



Development of mathematics learning device model cooperative script to teach social arithmetic materials

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Abstract

The research aims to produce mathematics learning tools in the form of lesson plans, worksheets, and THB on social arithmetic material using Cooperative Script learning models that have valid, practical, and effective qualifications. This research method is categorized as development research. In this research the RPP, LKS, and THB developed using the Problem based learning Model on the number pattern material. The results of this study state that the mathematics learning tool developed in this study is limited to the Learning Implementation Plan, Student Activity Sheets, and Learning Outcomes Tests on social arithmetic material for class VII SMP N 22 Halmahera Barat. The trial was only conducted in one class, which consisted of 39 students. Based on the research data, it can be concluded that a mathematics learning tool has been produced with ADDIE design model which includes five stages, namely: the analysis phase, the design phase, the development phase, the implementation phase, and evaluation phase modified evaluation results obtained: (1) Learning tools have been developed using Cooperative Script learning models on social arithmetic material for Grade VII students of SMP N 22 West Halmahera and meet valid, practical, and effective criteria, (2) Validity of devices based on learning models Cooperative Script is shown from the validation results of the validators against the device, (3) Practicality of the device based on Cooperative Script learning models is shown from the results of observations.

Keywords: cooperative script, development, learning tools, social arithmetic

1. Introduction

Mathematics is a thing that is familiar to everyone, especially in the world of education, because mathematics has been taught from the elementary school level up to tertiary education. The role of mathematics in life is strongly felt by everyone, especially for those who always carry out activities such as buying and selling which in conducting these transactions must be equipped with good numeracy skills so as not to harm themselves or others.

Based on the results of a survey conducted by researchers at SMP Negeri 22 West Halmahera, it shows that students have difficulty in understanding and solving problems related to social arithmetic material. Which is one of the causes of students having difficulty in understanding and solving mathematical problems is that learning done in the classroom is more dominated by the teacher. Students tend to be passive, teachers lack the opportunity for students to construct their own knowledge. As a result, it seems that students only hear and record the material provided. Apart from these factors, there are other factors, namely the mathematics learning device has not been fully prepared by the teacher, so that it seems that the teacher only teaches in the usual way, that is, learning is more dominated by teachers than students who only tend to be passive. The availability of learning tools is also one of the factors that can support the learning process in class.

To create good learning, we need an effective learning tool that can support all aspects of learning activities. These tools include Learning Implementation Plans, Student Worksheets, and Learning Outcomes Tests. Learning Implementation Plans play a role in the preparation and

support stages of implementation, while Student Worksheets are used to support the implementation of learning. Learning Outcomes Tests are used to measure student achievement or competencies that have been achieved by students in certain fields.

One form of planning in the learning process is the preparation of Learning Implementation Plans and Student Activity Sheets. Mulyasa (2006), RPP is a procedure that will be carried out in learning that is prepared by taking into account the characteristics of students of the standard material used as study material^[1]. Furthermore, according to Prastowo (2011), LKS is a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for the implementation of learning tasks to be done by students, both theoretical and practical, referring to the basic competencies that must be achieved by students^[2].

The results of an interview with one of the mathematics teachers at SMP N 22 Halmahera Barat that, most mathematics learning methods in schools use the lecture method, or only use the direct learning model. The lecture method is a method in which the teacher explains in front of the class by lecturing.

One method of learning that can overcome the low participation of students is the cooperative method. The cooperative method requires all members of the learning group to be face to face so that students can engage in dialogue not only with the teacher but also with other students (Slavin, 2009)^[3].

The activeness and participation of students in learning can be raised through the application of Cooperative Script

learning models in the learning process. According to A'la (2011), Cooperative Script learning models, also called Cooperative Scripts, are learning methods in which students work in pairs and verbally summarize the parts of the material they learn in the classroom^[4].

Cooperative Script is a learning model that can improve student memory (Slavin, 1994)^[3]. It is very helpful for students in developing and linking facts and concepts that have been found in problem solving.

2. Research Methods

This type of research is development research, This study aims to produce good learning tools, namely RPP, LKS, and THB on social arithmetic material. The device development model used is the ADDIE development model (analysis, design, develop, implementation, and evaluation). The subjects of the study were Grade VII students of SMP N 22 West Halmahera, with 39 students. The data source was obtained from validator and grade VII student of SMP N 22 West Halmahera. Data collection techniques in the form of tests and non-tests. The types of data are quantitative data and qualitative data.

3. Results and Discussion

As has been formulated in the purpose of this study in the previous chapter, that this study had the aim of producing mathematics learning tools using Cooperative Script learning models of social arithmetic material for Grade VII students of SMP N 22 West Halmahera. The resulting learning tools are (1) Learning Implementation Plan, (2) Student Activity Sheets, and (3) Learning Outcomes Test.

This learning tool was developed based on the ADDIE development model. The following is a description of the implementation and research results by following the stages of the ADDIE development model.

