < 60%	Decent Enough
21 <$\underline{X}$ < 40 %	Less Feasible
0< x < 20 %	Not Feasible

The outcomes of the expert test assessment were calculated utilizing the feasibility test formula to determine the feasibility coefficient. The validity of the material expert on the IPAS subject matter oh environment so damaged is 95% or in the range of 81-100% with extremely practical standards. Although the learning media expert's validity on the IPAS subject matter of the environment is damaged is 75% or in the range of 61-80% with decent criteria. Practitioner validity on the IPAS subject matter of the environment is damaged by 100% or in the range of 81-100% with very feasible criteria. While the validity of students on the content of the IPAS lesson material of the environment is damaged by 88% or in the range of 81-100% with very feasible standards. Considering the aforementioned assessment, it is concluded that the Android-based Digital Teaching Materials assisted by the articulate storyline 3 application are very feasible to use in the learning process.

Result and Discussion

The evolution of Android-based Digital Teaching Materials assisted by the articulate storyline 3 application on the content of IPAS subject matter of the environment is damaged begins with the analysis stage (analyze), namely needs analysis, literature study, and survey. Needs analysis was carried out at SDN Ngaliyan 02 Semarang city by distributing questionnaires to find out the needs of students and teachers in the learning

process, as well as a school where the development product was tested or where researchers conducted research. Literature study is done by looking for research that has been published in a journal, or looking for articles that are related to this research and then used as a reference to design the digital teaching materials developed.

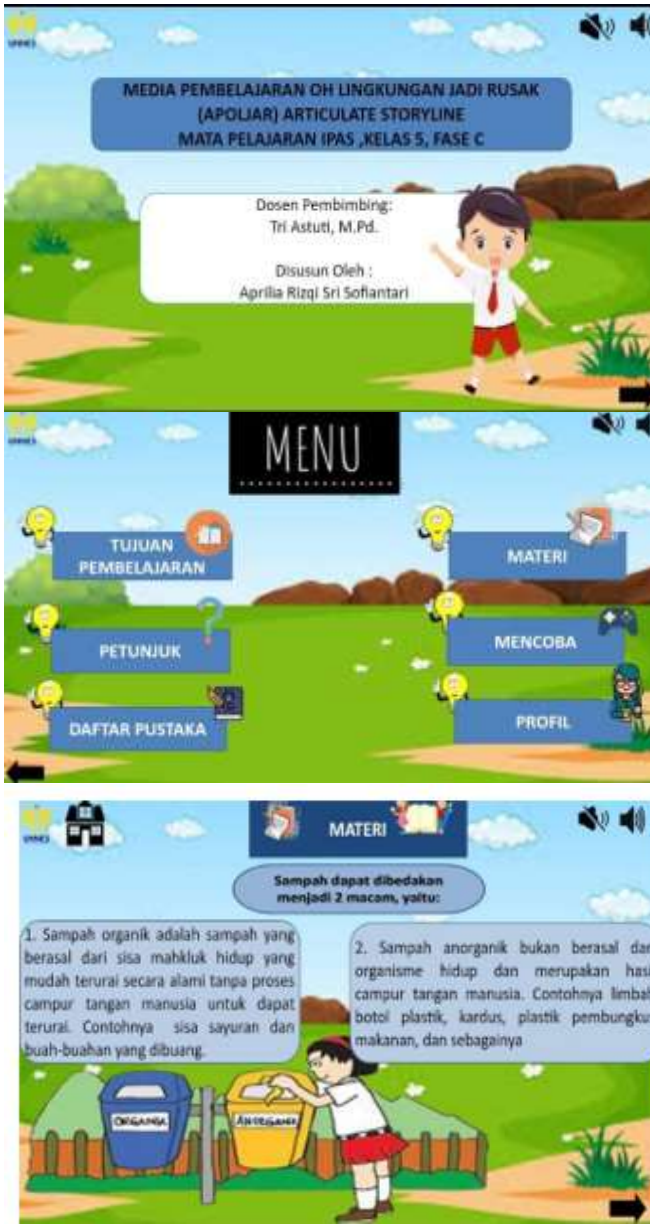

Figure 2. Display of Android-based Digital Teaching Materials Articulate Stotyline 3

The second stage is the design stage, at this stage a curriculum analysis is carried out which is used to determine the material, compile the content of Android-Based Digital Teaching Materials assisted by the articulate storyline 3 application in the IPAS subject matter of the environment is damaged, make drafts, determine assessment instruments, and determine the compiling software. Some views of the Android-Based Digital Teaching Materials assisted by the articulate storyline 3 application as demonstrated in Figure 2.

The fourth stage is the trial stage (implement). At this stage the android-based digital teaching material Articulate Storyline 3 which has been declared feasible to use and tested on educators by dividing 9 children as a small group and 18 children as a large group. But before entering this trial stage, researchers need to do a validity test first. The validity test is the level of reliability and validity of the measuring instrument used. When an instrument is deemed legitimate, it indicates that the measuring device that was utilized to collect the data is reliable and capable of measuring the appropriate things (Arsi, 2021; Husaeni et al., 2022) In other words, the validity test concerns whether or not the test actually measures what it is intended to measure (Haq, 2022; Ramadhan et al., 2024). Table 6 displays the validation test.

