The Development of Interactive Mathematics Learning Material Based on Local Wisdom

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Abstract. The purpose of this study is to create interactive learning materials that can be used on smart phones and computer with .swf format base on local wisdom. In this study using three stages of research that is observation, literature and mix. We found that interactive learning materials are suitable for learning in the digital age. Because from observation to students of senior high school in Serang district there are student do not have mathematics books to study. Local wisdom of the region should be enriched in the subject matter. This is to answer the challenge that many students do not have a package book and have a smart phone. This has impact on students better thinking processes.

1. Introduction
Mathematics is one of the areas that have an important role in education [1]. Evidence of the importance of mathematics is used in many fields. Mathematic can be used to develop the science of mathematics and can also apply in everyday life. Mathematics as a tool has been widely applied to facilitate, streamline and streamline human works [2]. Of the many reasons that mathematics is so important that mathematics should be taught as well as possible.

The benchmark that mathematics has been well distributed is that mathematical learning has been felt equally. The facts cited from kementrian pendidikan dan kebudayaan 2016, table 1 of graduation on the java island with uneven results [3]. If viewed from all provinces in Indonesia Banten province is ranked the bottom three. Judging from the percentage of graduation students of lower grade xii islands riau 95.75%, Bangka Belitung 96.51% and Banten 96.64%.

Table 1. Data on the number of high school graduates

| NO | Provinces      | The number of student level 12 | Graduates | Percentages of graduation |
|----|----------------|--------------------------------|-----------|--------------------------|
| 1  | DKI Jakarta    | 54.128                         | 52.686    | 97.34                    |
| 2  | West Java      | 183.987                        | 182.795   | 99.35                    |
| 3  | Banten         | 54.606                         | 52.772    | 96.64                    |
| 4  | Central Java   | 125.334                        | 123.791   | 98.77                    |
| 5  | Yogyakarta     | 17.449                         | 173.41    | 99.38                    |
| 6  | East Java      | 162.184                        | 160.215   | 9879                     |
Obtained from table 2 cites from Fitri 2014 on the table of percentage completeness of students on the math test first semester class XI IPS senior high school 1 Batipuh lesson period 2013/2014 the unevenness of education does not only occur between provinces but begins with differences between classes and even between students. Differences between students occur because of the facilities and environment in which students learn. Differences between classes that occur in one of senior high school in Anyer occur due to unequal facilities obtained. Books used by students from schools are obtained from given by the government and books lent by libraries. The textbook facilities provided by the government turned out not all classes got it. Books used today must be in accordance with the curriculum 2013 but many do not fit the curriculum 2013.

| Class     | The number of student | More than 75 quantity | Percentages (%) |
|-----------|-----------------------|-----------------------|-----------------|
| XI IPS1   | 29                    | 2                     | 6.89            |
| XI IPS 2  | 19                    | 5                     | 17.24           |
| XI IPS 3  | 21                    | 5                     | 23.8            |
| XI IPS 4  | 20                    | 1                     | 5               |
| XI IPS 5  | 26                    | 2                     | 7.69            |

Characteristic of curriculum 2013 also uses a scientific approach in its learning. There are five stages in a scientific approach: observing, asking, exploration, associating, communication [5]. Textbooks with curriculum 2013 should use lokal content as a basis for their learning. Provide motivation to learn to learners contextually according to the benefits and application of teaching materials in everyday life, by providing examples and comparisons of local, national and international, and tailored to the characteristics and learner learners [6]. In reality many learning materials do not provide local content in their study materials. In addition to the regional content of books should be adapted to the development of the times and according to student interests.

Limited test results obtained show students' response to interactive teaching materials based on scientific approach is good [6]. An interactive book is preferred for students to learn. Students enjoy to use intercative learning materials because learning with interactive material does not quickly feel bored. Interactive given can be a subject material that is presented in flash. Files generated in the form of flash can be diverse, one of them is .swf. Files with .swf format can be used in smart phones.

Smart phones nowadays are not an exceptional thing among high school students. Almost every student besides having a laptop computer also has a smart phone. In the present era carrying thick textbooks is no longer the most efficient thing. Many math text books are made into files with the .pdf format but they are not yet in line with curriculum 2013, local wisdom and interactive. Local wisdom in the western coastal of Serang distrik, among others related to the beach and building. An example that can be used in mathematics is a series formed from waves. If this is done the students will understand related things that are in their environment.

