

Development of Teaching Materials Based Interactive Scientific Approach towards the Concept of Social Arithmetic For Junior High School Student

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Abstract. The scientific approach is the characteristic of the curriculum 2013. In learning to use a scientific approach, learning process consists of five stages: observe, ask, try, reasoning and convey. In the curriculum 2013 the source of learning is a book, print media, electronic and about nature or relevant learning resources. Most of the print instructional materials on the market does not appropriate in the curriculum 2013. Teaching materials with a scientific approach, beside that to the teaching materials should motivate students to not be lazy, do not get bored, and more eager to learn mathematics. So the development of scientific-based interactive teaching materials that if this approach to answer the challenge. The purpose of this research is to create teaching materials appropriate to the curriculum 2013 that is based on scientific approach and interactive. This study used research and developed methodology. The results of this study are scientific based interactive teaching materials can be used by learners. That can be used by learners are then expected to study teaching materials can be used in android smartphone and be used portable.

1. Introduction

Mathematics is a discipline that was very important in their daily lives. This is evident in our daily activities can not be separated from activities related to mathematics. But awareness of the importance of mathematics is still not evenly distributed. This can be seen in students who still feel scared and lazy to learn mathematics. Many attempts by the government and teachers to improve students mathematical abilities. Efforts are being made among other teachers in the learning process in the classroom so that students are more interested and diligent in studying mathematics. In addition to the efforts of teachers is also important government role in improving the quality of students' mathematical abilities in Indonesia. Efforts have been made by the government among others to enhance the curriculum.

Curriculum is a set of plans and arrangements regarding the objectives, content and learning materials as well as the means used to guide the implementation of learning activities to achieve specific educational objectives. The new curriculum is currently at 2013 [1]. Curriculum 2013 has distinctive features namely the application of scientific approach. Efforts application of scientific or scholarly approaches in the learning process is often touted as a characteristic of the curriculum 2013, which is certainly interesting to learn and further elaborated [2]. Scientific approach in learning it includes components: observe, ask, try, processing, presenting, concluded, and create [1][2][3].



Implicitly, the statement becomes a challenge to learn more in-depth curriculum 2013 so that the educators are better equipped to develop the ability of learners.

Curriculum 2013 requires students to use learning resources to acquire knowledge about the subject matter. Definition of learning resources based on the Standard Process Primary and Secondary Education, learning resources can be in the form of books, print and electronic media, the natural surroundings or other relevant learning resources [4]. It can be concluded, books as teaching materials, including the learning resources that are used in the curriculum of students in 2013, so this is an important thing that needs to be developed.

Books or instructional materials used in teaching the curriculum in 2013 should correspond to the five stages of learning: to observe, ask, try, reasoning, and presentation. In the course curriculum in 2013 is still a lack of book that refers to the scientific approach to the curriculum in 2013, it can be known by comparing the book provided by the government with the books sold in public places. In addition to the lack of teaching materials based scientific approach we have challenges in curriculum in 2013 itself, which students use technology/electronic media as learning support. In developing teaching materials used in the curriculum in 2013 should be approached scientific and students use technology as a learning support. Based on the above preliminary researchers chose a title based interactive development of teaching materials scientific approach on the subject of social arithmetic SMP.

The purpose of this research is to produce interactive teaching materials based scientific approach on the subject of Social Arithmetic SMP. Limitation of research and development on these materials are as follows, first the teaching materials that developed is teaching material in the form of soft copy files to Portable Document Format. Second product development of teaching materials is limited in mathematic subjects the material social arithmetic for student class VII. Third measures undertaken in development research, seven of these, namely the potential and problems, data collection, product design, design validation, design revisions, product testing, and product revision.

2. Literature Review

2.1. *Interactive Teaching Materials*

To define interactive teaching materials we have to understand the meaning of the teaching materials and interactive. Instructional materials are all kinds of materials that are used to assist educators in implementing the teaching and learning activities in the classroom [5]. We understand anything related to classroom learning and provide an acceleration in understand the material being taught by educators to students called teaching materials. To increase students' interest in learning teaching materials should be interesting. Because of human nature that can be bored. Basically all the people do not want their boredom in his life [6]. This makes the challenge to create a more pleasant teaching material. To enhance the learning material to make it more attractive, effective when used in a predetermined learning purposes [7]. Besides the sense of teaching materials include products of science, technology, art, or sports, among others, in the form of articles, designs, patents, or teaching materials[8].

Through the learning model based interactive multimedia intended to make learning more interesting and the material is abstract can be visualized in animation media in accordance with the actual conditions on the ground to follow the development of science and technology continues to evolve so that student motivation to learn and build knowledge becomes easier to do [9].