Table 6. The outcomes of the product validation test

Test Subjects	Validity Results %	Information
Test by Media Experts	75	Worth It
Material Expert Test	95	Very Worth It
Classroom Teacher Test	100	Very Worth It
Small Group Trials	88	Very Worth It

The android-based digital teaching materials that researchers have developed are then implemented in field trials on grade V students. Small group trials were conducted in class IV SDN Ngaliyan 02 with 9 respondents with high, medium, and low learning outcomes, while large-scale trials were conducted with 18 respondents. The answers to the 20 questions that students were given for the pretest and posttest together show whether or not the media is beneficial. Before using android-based digital teaching materials, students are first given pre-test questions to measure students' initial knowledge of the material in the learning media (Juniari & Margunayasa, 2022; Sugiyarto et al., 2018). After working on the pre-test questions, then proceed with the application of android-based digital teaching materials and proceed with working on posttest inquiries.

Table 7. The outcomes of the product effectiveness test

Test Subjects	Pre-test	Post Test
Small Group	63.88	87.22
Material Expert Test	69.72	87.05

The evaluation step is the fifth phase. At this stage, management of the assessment results and drawing conclusions (Andi Rustandi & Rismayanti, 2021) In order for the small group to the pre- and post-test results should be regularly distributed normalcy test results

were 0.09, meaning that L count < L table (0.09< 0.27). In order for the large group pre- and post-test results must be regularly distributed normalcy test results were 0.01, meaning that L count < L table (0.011 < 0.200). The homogeneity test was then carried out. Because t count < t table, the results of the small group and big group homogeneity tests indicated homogeneous data. The N-gain test was then carried out. Table 8 displays the outcomes of the N-gain test.

Table 8. N-Gain Test Results

Class Pretest	Many Students Post Test	Average	N-Gain	Criteria
Small Group	9	87.22	0.64	Medium
Large Group	18	87.05	0.61	Medium

Based on the results of the acquisition of questionnaires from media experts, material experts, practitioners, and students, it can be concluded that Android-based digital teaching materials, on the IPAS subject matter of this damaged environment is declared feasible for use. Taking into account the results of the research that have been conducted, the development of android-based digital teaching materials assisted by the articulate storyline 3 application shows very high achievement. Learning media or teaching materials in addition to transforming material to students and achieving their development can also help teachers develop creativity in making unique and interesting teaching materials. show high achievement (Munawar, 2020; Haleem et al., 2022; Smiderle et al., 2020). Monotonous teaching materials can affect the passion and motivation of students who are less than optimal, so as to achieve the expected development (Kruk & Zawodniak, 2020; Yildiz et al., 2021). Based on research that has been conducted in creation of digital instructional resources through videos can improve the cognitive development of students (Muhajir et al., 2022; Munawar et al., 2020).

Seeing the importance of teaching materials to the ability of students, teachers must be capable of using digital instructional resources to speed up learning activities and can also stimulate students to be active. So that teachers as much as possible need varied media and teaching materials both digital and materials around the environment. Through interviews with the fifthgrade teacher of SDN Ngaliyan 02, it was found that students' understanding of the content of the IPAS lesson, especially the material the environment is damaged, is still very basic. Students find it difficult to identify between organic and inorganic waste, as well as the processing process. This happens because of the lack of illustrations. This is because the use of learning media in schools is still low, so the interactivity and innovation of teaching and learning activities are still low which affects student motivation and learning outcomes.

With this problem, researchers feel the need for a learning innovation so that later students' understanding of the IPAS lesson content, especially in the material h the environment is damaged to be even better. The innovation presented is expected to increase students' understanding which leads to the process of thinking development in learning. One of the appropriate learning innovations in the 21st century to solve the above problems is to utilize technology and data in educational materials, such as utilizing android-based digital teaching materials (Nenohai et al., 2023; Ratnasari & Haryanto, 2019). The practicality of learning media can be measured from teacher responses to learning media and student responses to learning media. Theaching Materials is said to be practical if observations of teacher and student responses at least get a score of 61-80% including in the feasible category and the results obtained have exceeded these minimum requirements, namely 100% for teacher responses and 88% for student responses. In addition, students' responses to the motivation questionnaire were also very good (Lundgren & Eklöf, 2023; Alves-Wold et al., 2023a; Hasanah & Mada Ali, 2020). Therefore, based on the results of the acquisition of questionnaires from media experts, material experts, practitioners, and students, it can be concluded that android-based digital teaching materials, on the subject matter of IPAS material oh environment so damaged is declared feasible for use and can increase student motivation and learning outcomes.

Conclusion

Drawing on the findings of the investigation and subsequent discourse, it can be inferred that the digital instructional resources based on Android (Alpojar) on the IPAS subject matter oh damaged environment meets the valid and practical criteria of a development product. The validity of the learning media is based on the results of the assessment of the two media expert material experts who are categorized as very feasible. While the practicality of learning media is indicated by the response of fifth grade students of SDN Negeri Ngaliyan 02 which is very good towards the use of media during the learning process. These findings suggest that digital teaching resources for Android Articulate Storyline 3 on the subject matter of IPAS material oh environment so damaged is feasible to use

and can be used as an alternative to teach IPAS subject matter oh environment so damaged to grade V students of SDN Ngaliyan 02. The extraordinary school can also integrate a learning model into the use of this media so that learning objectives are met.

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