The benefits gained by wisdom contented are efficient, practical and fun. To have learning materials student only copy or download the file so that the file resides on own software. In use of this interactive learning materials using .swf format so that it can be used in smart phones. This advantage makes students no longer carry thick paper. Furthermore it is fun because the learning material is tailored to the students. In this learning material not only contains writing and formulas in the form of silent letters but given the beauty with movement and color. Also in its use given the buttons so that students in using it must interact with his smartphone.

2. Method
In this study using three stages of research that is observation, literature and mix. First observation, observation is done in senior high school which is on west coast of Serang district. Observations were made to find out the mathematics books used student in the school. Observations are made to the conclusion that there are many shortcomings in mathematics learning books. Second by libraries, conducted by looking for theories related to the development of mathematics learning materials. Development of learning materials is done according to ADDIE approach. The third stage is a combination of observation and literature. This combination is done to solve problems by solving existing problems through existing theory. This combination to generates an answer the problem.

3. Result and Discussion

3.1. Interactive learning materials formatted .SWF

Learning materials are everything that is used for the purpose of providing knowledge in learning. Learning resources that can bring up the nuances of reasoning is the presentation of problems or tasks that require students to do activities include: conjecture, finding patterns on a mathematical phenomenon, make conclusions from a statement, providing an alternative to an argument [7]. Interactive learning materials should integrate content, content and look well. To support the interactive content of this learning material is made in .swf format.

Stands of .swf is short for shockwave flash (.swf) [8]. Files with this .swf format can be used on smartphones using applications that can be downloaded. The integrated teaching materials with life skills are essential to equip high school students in preparing for a brilliant future life [9]. Life skills possessed by students must start from the environment. To explore the skills and knowledge students learn to use local content approach. When combined in a single unit into interactivity materials with the format. This study material benefits rarely possessed by other learning materials ie local wisdom, interactive and cheap. This is very suitable for high school students in Banten who use a lot of smartphones in his life.

3.2. Local wisdom west coast Serang district

Local wisdom is defined as local wealth that contains policies or worldviews that serve to mold humans to be wiser in their lives [10]. Local wisdom goals are often related to wise purposes. The coastal environment of the district attack local wisdom aims to provide better living habits. Local wisdom in it contains the value of life born from within society it self and is used to megtatur social life [11]. It is important to use and continue the good cultural values that already exist. The values of local wisdom are not obsolete values that must be turned off, but can synergize with the universal values and modern values that globalization brings [12]. This proves that good local wisdom must be cultivated.

Local wisdom that is on the west coast of attack district, among others: not allowed to buy needles when sunset, pamali, bacakan, bacakan before entering ramadan, religious values. Firstly, you should not buy needles during sunset. When anyone buys a needle at dusk then many stalls that do have a needle for sale will pretend there is no needle.

The two pamali, pamali are the expression of not be or inappropriate to something. In its use the word pamali is often used to prohibit children or others when doing inappropriate. Third bacakan out, bacakan is to eat together. Bacakan often with family, friends or neighbors. The value that can be taken from the doing bacakan is to get closer to the relationship.

Thirdly bacakan before going to ramadhan, bacakan this as much as bacakan in general. The difference from reading in general is the purpose to strengthen the relationship and welcome the coming of Ramadan with gratitude. The four religious values, many values of life are taken from religion. It is often used in general places to decide something often done in the mosque. Often done in the mosque to greet the big days of Islam. In general, people use the value of Islamic religion in running their lives together without disturbing the life of other religions.

In addition to the value owned by coastal communities west of Serang district there are local wisdom in the form of beaches and building. The beaches in the west of the attacking district are
unique. Uniqueness owned among others become the main choice of coastal tourism in the district attack. Many tourists who come from the city of Jakarta and surrounding areas to visit the beach in this attack district. The coast on the west coast of Serang environment is directly adjacent to the industrial estate with its diverse factories. Building, the only buildings on Anyer beach are bojong tower, Anyer-Panarukan roads and unused train tracks. Anyer-Panarukan road is a road built by Daendels with a length of 1000km and built only one year.

The case that can be used in this study material is to use sea water waves for row and series material. For example: In a tsunami event in the past, the wave height at a distance of 8 kilometers from the beach was only 1m high, then doubled every 2 kilometers, the initial wave height from 1m to 2m at a distance of 6km, 4m at a distance of 4km, 8m At a distance of 2km, how high the stunami wave as it reaches the shore. The advantage gained from local wisdom discussed above is the students know the dangers of stunami so that will do the help well in case of stunami.

