



Development of Scientific and Constructivism-Based Handouts on Social Arithmetic Materials

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ABSTRACT

Purpose of the study: The purpose of this study is to combine a scientific approach and a constructivist learning model so that students can build their own knowledge through their experiences from the results of interactions with the environment using handout media.

Methodology: In this research, development uses the ADDIE model (Analysis, Design, Development or Production, Implementation or Delivery and Evaluations). The subject of this development trial was a mathematics teacher at school to respond to handout teaching materials, and the intended users of this product were class VII students of SMP N 11 Muaro Jambi. The type of data used is the type of quantitative data.

Main Findings: This research has produced a printed teaching material product in the form of scientific and constructivism-based Handouts on social arithmetic material, which can facilitate students to play an active role in the learning process, as well as make it easy for students to understand the concept of subject matter. Based on the results of the research and discussion, it can be concluded as follows: The development of scientific and constructivism-based Handouts on social arithmetic material is carried out in several stages, namely (1) Analysis, (2) Design, (3) Development, (4) Implementation and (5) Evaluation.

Novelty/Originality of this study: The development of scientific and constructivism-based Handouts on social arithmetic material is carried out in several stages, namely (1) Analysis, (2) Design, (3) Development, (4) Implementation and (5) Evaluation.

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1. INTRODUCTION

Mathematics is a compulsory subject for junior high school students. In general, students think that mathematics is difficult and boring [1]–[3]. As a result, there are not a few students who are not even interested in understanding and mastering basic concepts in mathematical material [4]–[6]. As a result of the difficulties, it is hoped that mathematics teachers will present mathematics material in a more interesting way, so that the erroneous assumption that mathematics is a difficult subject for junior high school students will disappear from their minds [7], [8]. To make mathematics material more interesting, teachers must have the ability to develop strategies, methods and use of learning media in such a way that learning objectives can be achieved properly.

In PP number 19 of 2005 article 20, it is indicated that teachers are expected to develop learning materials, which is confirmed through Permendiknas number 41 of 2007 concerning process standards, which

among other things regulates the planning of the learning process which requires educators in education units to develop learning resources. Thus, teachers are expected to develop learning materials as a source of learning [9]–[11]. At present, most of the learning conditions in schools are still conventional, such as the delivery of material that is only lectured. In addition, educators still use a lot of ready-made teaching materials, just use them, just buy them without the effort to plan, prepare and arrange them themselves [12]–[14]. Thus, it is very possible if the teaching materials they use are not necessarily in accordance with the circumstances of the school.

Teaching materials currently used by teachers are in the form of textbooks and handouts. Presentation of ordinary material makes students bored and not interested in reading it [15]–[17]. One effort to overcome this problem is that the teacher must provide teaching materials that can attract the attention of students and students absorb the subject matter provided by involving students to be active in class [14]–[19]. The teaching materials provided are well organized and structured and directed so that students can easily understand the subject matter provided [20], [21]. The development of teaching materials is one way to increase students' activeness in learning mathematics.

One example of printed teaching materials used is handouts. Handouts are teaching materials that contain brief or concise explanations related to a subject matter that is given by the teacher to students when participating in the learning process [22]–[24]. Handouts are something that is given away for free [25]–[27]. Handout is something that can support the learning process in education. The existence of teaching materials that are made in an interesting and systematic way can help students understand the concept of the material being taught and is expected to increase student motivation in learning, of course.

The reason for developing handouts using a scientific approach and constructivism is that in a scientific approach there are 5 stages of learning that can support student learning processes such as observing, asking questions, gathering information, processing information/associating and communicating it so that learning becomes more active. Both teachers and students [28]–[30]. While constructivism has a close relationship with the application of a scientific approach. For a long time, teachers have given freedom to students to develop their own existing knowledge, starting from junior high school, high school, especially for tertiary level students. In fact, not only junior high schools to tertiary institutions are given the freedom to shape their own knowledge through being active in thinking about an object, new experiences, and the environment. At present, at the elementary school education level, students are required to participate actively in the learning process.

Thus the author will combine the scientific approach and the constructivism learning model so that students can build their own knowledge through their experiences from the results of interactions with the environment using handout media. Most students do not understand social arithmetic material, for example determining selling prices, buying prices, discounts, interest, net, gross, tare. Social arithmetic is material related to everyday life, especially in buying and selling goods that one can do alone. This research is important to do considering that arithmetic material is considered difficult so that it requires learning resources that are easy to understand and accessible through this research, it is hoped that it can answer these problems. Based on this description, the researcher is interested in conducting research with the title development of scientific and constructivism-based handouts on social arithmetic material.