The purpose of the interactive teaching material is to visualize things that are abstract. Classification within the scope of multimedia interactive learning system lies not in hardware, but rather refers to the learning characteristics of students in response to the stimulus shown a computer screen [9]. In making the instructional materials interactive emphasis on making learning software that has characteristic students who can respond teaching materials. It can be concluded that interactive teaching material is a form of learning in this book-based software that provides stimulus in the form of animations to users [10].

2.2. *Scientific Approach*

Provides skills in the conception of the curriculum in 2013 that uses a scientific approach is to observe, ask, try, reasoning, Present, create [3][4]. In learning this should be an important basis in each learning approach. The components of the scientific approach as follows:

2.2.1. *Viewing*. Viewing is an activity to find out is to focus on what is being searched out. As activities seek out a merchant to sell his wares, selling way this is viewed and searched out by us. Event to find out is what is called observing.

2.2.2. *Ask*. Propose an activity to find out something by way of exchange of ideas. In contrast to observe, in a more focused activity observed observers do see something observed activities. Propose activities are activities to find out something by digging information to someone either directly or through the media. The cause of the students asked the educators, among others because the students do not understand the relevant subject matter, in addition to the students want to associate the knowledge that has been gained with the new knowledge gained.

2.2.3. *Attempt*. Trying to figure out something is activity results by giving the new treatment. Try activities in the field of mathematics is usually done when solving problems. Solving problems is done with tries to solve the problem with trying to work on a paper or doing new things based on observing first. This is the result of trying to know anything what happens after the treatment was given.

2.2.4. *Reasoning*. Reasoning is the process by which new knowledge is processed in mind. These cognitive skills are closely related with the speed to understand and analyse the material presented. Reason is used in questions and high rate ability.

2.2.5. *Present*. Present are activities to provide information to the audience with material that has been determined. Examples of seminars are wont to do, there are people as informants who provide specific information in a seminar attended by many audiences. Present can be concluded that the activities carried out by the presenter of material to the audience with material that has been determined.

2.2.6. *Creating*. Creating an activity to make it to have a new distinction. In mathematics learning activities to create a professional manner is to make the method, manner, or a new theory. But the simple, while answering students answer in their own way is a creative activity. Meaning of creating itself is made so that in the field of education students can create knowledge that exist in the real world into his mind.

2.3. *Arithmetic social*. Buying and selling activities are carried out in the supermarket or on the market, is one example of social arithmetic in economic activity [11]. We know that the economic activity we did was matter of discussion of social arithmetic. Social arithmetic studied in class VII SMP. Social arithmetic in economic activity, a rebate (discount), gross, tare, net, interest and tax savings [12]. The value of all, the value per unit, the value in part, the purchase price, purchase price, profit, loss, discount, gross, net, tare, tax and single flower [11].

3. **Experimental Method**

Educational R n D is an industry-based development model in which the findings of research are used to design new products and procedures[13]. This research aims to create products based interactive teaching materials scientific approach on the subject of social arithmetic junior high, so that the research will be carried out is a research and development or research and development.

Research and development is a research method that is used to produce a particular product, and test the effectiveness of these products [14]. Research and development is a process or steps to

develop a new product or improve existing products that can be justified [15]. So that it can be concluded that the development of the research is to improve or make things so much better.

3.1. Model Development

The products resulting from this research is based interactive teaching materials scientific approach on the subject of social arithmetic SMP. Research departing development of their potentials and problems of data collection, product design, design validation, test user, product revision, test products, design revisions, revision of the product, product mass [14]. For more details, step-by-step development of interactive teaching materials based scientific approach on the subject of social arithmetic SMP as shown in the figure below.

However, because given the time and budget constraints, this study only involves these steps until the seventh step. The seventh step is the potential and problems, data collection, product design, design validation, design revisions, product testing, and product revision. This is because the products are produced only in small scale.

3.2. Development Procedure

Interactive teaching materials based scientific approach on the subject of social arithmetic was developed using seven stages of development. Stages include the potential and problems, data collection, product design, design validation, design revisions, test products and product revision.

3.3. Testing Products

After the making of interactive teaching materials based scientific approach on the subject of social arithmetic is completed the next stage of product trials. Product testing is done twice: expert testing and limited test. Test validation is performed before performing the test because the experts to determine the extent to which the goals and objectives of product development experts on the development. For this test was carried out by expert mathematician and expert education.

Test on the field at 1 to 3 schools with 6 to 12 test subjects (teachers) [15]. In this limited test will involve six junior high students of class VII. In these trials will be used questionnaire assessment of teaching materials, filling a questionnaire carried out by six students after the test is done.

Scale model of computation that are used are Likert scale. Six students had been asked to fill out a questionnaire with the option strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). For the positive statements it will be to the value of SS = 4, C = 3, TS = 2, STS = 1 and vice versa for negative statement then SS = 1, C = 2, TS = 3, STS = 4. For the assessment based interactive teaching materials scientific approach used by students open questionnaire.

