

Development of Android-Based Mathematics Learning Media Using Powerpoint and I-Spring Suite on the Matter of Integers in Class VII UPTD SMP Negeri 11 Kupang

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Abstract

The rapid development of science and technology requires us to be more active in learning how to use technology to help us solve everyday problems, especially in the field of education. Android-based smartphones are one of the products of modern technology that can be utilized as media in learning activities. Therefore, this study aims to develop android-based mathematics learning media using Powerpoint and I-Spring suite on integer material in class VII UPTD SMP Negeri 11 Kupang which is valid, practical and effective. The type of research used in this study is Research and Development (R&D) with the ADDIE model which consists of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation. The data collection techniques used are interviews, questionnaires and tests. The data analysis techniques used are qualitative and quantitative analysis. The results showed that android-based learning media on whole number material met the criteria of valid, practical and effective. The average total validity (RTV) obtained from 3 material and media experts is 4.32 and 4.25 with a very valid category. The average total practicality (RTP) from teachers was 4.12 with a practical category and small and large class students were 4.8 and 4.41 with a very practical category, respectively. The percentage of learning completeness of small class students was 80% and the large class obtained a percentage of completeness of 75% so that the learning media was categorized as effective.

Keywords: *Development, Android-Based Learning Media, Integers*

1. Introduction

The rapid development of science and technology (IPTEK) requires us to be more active in learning how to use technology to help us solve everyday problems. In addition, the use of information and communication technology (ICT) has become a common thing that we often see in all aspects of life, especially in the field of education. Information and communication technology is needed in education to encourage innovation and creativity that can have a positive impact on the progress of education and improve the quality of education. Android-based smartphones are one of the latest modern technology products that can help create high-quality learning outcomes [1].

By using android smartphones, students and teachers can access learning materials either through internet-based learning applications or through learning websites. So that students

do not feel bored and bored during learning, including learning math [2]. In the learning process, the use of android-based smartphone technology leads more to the use of media. Media itself can be used as a tool in the learning process. The use of properly selected learning media can help students to better understand the material presented. Android-based learning media is one of the learning media that utilizes technological developments in the world of education [3].

To create android-based learning media with an attractive and creative appearance, we can use the help of software such as PowerPoint and I-Spring suite, both software will be the right combination for android-based learning media [4]. PowerPoint software is part of Microsoft office, which allows us to design and help present material [5]. I-Spring is a tool for creating learning media that is presentation-based and can be used in the learning process, which includes audio, visual, and audio [6]. If PowerPoint and I-Spring are combined, it will produce interesting learning media.

Mathematics is needed to solve problems in everyday life, for example, being able to operate calculations such as addition, subtraction, multiplication, and division [7]. One of the math materials related to everyday life is integers. Integer material is learning material for grade VII SMP odd semester and is one of the basic knowledge that must be mastered before studying algebra. In this learning, students have difficulty in understanding arithmetic operations, this is because students feel bored, causing them not to pay attention to the teacher during the learning process [8]. For this reason, it is very important to make learning more fun in order to attract students' attention by using android-based learning media [9].

Based on the results of observations and interviews conducted at UPTD SMP Negeri 11 Kupang in September 2023, it appears that during the teaching and learning process most teachers only use student books and teaching aids as learning media, so that the teaching and learning process tends to be boring and results in low student learning outcomes seen from the results of the recap of previous math scores. Therefore, it is necessary to develop an android application that can be used as a tool in the learning process in order to make the learning atmosphere in the classroom not monotonously fixated on books.

From the description above, the authors are interested in conducting research with the title "Development of Android-Based Mathematics Learning Media Using PowerPoint and I-Spring suite on Integer Material in Class VII UPTD SMP Negeri 11 Kupang".

2. Method

The type of research used is research and development (R&D). This research used the ADDIE development model which consists of five stages, namely analyze, design, development, implementation, and evaluation.

