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Development of Android-Based Interactive Teaching Materials Using the Ispring Application with Insight into Sustainable Development

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ABSTRACT

The lack of use of IT-based teaching materials and the low ability of students' scientific literacy in learning science causes the learning objectives to be not achieved in schools. In addition, the use of android among students who are also getting higher can support the learning process if it is used as well as possible. The purpose of this research is to produce Android-based interactive teaching materials using the Ispring application with a sustainable development perspective that is valid and practical to use. This research is a development research with the Plomp three-step development model, namely the preliminary stage, the development stage or the prototype stage and the assessment stage. Based on data analysis, the results of this study produced very valid interactive teaching materials with an average score of 89.22% in terms of material, media and language. Very practical to use by educators and students with an average score of 87.98%. It can be concluded that Android-based interactive teaching material use the Ispring application with an insight into sustainable development with very valid and practical criteria used in science learning.

1. INTRODUCTION

The Sustainable Development Goals (SDGs) replaced the Millennium Development Goals (MDGs) which ended in 2015 within the framework of sustainable development and negotiations and became the standard for sustainable development in countries around the world. Right in 2015, UN members consisting of 195 countries agreed to achieve sustainable development. This makes the world a better place to continue development without harming future generations. This agenda is known as the Sustainable Development Goals (SDGs) or also known as the 2030 Agenda which has 17 goals and 169 targets (Sebestyén et al. 2020). The 2030 sustainable development agenda reflects the urgency to instill the principles of education for sustainable development into all levels of education which has the aim of disseminating competencies that grow people to be able to reflect on what they do, think about their current social, economic and environmental impacts that will be generated in the future that is reviewed from a local and global perspective(Cebrián Bernat et al. 2020).

Education that is integrated with sustainable development is expected to help increase students' awareness of energy-saving attitudes related to environmental conditions and potential. One way that can be done is through the development of teaching materials used in learning. This is one of the principles of sustainable development (Ekantini and Wilujeng 2018). In line with the explanation above, the achievement of sustainable development goals is also related to the development of information and communication technology. In the 21st century, science and technology in various countries have progressed very rapidly (Lee et al. 2011). With this rapid development, the younger generation in this globalization era is required to be able to keep abreast

of information technology developments that are beneficial for developments in various aspects of life, especially in education (Uzunboylu and Aşıksoy 2014). Many strategies have been carried out by the government to meet the demands of the 21st century, one of which is by changing and updating the curriculum used in the learning process in schools.

Organization for Economic Co-operation and Development (OECD) is one of the international organizations involved in developing the world of international education (Schleicher 2016). The OECD regularly organizes the Program for International Student Assessment (PISA) every three years. One of the important aspects assessed from this program is students' scientific literacy skills. Indonesia is one of the countries that routinely participates in the PISA survey. However, the results achieved have never been satisfactory and Indonesia's performance has always been in a position that does not meet standards set internationally and tends to decline (Asyhari 2015). The results of the PISA survey of Indonesian students regarding scientific literacy show that most students in the Republic of Indonesia are at the basic level of scientific literacy 1 and a small proportion of Indonesian students have reached the basic level 2. There are 6 levels in the PISA ranking, so levels 1 and 2 are still considered low (Setiawan et al. 2017).

One way to make teaching and learning activities not boring is to involve technology in these learning activities (Sastrakusumah et al. 2018). Electronic media that students can use have different benefits and characteristics (Smaldino et al. 2004). In this case, the researcher applies the use of Ispring interactive multimedia. Interactive multimedia is an application that can be used to channel messages, stimulate thoughts, emotions, attention, and willingness to learn so that it can control the learning process (Sastrakusumah et al., 2018). Ispring is one of the tools that can convert presentation files to Flash form and SCORM/AICC form used in e-learning. Ispring is not complicated to use and can be easily integrated with PowerPoint (Qomariah and Mistianah 2021). Ispring acts as a powerpoint add-in, making powerpoint files more interesting and interactive, and can be accessed using Android offline anywhere and anytime.

