



## The Development of Android-Based “Smart Literacy Science” Application for 7th Grade Students

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### Abstrak

Penelitian ini bertujuan untuk menghasilkan aplikasi pembelajaran “*Smart Literacy Science*” berbasis Android dan mengetahui kelayakan aplikasi dari segi materi, media, dan keterbacaan. Pengembangan aplikasi ini dilandasi dari tren pembelajaran menggunakan perangkat pintar (*m-learning*) yang berdampak positif terhadap keterampilan literasi digital di abad 21. Penggunaan *mobile learning (m-learning)* untuk praktik yang dapat meningkatkan keterampilan sains siswa dan ketelitian. Penelitian menggunakan metode penelitian dan pengembangan (R&D). Aplikasi dengan ekstensi APK / android merupakan sistem operasi smartphone yang paling banyak digunakan di Indonesia. Metode penelitian yang digunakan adalah kombinasi dari dua model pengembangan yaitu ADDIE (Analyze, Design, Develop, Implementation and Evaluation) dan 4-D (Define, Design, Develop, and Disseminate) yang menghasilkan model pengembangan ADDIED (Analyze, Design, Develop, Implementasi, Evaluasi & Diseminasi). Berdasarkan hasil penelitian disimpulkan bahwa aplikasi pembelajaran “*Smart Literacy Science*” sudah menggunakan basis operasi Android. Aplikasi ini berisi materi pelajaran (video, desain praktis, dan laboratorium virtual) dan sistem evaluasi diri. Aplikasi ini sudah diuji kelayakan dari segi materi, media, dan keterbacaan, di mana hasil analisis data menggunakan rumus Aiken-V di atas 0,7. Dapat disimpulkan bahwa Aplikasi Literasi Cerdas berbasis Android layak digunakan dan efektif dalam meningkatkan kemampuan ilmiah siswa.

**Kata kunci:** *Smart Literacy Science*; Aplikasi Android; Ilmu alam; Kemampuan Sains

### Abstract

This study aims to produce an Android-based “*Smart Literacy Science*” learning application and find out the app's feasibility in terms of material, media, and readability. The development of this application is based on the thought of learning trends using smart device (*m-learning*) which has a positive impact on digital literacy skills in the 21st century. The use of mobile learning (*m-learning*) for practice that could improve students science skills and precisely. The study using research and development (R&D) method. The application made with APK/android extension the smartphone operating system most widely used in Indonesia. The research method used were combination of two development models namely ADDIE (Analyze, Design, Develop, Implementation and Evaluation) and 4-D (Define, Design, Develop, and Disseminate) that produce the ADDIED development model (Analyze, Design, Develop, Implementation, Evaluation & Disseminate). Based on the research result, concluded that the learning application “*Smart Literacy Science*” already used the Android operating base. This application contains subject matter (videos, practical designs, and virtual labs) and a self-evaluation system. This application has been tested for eligibility in terms of material, media, and legibility, where the results of data analysis using the AikenV Formula are above 0.7. It can be concluded that the Android-based *Smart Literacy Science* Application is feasible to use and effective in improving students' scientific abilities.

**Keywords:** *Smart Literacy Science*; Android Application; Natural sciences; Science Ability

## PRELIMINARY

Science is concerned with finding out all-natural phenomena systematically, mastering a collection of knowledge in the form of facts, concepts or principles, and a process of finding or "inquiry" (Curriculum Center, 2003: 6-7).

In 2006 Science was the main domain of the PISA (Program for International Student Assessment) program created by the Australian Council for Educational Research (ACER). When PISA is compared to Trends in International Maths and Science Studies (TIMSS) it produces a unique perspective that focuses on the application of knowledge to science and technology in real life [1]. One of the orientations of PISA is scientific literacy, which is a major theme for the science education community. Inline with the opinion of Glaze [2] which states the purpose of science education is to build scientific communities based on scientific literacy. Okada [3] even said that literacy is a key competency in the digital world. Literacy ability is also the ability that involves solving problems, proving to make decisions, and evaluating information logically [4]. According to PISA scientific literacy is "the capacity to use scientific knowledge, identify questions and draw evidence-based conclusions to understand and help make decisions about the natural world made through human activity". The understanding of science literacy capabilities according to PISA above is multidimensional oriented scientific literacy capabilities in its measurement aspects, namely the scientific content, science process, and context of relevant science applications used in daily life. The survey on PISA in recent years has produced data that Indonesia in a protruding position, for literacy capabilities compared to Asian countries. This certainly can be taken as a scale of scientific