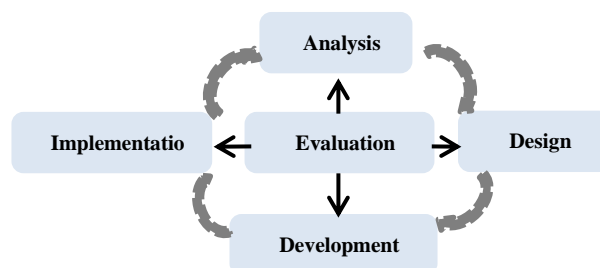


Figure 1. Steps of the ADDIE Development Model

This research was conducted at UPTD SMP Negeri 11 Kupang in the odd semester of the 2024/2025 school year. The subjects in this study were seventh grade students who were divided into 2 groups of subjects, namely a small class trial of 5 students and a large class trial of 20 students.

The data collection techniques used in this study are interviews, questionnaires and tests with the data collection instruments are interview guidelines containing questions related to learning mathematics in the classroom, questionnaire sheets in the form of response questionnaires that will be filled in by students and teachers after using learning media and test questions consisting of 5 questions in the form of descriptions with indicators of questions containing integer material. The data obtained will be analyzed using qualitative data analysis techniques from the results of interviews, criticisms and suggestions from validators and quantitative data analysis techniques obtained from the results of filling out questionnaire sheets by material and media experts, teachers and students as well as evaluation test results. Quantitative data analysis is divided into 3, namely:

1. Media validity analysis technique

This analysis serves to measure the feasibility of learning media both in terms of material, evaluation questions and the appearance of learning media. The validity analysis can be determined by calculating the total average validity of the media using the formula:

$$RTV = \frac{\sum_{i=1}^m A_i}{m}$$

Description:

RTV : Average total validity of learning media

A_i : Average of i- the aspect

i : Aspects

m : Number of aspects

The total average validity that has been obtained can be concluded with the scoring range as in the following table:

Table 1. Validity Scoring Criteria

Score Interval	Categori
$0 \leq RTV < 1.8$	Invalid
$1.8 \leq RTV < 2.6$	Less Valid
$2.6 \leq RTV < 3.4$	Fairly Valid
$3.4 \leq RTV < 4.2$	Valid
$4.2 \leq RTV < 5$	Very Valid

Source: Sudjiono in [10]

2. Media practicality analysis technique

The practicality of learning media is measured from the results of subject teacher responses and student responses after using learning media. Practicality analysis can be determined by calculating the total average of media practicality using the formula:

$$RTP = \frac{\sum_{i=1}^m A_i}{m}$$

Description:

RTP : Average total practicality of learning media

A_i : Average of i- the aspect

i : Aspects

m : Number of aspects

The total average of the ratings that have been obtained can be summarized with the scoring range as in the following table:

Table 2. Practicality Scoring Criteria

Score Interval	Category
$0 \leq RTV < 1.8$	Impractical
$1.8 \leq RTV < 2.6$	Less Practical
$2.6 \leq RTV < 3.4$	Quite Practical
$3.4 \leq RTV < 4.2$	Practical
$4.2 \leq RTV < 5$	Very Practical

Source: Sudjiono in [10]

3. Media effectiveness analysis technique

The learning media is said to be effective if the evaluation test results obtained by students meet the good classification. The percentage of passing completeness is calculated using the formula:

$$P = \frac{L}{n} \times 100\%$$

Description:

P : Percentage of students passing classically

L : Number of students who reached the KKM

n : Total students

The percentage of student completion that has been obtained is matched with the learning media effectiveness criteria as in the following table.

Table 3. Criteria for assessing effectiveness

Completion Percentage	Classification
$P > 80\%$	Very Effective
$60\% < P \leq 80\%$	Effective
$40\% < P \leq 60\%$	Quite Effective
$20\% < P \leq 40\%$	Less Effective
$P \leq 20\%$	Ineffective

Source: Riduwan in [11]

3. RESULTS AND DISCUSSION

3.1. Results

The results obtained from this development research are an *android* application-based math learning media named Abibul, where this application contains integer material for VII grade students of UPTD SMP Negeri 1 Kupang. The learning media produced is a file in apk format that can be installed on an *android smartphone*. The results of this study use the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation).