3.4. Instruments

In this study, data collection using research instruments such as questionnaires. Technique of data collection is done by giving a set of questions or a written statement to the respondent to answer [14]. This questionnaire will be given to student who have been using interactive teaching materials and is completed by the student. The questionnaire used in the form of closed and open questionnaire questionnaires so that researchers will get more feedback from users of this interactive teaching material.

3.5. Data Analysis

These calculations are used to determine the results achieved in the trials conducted to students. This description uses the following formula[16]:

$$Final\ value = \frac{raw\ score\ or\ total\ score\ of\ responden}{scores\ ideal\ or\ highest\ total\ score\ answers} \times 100\% \quad (1)$$

3.6. *Indicators of Success*

In this study, the indicator is the assessment of test trials mathematician and education experts. Indicators of success of research and development-based interactive teaching materials scientific this approach is assessed by greater than 70% of the tester mathematicians and education experts.

4. **Result and Discussion**

4.1. *Test Expert*

Mathematicians have come from the environment department of Mathematics Education University of Sultan Ageng Tirtayasa. In case this is a lecturer of mathematics education so that scientific mathematics is the field of science. Assessment is done objectively about interactive teaching materials scientific-based approach that was developed from the viewpoint of mathematical concepts or materials. The result are mathematic expert 1 is 82.14% and mathematic expert 2 is 92.86%.

Education experts whose role in the assessment of this questionnaire derived from one tester supervisor and an examiner of SMPN 1 Cinangka mathematics teachers who have experience in educating students and understand the curriculum, 2013. Following the results of the assessment tester education expert 1 93.75% and education experts 2 is 73.96%.

Media experts who play a role in these two testers assessment questionnaire derived from SMAN 1 Cinangka computer teacher. Following the assessment of examiner media expert 1 is 83.75% and media expert 2 is 77.5%.

4.2. *Test Results Limited*

After testing expert and product improvement of teaching materials, and then do the test product against a small group (limited test). Test a small group consisted of 13 students of VII class of SMP Satu Atap Gelam 2 Kota Serang. The result of Limited test is 85.77%.

4.3. *Final Product*

Storage media using data storage device in the form of soft copy (flash dish, hard disk, CD, DVD). Teaching material size is 21 cm x 29.7 cm (A4). The file size is 116 Mb. The number of pages is 33 pages of teaching materials. The format of teaching materials is a Portable Document Format (.PDF). Typeface on teaching materials is Times New Roman 12 and 12. The material presented Cambria is a social arithmetic.

4.4. *Linkage Teaching Material*

Learning curriculum emphasizes activity observed in 2013 contains, ask, digging up information / tries, reasoning, inform. The meaning of the five thing above are educators can not provide material information directly to learners. In this case the teacher becomes a facilitator of learners in constructing their own knowledge. In this teaching material teaching material users are required to construction own knowledge. Teaching material automatic constructknowledgeby giving problems from simple to complexes. This problem is the usefulness of the material being studied, so that users can easily imagine for example refers to real-world problems. In this teaching material at each end of the material is given the correct definition, so that after the next phase of his knowledge to constructstraighten information if there is some mistake. This is the basis of the manufacturing-based interactive teaching materials scientific approach.

5. **Conclusion**

After the various processes of testing by several experts as well as a limited test of the number of students obtained percentage of the assessment results. Results of votes mathematician first test of 82.14% and test mathematician second at 93.86%, so by testing mathematic expert that materials based interactive scientific approach include category is very strong. Results of the assessment of the educational expert test is 93.75% so get conclusion these materials include the category is very strong

and the two education experts test is 73.96% so that the resulting conclusion of these materials include strong category. The results of expert assessment of the media is 83.75% and the two media expert assessment is thus 77.5% based interactive teaching materials scientific approach is categorized as strong. The limited test results were excellent which got 85.77%, so very strong in the category.

Based on the results of expert testing and limited testing has been done addressing that interactive teaching material based scientific approach is fit for use in the learning process. Limited test results obtained show students' response to interactive teaching material based scientific approach is good.

Based on the conclusion, some suggestions that could be addressed are: (1) The only teaching materials developed in social arithmetic material so expect further researchers develop interactive teaching material based on a scientific approach to the subject of another; (2) for researchers who want to develop further teaching materials, it is advisable to increase the population in a limited test; (3) Researchers who wish to further develop this material is advisable to increase the exercises more challenging and should be tailored sequence material level of difficulty so that students feel more challenged; (4) Preparation of teaching materials also requires the ability of researchers to operate the computer to support the manufacture so that further research is expected to be ready in the use of computer technology; (5) In making interactive teaching materials adapted to the design of a computer and mobile phone screen; and (6) It is expected that the first secondary school teachers try to use products based interactive teaching materials of this scientific approach.

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