literacy ability in Indonesia, especially in the Manggarai district, at the same point, if we look at the academic achievement of students in the province of NTT (East Nusa Tenggara) at the lower level of other provinces in Indonesia.

In 2006 Science was main domain of the PISA (Program for International Student Assessment) program created by the Australian Council for Educational Research (ACER). When PISA compared to Trends in International Maths and Science Studies (TIMSS) produces a unique perspective that focuses on the application of knowledge to science and technology in real life [1]. Digital-based learning especially based on Android is increasingly having a positive impact on improving literacy skills [5]. This opinion confirmed by Hutchison [6] who states that learning in the age of "digital age" consciously students must ultimately have the ability of digital literacy. Another advantage is the use of Android smartphones in large numbers in Indonesia. A study by Gartner Inc. [7], reported that Indonesians actively use a smartphone on average 5 hours per day, with the dominant application being social media.

The study of mobile learning (m-learning) used in education has begun many years ago, researched by Johnson (Johnson, Levine, & Smith, 2009). Martono in his research [8]; [9]; [10]; [11] revealed that the new trend for e-learning is to use mobile learning or m-learning using smartphones based on Android, IOS or Windows Phone. Another opinion by Joshi [12]; [13] states that mobile learning is the "next generation" e-learning that can be used in the learning process. Even so, students and educators are more interested in features that are more familiar to them [14] for example Facebook, Twitter, Instagram. The results of observations made in May 2018 at SMPN 1

Ruteng Regency, also found that all students use smartphones, from the data found that 90% of students use smartphones with the Android operating system. So it can be concluded that the use of Android as a learning media is an option that can be tried in improving the ability of students, especially the ability of scientific literacy.

Therefore, based on facts and literature studies, researchers create an android-based science learning media with the name "Smart Literacy Science." This application contains material containing VII class science content, videos and animations of simple science processes, and questions that can be practiced simply by students at home.

### **METHOD**

The development method was used in this study were ADDIE [15] (Analyze, Design, Develop, Implementation, and Evaluation). The study population was all students of 7th grade SMP N 1 Wae Ri'i I and the research sample was students of 7th A grade and class 7th B grade. Data were collected by questionnaire of validity and a practicality questionnaire. Data was analysis by Aiken V [16] to test the validity, material, and media. Analysis of readability test data and extensive trials using Likert categorization analysis formulas according to Arikunto [17].

### **RESULTS AND DISCUSSION**

This research produced the Smart Literacy Science based on the stages of the development of ADDIE. (1). Analyze Phase. In this stage, the researcher made a diagnosis related to science learning in 7th grade by making a theoretical study related to students' difficulties in learning science, especially all

learning themes. The researcher found that teacher-centered learning and the method used was lecture, so learning became boring and verbalism tended. Based on interviews with students, students explained that they did not understand abstract material. (2). Design stage. The results of preliminary studies found that the material of all learning themes is difficult to learn and tends to be abstract, especially on calculations that contain scientific equations of physics, biology, and chemistry. These results are used as the basis for conducting this stage making prototype design or initial product design which includes the following stages: Defining the Material. This stage the researchers conducted a literature review and found there were difficulties in students understanding scientific material. Based on the conclusion of the review, the researcher determined that material would take was all the learning themes of VII class. Making Media Design (storyboard). The researcher made a storyboard at this stage, by referring to the existing Android-based learning media. Making Media Design (storyboard). The researcher made a storyboard at this stage, by referring to the existing Android-based learning media. The storyboard that researcher made had the attribute namely campus logo; application title; developer name and profile; material summary and worked example and evaluation. Storyboard contains other attributes namely the home, back, and next icons. (3). Development Phase (Development). Making the initial design (Prototype) using the Lectora Inspire 18 application. After reviewing the material of all learning and evaluation themes, researchers then create an android application designed using Corel Draw X7 and Lectora Inspire 18, and Web2APK software. This design was made with researchers by the storyboard. The following are some application interfaces and steps for their use. The Lectora