3.1.1. Analysis

a. Curriculum Analysis

Based on interviews conducted with one of the UPTD teachers at SMP Negeri 11 Kupang, it is known that the applicable curriculum is the independent curriculum.

b. Learning Media Analysis

Based on the results of the interview, it was found that mathematics learning had not yet applied technology-based learning media in the classroom. The learning media commonly used in the classroom are independent curriculum VII grade student books and math props, which make students feel bored and lack concentration during the learning process, and ultimately make students less understanding of the material being taught. So that researchers developed an *android-based* learning media on integer material to help students understand learning material and help teachers to teach using technology-based learning media.

c. Material Analysis

The material analysis is related to the content of learning materials on *android-based* learning media. The learning media developed contains material topics about integers with sub-topics namely comparing integers, addition and subtraction of integers, multiplication and division of integers, and solving everyday problems related to integers.

3.1.2. Design

In the design stage, researchers design learning media to be developed, by making flowcharts and storyboards and collecting materials used in developing learning media. Flowchart serves to describe the flow of learning media which is explained in the form of a chart.

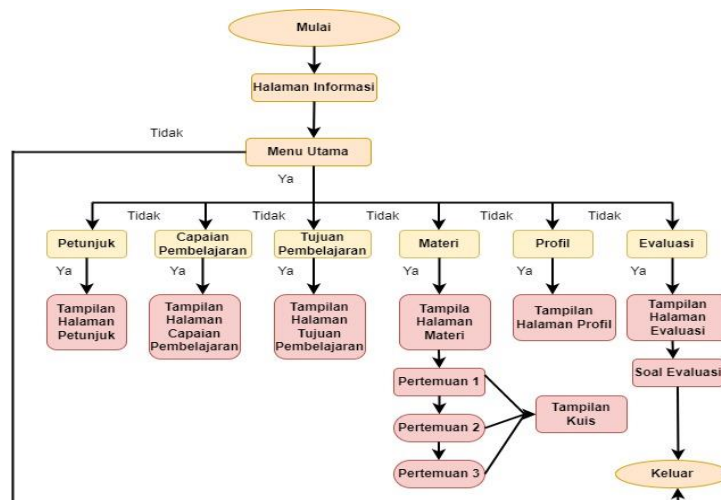


Figure 2.Flowchart display

Storyboard serves to describe the learning media plan based on the *flowchart* that has been made. The storyboard displays the layout of materials, logos, icons, buttons, and other.

3.1.3. Development

a. Learning Media Display Development

At the development stage, products that have been designed previously at the design stage are then realized into the actual display. After that the learning media that has been realized will be published in html5 form using the I-Spring suite and then converted to apk format using the help of Web2 APK Builder Pro software. Learning media that has been converted into apk form can be installed on an android smartphone.



