The Development of Interactive Mathematics Learning Material Based on Local Wisdom with .swf Format

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Abstract. Learning materials used by students and schools in Serang district are lacking because they do not contain local wisdom content. The aim of this study is to improve the deficiencies in learning materials used by students by making interactive materials based on local wisdom content with format .swf. The method in this research is research and development (RnD) with ADDIE model. In making this interactive learning materials in accordance with the stages of the ADDIE study. The results of this study include interactive learning materials based on local wisdom. This learning material is suitable for digital students.

1. Introduction
Learning outcomes are not always good to make a difference in learning outcomes. Differences in learning outcomes are not only between provinces but among students in the classroom there are differences in learning outcomes. Differences in learning outcomes due to several factors such as student intelligence, how to learn, and facilities used. Student intelligence is a factor of learning from each student. Students with poor intelligence should learn longer than smart students. During the teaching process, many students have learning difficulties [1]. In addition to study time, how to learn must also be in accordance with the habits and abilities of students so that students more easily learn. The conclusion about self confidence based on the tree is a good confidence to have good belief to his / her ability [2]. Facilities for learning include important things in learning. Facilities received by high school students in Serang district is the same as the government. Facilities that are available, among others, ready-made classroom but only part of the class that there are projectors. Government facilities such as textbooks are not available to all students. This is due to the limited number of books available. The book students used at one of the high schools on the west coast of Serang district in addition to borrowing to their library partly got the 2013 curriculum book published by the government. At the school there are many students who do not get books from libraries or books from the government.

Existing learning materials and use in upper secondary schools in Serang district turned out to be something that is not in accordance with government regulations. Provide motivation to learn, learn, and learn from the local, national and international, and tailored to the characteristics and learner learners [3]. The study material should contain local content so that students know the local content in their respective areas. The current study materials have national content and even examples of problems that are used are national problems and problems internationally. In addition to learning materials that hard file there are learning materials in the form of soft files. Soft file materials that have been used, among
others, government books in the soft file format portable document format written .pdf on the file. In addition to books in the form of soft files there are learning materials in the form of free and paid video.

The disadvantages of learning materials in Indonesia are the lack of local wisdom and less interactive content. Several factors that cause the slump are: First, learning models used have not been local wisdom oriented [4]. Local wisdom content should be incorporated into learning material to increase student insight. Therefore, mathematics has always been part of human culture even in the simplest form [5]. Observations made at one of the high schools on the west coast of Serang district found that students got bored and exhausted about learning with the usual learning materials. Therefore awareness about strengths and limitations in textbooks may be enough to over-win the obstacles [6]. Interactive content should be incorporated into learning materials that students use so students are more enthusiastic about learning. In addition to be in accordance with the student learning materials should be in accordance with government regulations.

The study materials according to Indonesian government regulations in addition to the book standards as used in general learning materials should contain local content from the region. This local content is rarely found in math textbooks. Local wisdom owned by Indonesia [7]. The learning materials that should be made at this time should have local wisdom and added interactive content. Modern technology offers educators a variety of new tools that are used in the classroom [8]. Interactive learning materials should be used on smart android phones and computers. Observation results in 2016 almost all students in high school use in Serang district using smart phone android. So interactive learning materials should be run on android and more fun. Limited test results obtained show students’ response to interactive teaching material based on scientific approach is good [9]. To answer the challenges related to learning materials, make learning materials appropriate to students, improve shortcomings, as per rules, and better. This study develops interactive learning materials with the format .swf based on local wisdom western coastal Serang district.

2. Methods

This research is a mining research (R n D). This research conducted at a high school on the west coast of Serang district, Banten province. This development study conducted using the ADDIE research design. Stages in this research are analyze, design, development, implementation, evaluation done in sequence. This learning material adapted to the western coastal wisdom of the attacking district.