In fact, the teaching materials that teachers use still seem unattractive and a bit boring and there are no teaching materials that are integrated with sustainable development. Based on observations in the field, teachers still tend to teach conventionally and do not utilize technology in learning. Most teachers only rely on handbooks from the government. There is no innovation in the use of teaching materials by teachers, so this method is still considered traditional. Traditional teaching methods are not only inefficient but also a waste of time (Herwinarso et al. 2020). In teaching using this traditional method, time constraints often occur in science classes, and the teacher may miss explaining some concepts in detail. Sometimes, some students cannot follow the material within the allotted time (Herwinarso et al. 2020).

The use of teaching materials that are not optimal is not in accordance with the 2013 curriculum. Learning is carried out to support learning activities using various kinds of teaching materials. One of the suitable teaching materials is Android-based interactive teaching materials. The impact of the underdeveloped use of teaching materials results in students' abilities that are still underdeveloped and limited so there is no better achievement (Reinders and Balcikanli 2011). The lack of development of students' abilities is also caused by the use of more time using smartphones which are not used properly, such as playing games and accessing less useful things, especially in the educational aspect. The research carried out is product development from research that is relevant to this research, namely that carried out by (Manasikana 2017). Based on these problems, the researcher aims to develop an Android-based interactive teaching material using the Ispring application with a sustainable development perspective to support scientific literacy.

The development of this teaching material was developed in accordance with the problems that occur, namely the low ability of scientific literacy and energy-saving attitudes that are still not applied in everyday life by students. The purpose of developing this teaching material is to produce Android-based interactive teaching materials using the Ispring application with a sustainable development perspective that is valid and practical for use by students and teachers. The reference used to develop good teaching materials is that these teaching materials can be used by educators

and students as learning resources. In addition, teaching materials must also be attractive and the appearance can also attract attention and improve students' scientific literacy abilities.

2. MATERIALS AND METHODS

The method used in this study is a research and development method using the Plomp & Nieveen model, (2013). The stages of research and development according to Plomp and Nieveen (2013) are divided into three stages, namely: (1) Preliminary research ; (2) the development or prototyping phase; and (3) the assessment/implementation phase. The three stages are presented in the following figure.

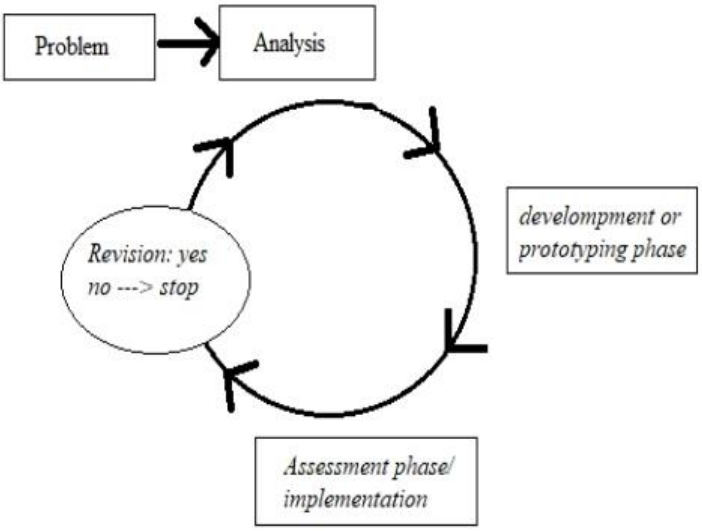
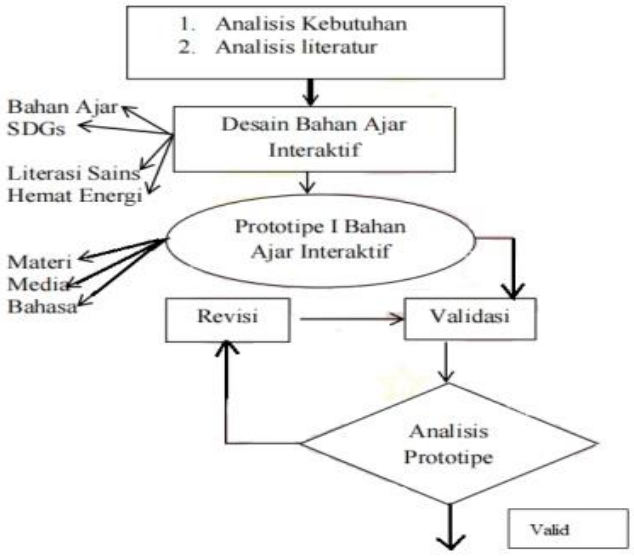
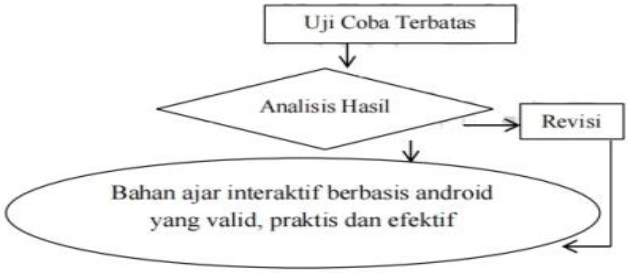