Figure 3. Home Page



Figure 4. Information Page



Figure 5. Main Menu Page



Figure 6. Instructions Page

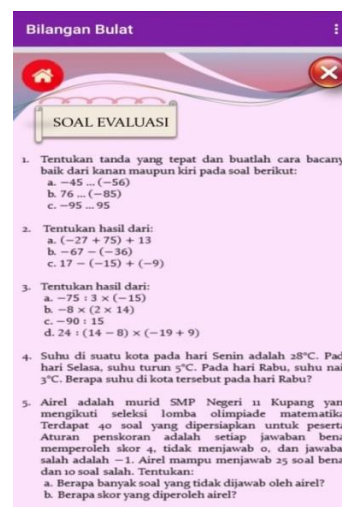
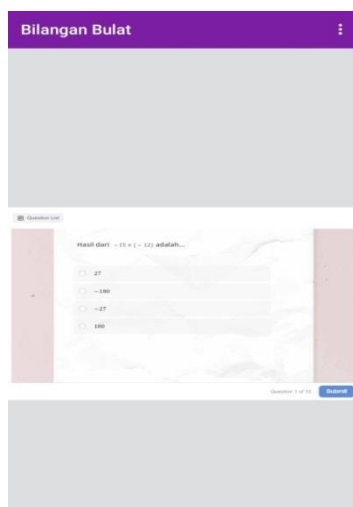
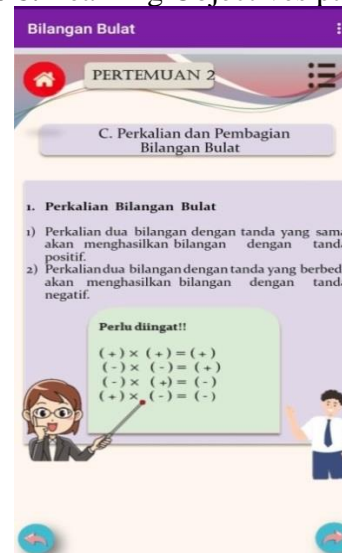
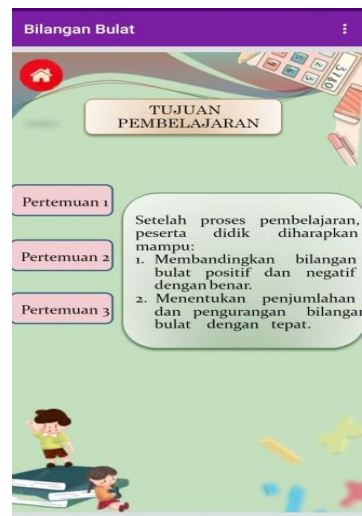
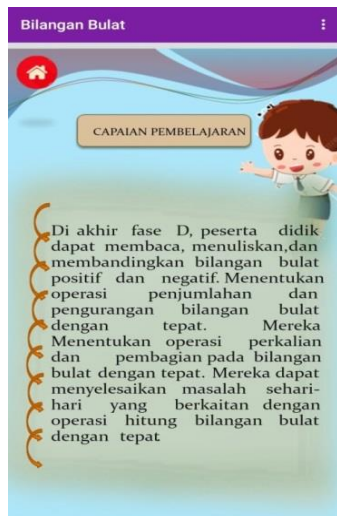




Figure 13 Profile page

b. Learning Media Validation

After the learning media has been made, the next step is to test the validity of the media by 3 validators. The following is presented the validator profile which can be seen in table 4.

Table 4. Validator Profile

Name	Jobs	Validator
Dr. Ch. Krisnandari Ekowati, M.si	Lecturer in Mathematics Education, FKIP, Undana	Material and media expert 1
Yohanes H. Nada, M.Pd	Lecturer in Mathematics Education, FKIP, Undana	Material and media expert 2
Fransiskus S. A. Nenoliu, S.Pd., Gr	Mathematics Teacher UPTD SMP Negeri 11 Kupang	Material and media expert 2

The results of the analysis of learning media validation by material experts and can be seen in table 5 and table 6.

Table 5. Material Expert Validation Analysis Results

Aspects	Statement.	Total Score	(A_j)
Curriculum	1	13	4.16
	2	12	
Learning	3	13	4.33
	4	13	
Content	5	13	4.38
	6	12	
	7	13	
	8	12	
	9	15	
	10	14	
Exercise and Evaluation Questions	11	12	4.11
	12	12	
	13	13	
Utilization of	14	15	4.66
	15	13	
Average Total Validity (RTV) Category			4.32 Very Valid

Based on table 5, it can be seen that the total average validity (RTV) of learning media from material experts is 4.32 and is included in the "**very valid**" category with a score interval of 1.5 points. $4.2 \leq RTV \leq 5$.

3.1.4. Implementation

At this stage, trials will be conducted to students. This trial was conducted to determine the practicality and effectiveness of the learning media that had been developed. This trial consists of two stages, namely small class trials and large class trials.

a. Small class trial

The small class trial was conducted by the researchers themselves on 5 students of class VII-I UPTD SMP Negeri 11 Kupang. This trial was conducted from July 27 to August 1, 2024.