3. Result and Discussion

3.1. Analyse

Analyse was done to teachers, students, curriculum, learning materials. Teachers on the subjects of mathematics teach according to the applicable curriculum. Learning is the most basic activities in the whole process of education at schools [10]. The learning that done in the classroom every teacher seeks to look for examples that exist in the real world. Students, not all learning outcomes obtained by students who are in high school the same. Differences in learning outcomes are due to different ways of learning and different thinking skills. Curriculum, curriculum used in schools today is the curriculum 2013. This curriculum has the characteristics of learning with five stages. There are five stages in a scientific approach: observing, asking, exploration, associating, communication [11]. At the time of conducting the research implementation phase in the eleven year class of 2017 there is a curriculum revision. Revisions to the 2013 curriculum include chapters and sequences that initially in the odd semester to be in the even semester. The 2013 curriculum continues to improve for better education. The core competence related to the ability to live and practice the religion professed, behavior develop (social attitudes), understand and apply knowledge (cognitive), and develop skills (psychomotor) [12]. Learning materials, learning materials used by students in this school is a book obtained from borrowing in the library. In addition to borrowing, students can purchase books independently. In addition to printed materials there are learning materials in the form of soft files such as electronic school books.
free of charge from the government. After doing the analysis of the material used is still there is a lack of the lack of local wisdom content that should exist in every material.

After knowing the shortcomings in the learning materials used the next process is to find a solution. The initial solution search done at the analyze stage that is looking for information in making interactive learning materials based on local wisdom. In addition to finding a way to make learning materials conducted a study of local wisdom in the west coastal of Serang district. Local wisdom in the west coast of Serang district used in this study materials are: fish, coconut, fisherman activity, tsunami, bojong tower, Anyer Panarukan road (postal road). Local wisdom made into a mathematical problem and made into matter in accordance with the material presented.

3.2. Design
The initial process of design done by looking for the concept of a suitable display for students and create a design concept in accordance with local wisdom. Design stage is the stage of designing the product, the design is made for the contents and the flow of the program [13]. The results show that school activities based on local wisdom turns perceived positively and contribute to improving the perception of the high importance of education in small island [14]. Next create a look at this learning material that suits the students and local wisdom. The purpose of good design is to suit students emotionally and in theory to improve learning outcomes.

The design used is to use blue as the base because it reflects the sea. In addition to the blue background color images using waves and beach images in the sea. In writing the material using a type of letters that are not rigid and interesting. Display the formula placed in the middle of the screen so it is easy to see. The navigation buttons placed to the right of the screen.

3.3. Development
The process of developing learning materials divided into two stages namely the stage of making the material and the stage of making the program in flash applications. Material development is done by making electronic school books from government as the main reference. Writing material done by adjusting to the book from the government and then included local content wisdom. The content of local wisdom incorporated into teaching materials as additional knowledge, examples of problems and challenges. The local content of wisdom used are fish, coconut, fishing activities, tsunami, bojong tower, Anyer Panarukan road (Postal road).

After development of the material then be done in the flash program. This teaching material developed using adobe flash application. The resulting file format is .swf with the advantage of being used on computers and in android. Development done from start page to last page in sequence. Selection of application and file format .swf because this format can provide interactive content. Interactive content that exists in this learning material include mobile content, voice and input content.

3.4. Implementation
Implementation in this study conducted in one of the high schools on the west coast of the attack district. Implementation done in the eleventh grade of science program 4 (XI IPA 4). Student XI IPA 4 amounted to 40 students but the data be entered as many as 31 students, because 8 students are not appropriate research criteria. Selection of class based on input from teacher of mathematics teacher related to conformity of research with student.

In the implementation phase of the school divided into several stages, namely distribution of learning materials, the use of materials in the classroom, and the use of learning materials by students other than in the classroom. Distribution of learning materials done by the class management to all class members. After all students get interactive learning materials then do the use of interactive learning materials independently and use in the classroom. Use in the classroom during learning takes place so that students can see the formulas and sample questions that help in learning. During classroom implementation, teachers teach with ordinary teaching. This is to see how the effect on learning outcomes. The use of learning materials independently done by all students either using Android smart phone or computer.
3.5. Evaluation
The evaluation is done from the beginning of the research until the end of the research. Evaluation is done related to the research process and related learning materials. Evaluation of research process conducted by discussion of research process with research expert from University of Mathematics Education. Evaluation of learning materials is done from learning materials and interactive learning materials that are being developed. In addition to material evaluation and interactive evaluation is done on the language used so that in accordance with the Indonesian language is good and correct and suitable for students.

3.6. Implementation result
In this study, trials were conducted with pretest, posttest and questionnaire. Test trials were conducted to see improvements before the study and after the study. Trials conducted to retrieve data to students and teachers of mathematics lessons.