2. RESEARCH METHOD

In this research, development uses the ADDIE model (Analysis, Design, Development or Production, Implementation or Delivery and Evaluations). ADDIE is an acronym from analyze, design, develop, implement and evaluate. ADDIE is a product development concept. The ADDIE concept is being applied here constructing performance-based learning". In Indonesian, ADDIE stands for analyzing, designing, developing, implementing, and evaluating.

The subject of this development trial was a mathematics teacher at school to respond to handout teaching materials, and the intended users of this product were class VII students of SMP N 11 Muaro Jambi. Based on its nature, the type of data is divided into 2, namely qualitative and quantitative data. In this development research, the type of data used is quantitative data. Quantitative data is data in the form of numbers (scoring). And based on how to obtain, the data source used is primary data. The data was obtained from material validation data and handout designs from experts, teacher and student response data or responses to the content, design, and language of the handouts as well as data on student learning outcomes through a post-test after using the handouts. So that the handout used is said to be valid. Handouts that have been valid are then tested to determine effectiveness.

3. RESULTS AND DISCUSSION

The results of this study were (1) a scientific and constructivism-based handout on social arithmetic material in class VII SMP Negeri 11 Muaro Jambi, (2) assessment of the material content and handout design by materials experts, design experts, and questionnaire instrument experts. (3) Students' and math teacher's

responses to the math handouts that have been made. (4) Student learning outcomes on the use of scientific and constructivism-based handouts in Social Arithmetic material in class VII SMP Negeri 11 Muaro Jambi.

Inside this handout is the name of the school, namely SMP Negeri 11 Muaro Jambi, the class filled in is class VII, the name of the subject in question is mathematics. Then this handout also contains 3 meetings, namely (1) selling price, buying price, profit and loss, (2) gross, tare and net, (3) single interest. In each chapter there is also a page that can make it easier for students to find the material to be studied.

Furthermore, in this subject matter there are five scientific stages, namely observing, asking questions, gathering information, reasoning, and forming networks. In addition, when learning uses scientific and constructivism stages. At the observing stage, students are given illustrations that can make students remember the previous lesson. And this stage is also given a problem that makes students find their own answers. Furthermore, at this asking stage students have the desire to ask after solving the problem so that students can make a question after observing a given problem at the observing stage. In addition, this handout also provides supporting material such as a little information about Social Arithmetic, as well as examples of questions that can make it easier for students to understand and dig up information from what they get. At the reasoning stage students are given questions where they solve a problem or a problem after digging up information from various sources. As well as the stages of forming a network of students forming groups, solving problems and then presenting the results obtained in front of the class.

After going through the development process, the stages included: first, the researcher designed a scientific and constructivist-based Handout on Social Arithmetic Material. The design of this handout refers to scientific-based learning steps and constructivism. In discussing the whole material of social arithmetic in the handout students can understand more easily because the students' way of thinking has been directed towards the description of the material which is done using scientific steps and constructivism. This scientific approach-based handout is complemented by core competencies and basic competencies. Then at the end of the handout questions have also been prepared covering all the material discussed.

In this section After designing and making handouts, the handouts are validated by a team of material experts and a team of design experts. Validation is a product design assessment process that is carried out by giving an assessment based on rational thinking, without field trials [9]. The results of the validation assessment from the material expert team and learning design were included in the good category and meant that the handout was valid. Then suggestions and comments from the expert team as input for researchers to revise the handout.

After the design and material for the handouts were revised, the researchers conducted individual product trials consisting of 1 mathematics teacher and small group trials consisting of 10 class VII students at SMP Negeri 11 Muaro Jambi. This aims to ask for teacher and student responses regarding the handouts that have been made. After conducting individual trials on math teachers on handouts, a percentage of 78% was obtained in the "Good" category. The next stage after the handout was revised, the researchers conducted a test of its use on students of class VII E, SMP Negeri 11 Muaro Jambi. In the trial use, it was found that student learning outcomes through the post-test trial found 80% of students who had passed and the results of student responses to the use of scientific and constructivism-based handouts on social arithmetic material had a good or positive response from students because it had a percentage of 78, 61%. A handout is said to be effective if it meets the indicators of the average score of student learning outcomes obtained by achieving the minimum completeness criteria and the positive response of students shown through the questionnaire given, from the results of the study and the questionnaire given shows that the developed handout is effective.

4. CONCLUSION

This research has produced a printed teaching material product in the form of scientific and constructivism-based Handouts on social arithmetic material, which can facilitate students to play an active role in the learning process, as well as make it easy for students to understand the concept of subject matter. Based on the results of the research and discussion, it can be concluded as follows: The development of scientific and constructivism-based Handouts on social arithmetic material is carried out in several stages, namely (1) Analysis, (2) Design, (3) Development, (4) Implementation and (5) Evaluation.

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