1) The results of the media practicality analysis

Table 7. Practicality Analysis Results of Small Class Trial

Aspects	Statement to	Answer Score					Total	A_i
		1	2	3	4	5		
Media usage response	1	0	0	0	0	25	25	4.8
	2	0	0	0	4	20	24	
	3	0	0	0	4	20	24	
	4	0	0	0	0	25	25	
	5	0	0	0	12	10	22	
	6	0	0	0	0	25	25	
	7	0	0	0	8	15	23	
	8	0	0	0	0	25	25	
RTP							4.8	
Category							Very Practical	

Based on table 7, the average total practicality (RTP) in the small class trial is 4.8 and included in the "**very practical**" category.

2) The results of the analysis of the effectiveness of learning media

Table 8. Results of the Small Class Effectiveness Analysis

Student Grades	Many Students	Information
69	1	Not Passed
79	1	Passed
83	1	Passed
84	1	Passed
85	1	Passed
Presentation of classical provisions		80%

Based on the table above, the percentage of learning completeness of small class students after participating in learning using Abibul application learning media is 80% and is included in the "**effective**" category.

b. Large class trial

The large class trial was conducted by the mathematics teacher on 20 students of class VII-D UPTD SMP Negeri 11 Kupang. This trial was conducted on August 5 to August 19, 2024.

1) The results of the media practicality analysis

Table 9: Results of Practicality Analysis of Large Classes by Teachers

Aspects	Statement.	Answer Score	(A_i)
Media Usage	1	4	4.12
Response	2	4	
	3	5	
	4	4	
	5	4	
	6	4	
	7	4	
	8	4	
Average Total Practicality Category			4.12 Practical

Based on table 9, the total average practicality (*RTP*) obtained by the teacher in the large class trial is 4.12 and included in the "**practical**" category.

Table 10: Results of Practicality Analysis of Large Classes by Students

Aspects	Statement to	Answer Score					Total	A_i
		1	2	3	4	5		
Media usage response	1	0	0	6	16	70	92	4.41
	2	0	0	6	28	55	89	
	3	0	0	3	40	45	88	
	4	0	0	12	48	20	80	
	5	0	0	3	52	30	85	
	6	0	0	0	32	60	92	
	7	0	0	0	28	65	93	
	8	0	0	3	40	45	88	
<i>RTP</i>							4.41	
Category							Very Practical	

Based on table 10, the average total practicality (*RTP*) in the small class trial is 4.41 and is included in the "**very practical**" category.

3) The results of the analysis of the effectiveness of learning media

Table 11: Large Class Effectiveness Analysis Results

Student Grades	Many Students	Information
25-34	1	Not Passed
35-44	0	Not Passed
45-54	0	Not Passes
55-64	2	Not Passed
65-74	2	Not Passed
75-84	8	Passed
85-94	6	Passed
95-100	1	Passed
Classical completion percentage		75%

Based on the table above, the percentage of learning completeness of small class students after participating in learning using Abibul application learning media is 75% and is included in the "**effective**" category.

3.1.5 Evaluation

Evaluation is carried out at each stage of the research starting from the analysis, design, development, and implementation stages, in order to improve the learning media developed in accordance with the suggestions and input that have been given.

3.2. Discussion

This *android-based* math learning media using *powerpoint* and *I-Spring suite* on integer material was developed using the *research and development* type of research with the ADDIE development model (*analysis, design, development, implementation and evaluation*). The resulting learning media is in the form of an android application and is named the Abibul application. The Abibul application has met the eligibility criteria, namely valid, practical and effective.