3.6.1. Student. This study tested students related to learning materials with pre-test, post-test and data collection with questionnaires to 31 students of class XI IPA 4. Problem test given to the students with the problem to know how much knowledge of students blessed material sequence and series.

The result of pretest among other things is the number 1 is the knowledge related to the pattern of sequence with the result of 25 students can answer. Problem number 2 related arithmetic sequence with the characteristics of answering questions can use logic or formulas. 25 students from 31 students can answer correctly with logic and a small part answer using formula. Problem number 3 related arithmetic sequence with characteristic answer the problem must by formula. A total of 27 students can answer using arithmetic sequence formula. In question number 4 related to arithmetic sequences with basic problems no students are able to answer. In question number 5 related to geometry sequence with characteristic answer the problem with logic or by formula no student can answer. Question number 6 related questions geometry sequence with the level of difficulty being students no one can answer. Problem number 7 blessed by geometry series with difficult difficulty, no student can answer the number 7 problem.

Posttest result, among others, question number 1 is all students can answer well and correctly. On the number 2 as many as 30 students answered correctly and 1 student answered wrong. In question number 3 as many as 25 students answered well and correctly, 2 people answered wrong but know the formula correctly and 4 people answered wrong. In question number 4 as many as 13 students answered well and correctly, as many as 6 students answered with some true, and as many as 12 students answered wrong. At number 5, 27 students answered correctly and 4 students answered wrongly. On the number 6 problem as many as 23 students answered well and correctly, as many as 3 people answered imperfectly, and as many as 5 students answered wrong. On the number 7 problem as many as 13 students answered well and correctly, as many as 1 student answered imperfectly and as many as 17 students answered wrong. In this post test result there are 8 students with perfect score.

The result of closed questionnaire can use the following formula. This description uses the following formula [15] and table 1.

\[ x = \frac{M}{I} \times 100\% \]  

Information:
- \( x \) : Presentation of the final value
- \( M \) : The raw score or the total score of respondents' answers
- \( I \) : Ideal score or highest score
Table 1. Score Criteria of Questionnaire Scale

| Criteria          | Classification |
|-------------------|----------------|
| $0% \leq x \leq 20\%$ | Very weak      |
| $20% < x \leq 40\%$ | Weak           |
| $40% < x \leq 60\%$ | Enough         |
| $60% < x \leq 80\%$ | Strong         |
| $80% < x \leq 100\%$ | Very strong    |

The result obtained from the closed questionnaire is 78.34% so it goes into the criterion strong.

3.6.2. Teacher. In this study the teacher became an observer and given a closed questionnaire and an open questionnaire. The results obtained from the closed questionnaire is 75% so it is included in the criteria strong. The open questionnaire produced by number 1 teaching materials on interactive learning materials has to do with daily life. Number 2 related persistence, with an interesting dish and media used android makes it easier for students to learn more diligently. Number 3 about getting students to study hard, providing interesting interactive learning materials that encourage students to be diligent. Number 4 related diction, diction used in interactive learning material is good. Number 5 related local wisdom, local wisdom on this interactive learning material is quite complete. Number 6 related local wisdom that has not been used in this study material is batik Anyer. Number 7 related to local wisdom to improve understanding, local wisdom increases understanding because it relates to the subject matter. Number 8 related to the sense of wanting to know local wisdom, curiosity to be increased after using local-based wisdom interactive materials.

4. Conclusion
Based on the research result it is related to the making of local wisdom-based teaching materials with .swf format. Creation of interactive materials based on local wisdom with .swf format can be made well using adobe flash application and can run smoothly. Search for local wisdom can be done by going to a place to be sought to know better.

The next conclusion is related to the use of students of XI IPA 4 High School. The result of closed questionnaire is 78% or strong. Closed questionnaires show students enjoy learning to use interactive learning materials and are happy to use local wisdom-based learning materials. In addition, the conclusions obtained from students is that this learning material in practice can improve students’ ability in learning.

The conclusions of teachers with these instructional materials show that interactive learning materials based on local wisdom are good. Closed questionnaires show 75% of the material so that these learning materials fall into the strong category. Closed questionnaires indicate that these learning materials are suitable and enhance students' knowledge.

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