Figure 1. Plomp & Nieveen Development Model, (2013)

Based on the development steps of Plomp and Nieveen (2013), the development procedure in this study can be described in detail as the phases of developing interactive android-based teaching materials with an insight into sustainable development with the Plomp model as follows:

Table 1. The Phases of Developing Interactive Android-Based Teaching Materials with an Insight Into Sustainable Development With The Plomp Model

Stages of Research Activities	**Step** **Plomp & Nieveen Development**
	*PreliminariesResearch*(Preliminary Research) *Prototyping Phase*

Stages of Research Activities	Step Plomp & Nieveen Development
	*Assessment Phase*

This final value indicates the level of validity. The interval for determining these criteria can be seen in **(Table 2.)** follows:

Table 2. Criteria level of validity

No	Score	Criteria
1	81% - 100%	Very Valid
2	61% - 80%	Valid
3	41% - 60%	Valid Enough
4	21% - 40%	Invalid
5	0% - 20%	Invalid

(Sugiyono, 2010)

3. RESULTS AND DISCUSSION

3.1. Preliminary research

Preliminary Research is an initial investigative stage that aims to conduct need and context analysis. The first step taken in this research is Preliminary Research, this activity focuses on gathering information to identify problems. The preliminary research stage is an initial analysis that aims to determine the need for developing Android-based interactive teaching materials (Yustianingsih et al. 2017). researchers collect information about the problems contained in science learning by observing the implementation of learning activities, interviewing science teachers and students in class (Siahaan et al. 2021)

This stage consists of several analyzes, namely:

a. Needs analysis stage (Educators and Students)

At this stage, to collect, analyze and define problems related to the use of learning resources the researcher conducted an interview with Mrs. "A", an integrated science educator at SMPN 3 Solok Selatan. This interview was conducted in person at the residence of Mrs. "A" in Padang Aro, Sangir District, South Solok Regency in July 2021.

Based on the results of interviews conducted with educators, learning is still minimal in terms of the use of technology due to the limited ability of educators in terms of technology. While other factors are due to the need for time and capital to design teaching materials that are in accordance with learning materials, especially interactive teaching materials based on Android. In addition to interviews with educators, to strengthen this research an interview was also conducted with a class VII student at SMPN 3 Solok Selatan. The interview was conducted at the student's residence in Sungai Aro.

Based on the results of the analysis of interviews with students, it can be concluded that most students already have Android, and like learning using technology such as Android. So, one of the teaching materials that can be used is Android-based interactive teaching materials which make it easier for educators in the learning process on temperature and heat, and energy materials. In line with research conducted by Kasmita et al. (2021) who also found that most students use Android and this can have a positive impact if used in

learning. then Android-based learning will maximize the function of technology in the process of understanding science content. Previous research also found that Android-based learning can also improve scientific literacy, conceptual understanding and student learning outcomes (Istighfarini et al. 2022; Manasikana 2017; Nurhamidah et al. 2022; Ramdani et al. 2020).

b. Results of Literature Analysis / Literature Study

This analysis was carried out to find concepts or theoretical foundations that strengthen Android-based Interactive Teaching Materials using the Ispring application with an insight into sustainable development. In this stage, the steps taken are:

1) Curriculum Analysis Stage. The curriculum analysis phase includes core competencies and describes basic competencies into several indicators.
2) Data Analysis Stages. The analysis carried out included identifying what kind of electronic teaching materials were used during online learning during this pandemic, identifying temperature and heat materials and energy materials used in SMP/MTs, as well as the advantages and disadvantages of these interactive android-based teaching materials.
3) Material Analysis Stage. Aims to determine the content and subject matter in accordance with the sustainable development program (SDGs) which can develop students' scientific literacy and energy-saving attitudes. Educators also play a role in the success of the SDGs program, namely the 7th and 15th SDGs programs where everyone supports sustainable development programs by protecting the environment and using renewable energy. Thus, students can apply science learning materials in everyday life.

3.2. Development or prototyping phase ;

This stage is a continuation of the first stage, which aims to produce prototypes of Android-based interactive teaching materials using the Ispring application with a valid sustainable development perspective. The stages in this activity are as follows:

a. Designing Prototypes

The design stage for what is done for Android-based interactive teaching materials using the ispring application with a sustainable development perspective is as follows:

1) Prepare a background design for teaching materials
2) The design of making introductory words, instructions for using teaching materials, as well as the design of making KI, KD, indicators, and learning objectives
3) The design of making the author's bio as an introductory stage before learning begins
4) The design makes matter temperature and heat and matter-energy
5) The design chooses an image that matches the material
6) The design of making learning videos related to the material
7) The design of making sample questions
8) The design makes evaluation questions
9) The design of making a video of the prayer of kafaratul assemblies is a sign of gratitude because learning has been completed.

b. Development of Android-based interactive teaching materials using the ispring application with an insight into sustainable development

1) Product Identity
   Physical form : Electronic Teaching Materials
   Title : Android-Based Interactive Teaching Materials with an Insight into Sustainable Development
2) Android-based display of interactive teaching materials
   The display of interactive teaching materials developed can be seen in the following figure 2.

Figure 2. The appearance of Android-Based Interactive Teaching Materials

3.3. Assessment phase/implementation

The purpose of this stage is to produce interactive teaching materials based on Android using the Ispring application with a sustainable development perspective that is valid and practical. This Android-based interactive teaching material validator consists of 3 lecturers at UIN Imam Bonjol Padang consisting of 1 material expert, 1 media expert and 1 linguist.

a. Content Eligibility
   Indicators for testing the validity of the material/content validity of Android-based interactive teaching materials consist of 12 statements. The lowest score for each statement is 1 and the highest score is 5.
b. Language Eligibility
   Language validity indicators in Android-based interactive teaching materials consist of 4 statements. The lowest score for each language validity statement was 1 and the highest score was 5. The language validity questionnaire was filled out by 1 validator.
c. Media Eligibility
   Android-based interactive teaching material media indicators consist of 15 statements. The lowest score for each statement of media validity is 1 and the highest score is 5. The value of the media validity questionnaire is filled out by 1 validator.