The first eligibility criterion is valid. Based on the data from the analysis of the validity of learning media obtained from questionnaires filled out by material and media experts, the *android-based* learning media on integer material is said to be valid. The material and media expert validation questionnaires each consist of 5 aspects containing 15 statements with alternative answers given in the form of a *Likert scale*, namely intervals 1-5 and there are columns for comments and suggestions. The aspects of the material validation questionnaire include curriculum aspects, learning aspects, material content aspects, aspects of training and evaluation questions, and utilization aspects as well as media validation aspects including design aspects, aspects of language use and text writing, coloring aspects, visual aspects, and graphic aspects. The results of validation by material experts show the total average validity of android-based learning media (RTV) is 4.32 and is included in the very valid category and the results of validation by media experts show the total average validity of *android-based* learning media is 4.25 and is included in the very valid category. The results of this validity analysis are in line with research conducted by Langonelen et al [12] which shows that the total average validity by media and material experts is 4.52 and 4.75 where the aspect assessment criteria used are in accordance with the predetermined validity criteria so that the media is said to be suitable for use in learning. Learning media is said to be valid based on the match of validation results with predetermined validity criteria [13].

The second eligibility criterion is practical. Based on the results of the analysis of the practicality of learning media obtained from the response questionnaire filled out by teachers and students, the learning media is said to be practical and very practical. The teacher and learner response questionnaires each consist of 1 aspect, namely the media usage response aspect which contains 8 statements and there is a comments and suggestions column. The results of the analysis of the practicality of *android-based* integer learning media by teachers in large-class trials show that the total average practicality is 4.12 and is included in the practical category. while the results of the analysis of the practicality of learning media by students in small-class and large-class trials each show a total average practicality of 4.8 and 4.41 with a very practical category where each aspect assessed is classified in the good category. The results of this analysis are in line with research conducted by Adu et al [14] namely the practicality of the learning media developed is included in the practical category obtained from the results of the analysis of teacher responses, small class and large class students where each aspect assessed is classified in the good category. Learning media is said to be practical if the minimum answer can show a good category [15].

The last eligibility criterion is the effectiveness of learning media. Based on data analysis of the results of student evaluation tests in small and large classes, *android-based* learning media is said to be effective. The evaluation test consists of 5 description questions with the level of cognitive questions C2 to C4 and the minimum completeness criteria (KKM) set is 75. The results of the evaluation test of students after using *android-based* learning media obtained a percentage of learning outcomes completeness of 80% in small class trials and 75% in large class trials. Of the 5 students in the small class trial there was 1 student who was not complete and of the 20 students in the large class trial there were 5 students who were not complete, so that the *android-based* learning media on integer material was included in the practical category. This is in line with research conducted by Dwiranata et al [16] which shows that the percentage of completeness in the results of small and large class trials is 100% and 80% respectively, this means that students who reach the KKM are more than students who do not reach the KKM after learning to use *android-based* learning media. The results of this study are also supported by Maulidita & Sukartiningsih [17] which states that learning media is said to be effective if the percentage of student learning outcomes after using the media is as expected, namely reaching the minimum completeness criteria (KKM).

Based on the discussion above, it is found that the development of *android-based* learning media on whole number material in class VII SMP has met the criteria for the feasibility of valid, practical and effective learning media. This is in accordance with what was conveyed by Maullidyawati et al [18] learning media is said to be feasible to use if it meets the criteria of valid, practical and effective. Thus, *android-based* learning media on integer material is very feasible to use for VII grade junior high school students, especially in UPTD SMP Negeri 11 Kupang.

4. Conclusions

Android-based learning media on whole number material is developed using the ADDIE development model which consists of five stages namely analysis, design, development, implementation and evaluation. The media developed is in the form of an application and is named Abibul which can be used on *smartphones* with the *android* operating system. The Abibul application *android* learning media has met the eligibility criteria based on valid, practical and effective criteria. The total average validity of learning media from material and media experts is 4.32 and 4.25 with a very valid category. The total average of practicality based on the results of the teacher response questionnaire is 4.12 with the practical category and the total average of practicality in small and large class trials based on the results of students' questionnaire responses is 4.8 and 4.41 with a very practical category. Effective criteria are obtained by the percentage of students' completeness based on the results of student evaluation tests in large and small class trials, namely 75% and 80%.

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