3.3. ADDIE
The model of development in this study using approach analysis, design, development, and evaluate or ADDIE [13]. Selection uses this model because it has been widely used by previous researchers and is suitable for this development research. As a core model, ADDIE offers proposals that can be developed according to the learning objectives in the analysis, design, development, implementation and evaluation phase [14]. The relevance of the ADDIE model to this research is the main attraction for using it. In the development of this learning materials used stages according to ADDIE.

In the analysis phase the analyzed things are needs analysis, learner analysis, content analysis, technical analysis, structural analysis and online environmental analysis [15]. The analysis phase of this research analyzed from various side that is requirement analysis, learner analysis, content analysis, technical analysis, structural analysis and online environmental analysis. Needs analysis, in the first stage the researchers analyzed the needs of the students. In addition to the needs of students who are not less important is the need according to the curriculum 2013. Next is the analysis of subject matter to be given to students on this learning materials. Students receiving education are expected to have very high success rates [16].

Design: In this phase, education, visual and technical design strategies are used in objectivity and according to function [17]. At the design stage a preliminary drawing will be made in this study material. Images designed on these learning materials include lesson material, curriculum 2013 with interactive, and interactive content. First, the content of the material provided tailored to the needs of students and tailored to the stages of learning and interactive content. Content is adapted to local wisdom that is on the west coast of Serang district. Secondly, the curriculum 2013 has become the basis for making this study material. This book is adapted to the stages of observing, questioning, expansion, association, communication. Third, interactive content is provided through case approach, practice questions, video, and internet link context. Having done the design then make the initial design of the expected product. The format of this study material is in .swf format. The appearance of this learning material is landscape this is due to the adjustment to the display on the monitor.

Development: in this phase, the preparation of the design for face-to-face graphics and stories has been implemented by web designers and programmer designers using technology tools and strategies from software [17]. The next step after designing in this research is development stage. At this stage made the product that is learning materials format .swf. Development is done by searching for mathematical material content accordingly. This material was developed by providing input with local content. After obtaining the appropriate material, carried out the stage of making learning materials with the format .swf. This learning material is made by using flash and output with .swf format and tailored to the android gadget so it can be used in android.

At the implementation stage, some students from the target group were tested with prototype material that had been implemented [17]. After making the product then conducted a trial in implementing this learning materials product. Implementation is done at the research site that is senior high school.
Evaluation is fundamental to the success of a product because it can improve errors and develop. So, it is important to consider evaluating the research by asking, “what is kind of criteria should I use?” [18]. Criteria of this research is according to problem formulation. Evaluations were performed both in the design process and at the end of the design [17]. After obtained data from learning materials used then evaluated. Evaluation related to research, manufacture of product and product itself. Evaluations related to this product are improved materials, interactive content.

3.4. Data Collection Technique

Data collection is done into three stages of data collection before the research, while developing product and when evaluating the product. The data collection stage before the research is done for the purpose of input to the product so that it is better. The data collection stage when the study was taken to educational experts, mathematicians and multimedia experts. The last stage of data collection is to retrieve information for product related inputs from students. The tests conducted in the development of this product include test of educational experts, test of mathematician, test of multimedia expert, limited test and observer test.

3.5. Data Analysis Technique

After collecting data the next stage is data analysis. Data obtained using assessment instruments for educational experts, mathematicians and multimedia experts were analyzed for the feasibility of teaching materials. To describe the result of questionnaire of interactive learning material, then do the calculation. This calculation is used to find out the results achieved in the experiments conducted to the students. This description uses the following formula [19] and table 3.

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

Information:

- \( x \) : Presentation of the final value
- \( M \) : The raw score or the total score of respondents’ answers
- \( I \) : Ideal score or highest score

| 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         |

4. Conclusion

From the description above obtained that interactive learning materials with local wisdom content has many advantages. The advantages gained include students happy with learning materials that contain interactive content. This study material has advantages by loading regional content. Practically used anywhere because this learning material is portable and used in computers and smart phones. Another advantage is that this study material is cheaper than paper-shaped learning materials. Limited test results obtained show students’ response to interactive teaching materials based on scientific approach is good [6].

To create interactive content with local wisdom content with .swf format can use the ADDIE approach. Stages include analysis, design, development, implementation, and evaluation. In addition to these stages of development can be done with a computer with intermediate capabilities. To develop the teaching materials can use adobe flash application.

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