Inspire 18 application is used to build the initial Smart Literature Science application for all learning themes. Applications began to be made from the initial appearance of the entry, the main menu, developer profile, theme material, and evaluation. The complete design then exported to the html5 programming language. Furthermore, the build process will be continue using the Web2APK application, and PhoneGap.

of the validation questionnaire consisted of 3 major parts namely from the material, learning, and language. Data were analyzed using the Aiken's V formula results in Table 1. Based on the V index, according to Saifuddin Azwar, items 1, 2, 3, 5, 6, 7, 9, 11, and 12 were categorized very well and items 4,8 and 10 had a good category. So it can be concluded the material in the application is suitable for use.

A material feasibility analysis was carried out by 3 material expert lecturers. The contents

**Table 1. Material Feasibility Test by Material Expert**

Expert	ITEM											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>1</b>	5	5	5	5	5	5	5	5	5	3	5	5
<b>2</b>	5	5	5	3	5	5	5	3	5	5	5	5
<b>3</b>	5	5	5	5	5	5	5	3	5	5	5	5
$\Sigma$	12	12	12	10	12	12	12	8	12	10	12	12
<b>v</b>	1.0	1.0	1.0	0.8	1.0	1.0	1.0	0.7	1.0	0.8	1.0	1.0

**Table 2. Media Feasibility Test by Media Experts**

Expert	ITEM						
	1	2	3	4	5	6	7
<b>1</b>	5	5	5	5	5	5	5
<b>2</b>	4	5	4	3	5	4	5
<b>3</b>	5	5	5	5	5	5	5
$\Sigma$	11	12	11	10	12	11	12
<b>v</b>	0.9	1.0	0.9	0.8	1.0	0.9	1.0

**Table 3. Readability Test on Small Scale (Readability Test)**

Nu. Item	Things Considered	Total by Rating Scale					JR	JN	R	K
		1	2	3	4	5				
<b>1</b>	Difficulty in Using Applications	0	0	0	5	6	10	50	5	<b>SB</b>
<b>2</b>	App Display	0	0	0	4	6	10	46	4.6	<b>SB</b>
<b>3</b>	Ease of Use	0	0	0	4	6	10	46	4.6	<b>SB</b>
<b>3</b>	Read the contents of the application	0	0	1	3	6	10	45	4.5	<b>SB</b>
<b>4</b>	Application Guide	0	0	0	3	7	10	47	4.7	<b>SB</b>

5	Application Language	0	0	0	2	8	10	48	4.8	<b>SB</b>
6	Application Completion Steps	0	0	0	2	8	10	48	4.8	<b>SB</b>
7	Application Helps with scientific ability	0	0	1	2	7	10	46	4.6	<b>SB</b>
8	Application According to Syllabus and RPS given	0	0	1	1	8	10	47	4.7	<b>SB</b>
9	Project Application is challenging and interesting to work on	0	0	0	1	9	10	49	4.9	<b>SB</b>

**Table 4. Analysis of Area Scale Tests**

Nu. Item	Things Considered	Total by Rating Scale					JR	JN	R	K
		1	2	3	4	5				
1	Difficulties in Using CBS Applications	0	0	0	32	42	74	338	4.6	<b>SB</b>
2	Display CBS Application	0	0	0	30	44	74	340	4.6	<b>SB</b>
3	Ease of Use	0	0	0	31	43	74	339	4.6	<b>SB</b>
3	Read the CBS Application	0	0	0	32	42	74	338	4.6	<b>SB</b>
4	CBS Application Guide	0	0	0	37	37	74	333	4.5	<b>SB</b>
5	BATBA Language	0	0	0	29	45	74	341	4.6	<b>SB</b>
6	CBS Application Completion Steps	0	0	0	27	47	74	343	4.6	<b>SB</b>
7	CBS Application Helps with Science Ability	0	0	3	29	45	74	341	4.6	<b>SB</b>
8	CBS Application In accordance with the Syllabus and RPS given	0	0	2	30	44	74	340	4.6	<b>SB</b>
9	Problem Variations are challenging and interesting to work on	0	0	0	36	38	74	334	4.5	<b>SB</b>