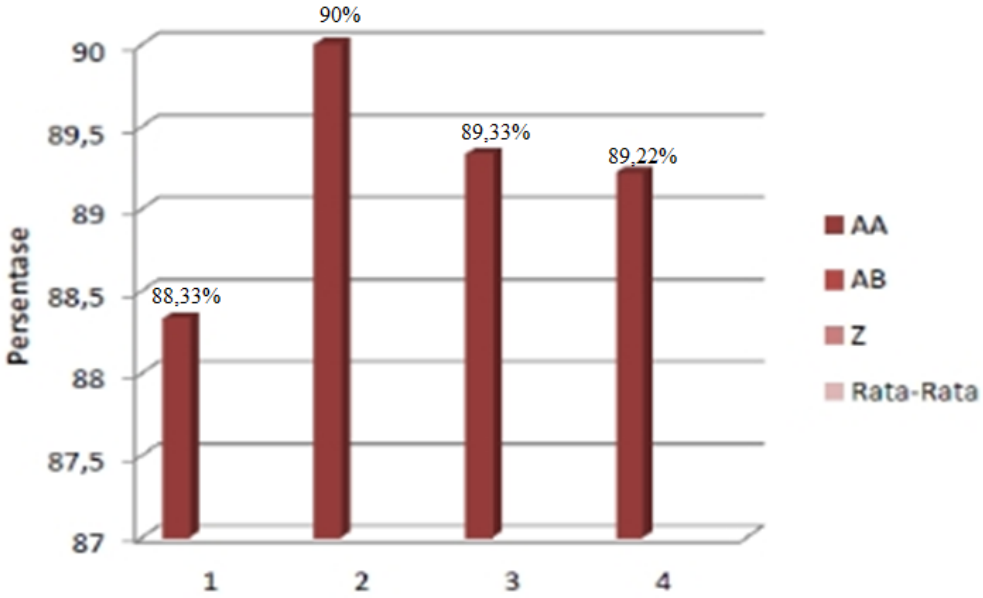


Figure 3. Average Value of Product Validation

Information:
1 Content/Material Validation
2 Language Validation
3 Media Validation
4 Average

If the validation results are at an interval of 81% -100%, it is a very valid category. Judging from the results of the validation analysis by the three validators, the average percentage was 89.22%. So it was revealed that Android-based interactive teaching materials using the Ispring application with an insight into sustainable development are in a very valid category.

Furthermore, a practicality test was carried out using interactive teaching materials based on Android using the Ispring application with an insight into sustainable development for educators and students. As many as 2 science educators and 20 students took this practicality test. The results of the practicality test of educators and students can be seen in the graph below.

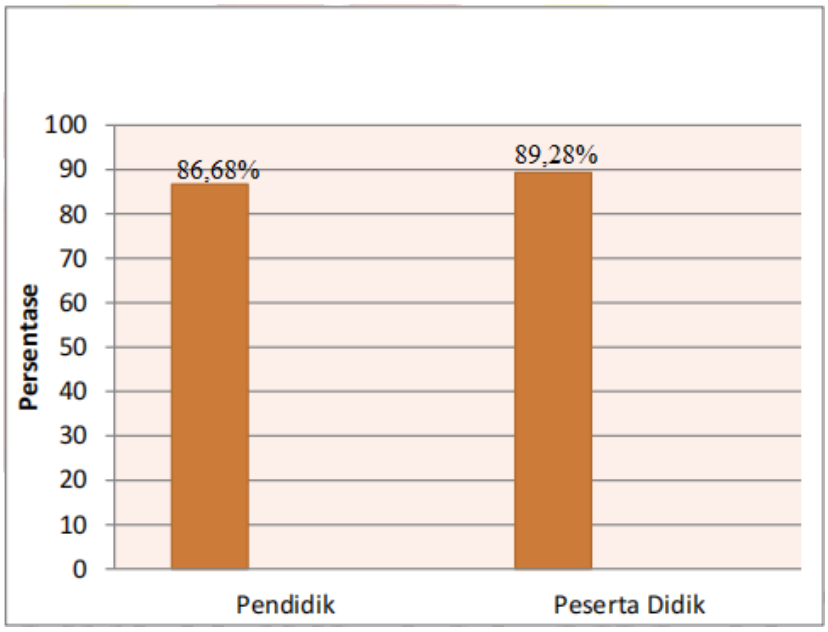


Figure 4. Average Practicality Validation Value

Judging from the results of the analysis of practitioners by educators and students, an average percentage of 87.98% was obtained, it was revealed that Android-based interactive teaching materials used the Ispring application with an insight into sustainable development in a very practical category. This is also supported by several previous studies which also found that the development of teaching materials using ISpring can help students understand science concepts and make learning more interactive (Dasmo et al. 2020; Qomariah and Mistianah 2021; Sari and Ridwan 2020; Sastrakusumah et al. 2018).

4. CONCLUSIONS

Android-based interactive teaching materials using the ispring application with the perspective of sustainable development with very valid, practical, and usable categories. However, this interactive teaching material needs to further see the effectiveness of its use on a larger scale. To be able to see the impact and influence of this interactive teaching material which is more significant for students and educators in learning science.

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