Media validation was carried out by 3 media expert lecturers. The contents of the validation questionnaire consisted of 3 major parts namely the completeness of identity, text, layout, images/graphics/video/virtual lab, installation, performance, creativity, and innovation. Data were analyzed using Aiken's V formula with the results in Table 2. Based on the V index, according to Aiken (Aiken, 1980: 956), all items of media validation were categorized as very good. Therefore it can be concluded that the elements of learning media application have very good validity, and are suitable for use.

Readability test (Limited trial) of this Smart Literacy Science application product is conducted by 10 students. Data analyzed using a

Likert categorization analysis formula according to Arikunto (Arikunto, 2006: 293). The results of the readability trial analysis in Table 3. The decision criteria used if the average value of R is  $4 < R \leq 5$ , then the items are categorized as very good; if R is worth  $2 < R \leq 3$  then the item is in a good category; if the average value of R is in the category  $2 < R \leq 3$ , then the item in the category is sufficient; if R is  $1 < R \leq 2$  then the item is of less value; and if R is  $0 < R \leq 1$  then the item is of very less value.

The conclusion can be drawn is that all items of trial readability are categorized as very good (SB), which means android-based “smart literacy science” application can be used or has high readability. Likewise, a broad trial with the

results of the analysis is shown in Table 4. The conclusion can be drawn that all the trial items are in the very good category (SB), which means that the application can be used.

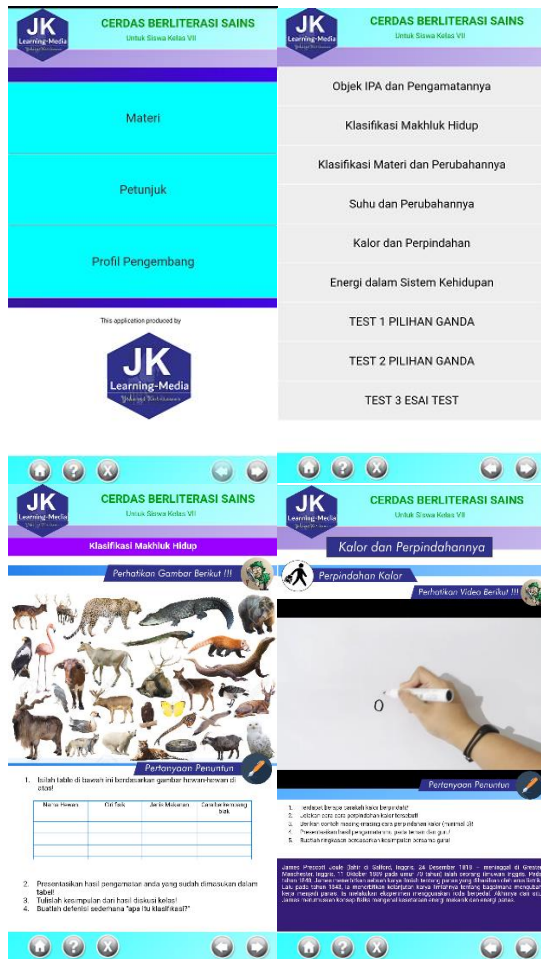


Figure 1. application Interface “CBS”



Figure 2. Test of Area and Restricted on Applications "CBS"

This research produce an android-based "smart literacy science" that is appropriate to be used based on the eligibility criteria of material, media, limited trials, and extensive trials.

## CONCLUSION

This research in developing an Android-based Smart Literacy science learning application that suitable for use in the learning process. Eligibility of the application in terms of material, media, and legibility of the application. This application can be used offline without data. This application can be used as a learning resource for junior high school students, especially during the COVID-19 Pandemic.

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