Analysis Phase

At this stage an analysis of the needs of the learning tool is carried out, curriculum analysis, and analysis of student characteristics. The details of the analysis phase are:

Analysis of Learning Equipment Needs

This analysis aims to determine the problems that exist in schools, so the need for a development of teaching materials. At this stage, the availability and condition of the learning tools used to identify learning is carried out. If there is a problem, or expectations that are not in accordance with reality at school, then the solution is determined, which is in the form of developing certain teaching materials.

Based on the results of observations and interviews obtained information that the teacher's role is more dominant in learning activities in the classroom. Furthermore, teachers still have difficulty in making learning devices. Therefore, an effort should be made to overcome these problems, namely by developing learning tools that are in accordance with social arithmetic material.

Analysis of Student Characteristics

This analysis aims to determine the characteristics of students, which include abilities, background knowledge, and the level of cognitive development of students as an illustration to develop learning devices. The analysis is done through observation of learning in the classroom and teaching experience in the classroom as well as theoretical

studies. It also identified the tendency of intelligence possessed by students and student learning independence through a pre-research questionnaire.

Curriculum Analysis

This analysis was conducted to explore the material outlined in the learning kit based on the 2013 curriculum. The selection of material is based on the absorption of student learning outcomes. If there are still materials with low absorption, learning tools will be developed on the subject. The material provided is adjusted to the Competency Standards and Basic Competencies that exist in the 2013 curriculum.

Design Stage

Based on the results of the analysis, the researchers then designed the teaching material. Teaching material designed in the form of lesson plans, worksheets and THB using Cooperative Script learning models on social arithmetic material for seventh grade junior high school students. After that, an instrument of assessment of learning tools was also arranged to assess the quality of learning tools. In detail the activities carried out by researchers at this stage are:

Preparation of Learning Implementation Plan.

The steps in preparing the lesson plan are: (1) Determine identity, which includes: name of school, subject, class / semester, and time allocation, (2) Determine KI and KD, (3) Determine learning indicators and objectives, (4) Selection of learning resources, (5) Determine learning models, (6) Arrange learning activities, (7) Determine assessment techniques.

Preparation of Student Activity Sheets

The worksheets are designed so that they meet the didactic aspects, aspects of construction requirements, aspects of technical requirements, aspects of the quality of material content, and the presentation is in the form of steps in the Cooperative Script learning model. The following are the steps for preparing an LKS: (1) Drafting the contents of the LKS, (2) Preparing reference books, pictures, and materials, (3) Drafting the Technical Requirements or LKS Display.

Preparation of Learning Outcomes Tests

Development of Learning Outcomes Tests is carried out in accordance with the initial design that has been set. Preparation of learning instrument assessment sheets. There are 4 instruments used to assess the quality of learning tools, namely: (1) Learning tools assessment sheet. There are two kinds of assessment sheets, namely the RPP assessment sheet and (2) the LKS assessment sheet. The second function is to determine the validity of the learning device developed.

Student response questionnaire

This questionnaire is to determine students' responses to learning tools to measure practicality.

Test results on learning outcomes

This problem is used at the end of the lesson. The results of these achievement tests are used to determine the effectiveness of the learning device.

Observation sheet on the learning process

This sheet is useful for monitoring and evaluating the

effectiveness of learning with the learning tools being tested. Data from this sheet is used as supporting data.

Development Phase

At this stage a mathematical learning tool was developed using the Cooperative Script learning model on social arithmetic material for seventh grade junior high school students, which includes:

Development of Learning Device Design

Learning device design activities carried out in accordance with the initial planning that has been prepared. At this stage, the initial product of the mathematics learning tool is obtained by using the Cooperative Script learning model on the social arithmetic material of seventh grade junior high school students.

Learning tools in the form of RPP, LKS and THB. The learning tools that have been compiled are then consulted with the supervisor to get corrections and suggestions.

Validation

This stage aims to get a valid quality product. This is done by submitting an initial product to the validator, namely 2 expert lecturers, 2 mathematics teachers, and a colleague who is also a mathematics teacher.

The results of the validator assessment as well as suggestions and input will be used to improve and develop the product so that it meets the validity aspects. Expert validation, namely the assessment of RPP, LKS, and THB using the assessment instruments RPP, LKS, and THB in the form of a questionnaire for the validator.

Revision

Learning tools in the form of lesson plans and worksheets that have been validated by the validator, are then revised according to the criticisms and suggestions given. After the revision, the learning tools developed are ready to be trialled.

Expert Assessment

An expert assessment is conducted to determine the validity and feasibility of the learning tools developed in the form of lesson plans, worksheets, and THB that have been approved by the supervisor and then validated by the validator. Expert validation, namely the assessment of RPP, LKS, and THB using the assessment instruments RPP, LKS, and THB in the form of a questionnaire for expert lecturers. The names of the Validators are (1) I Wayan Damai, (2) Anneke Pesik, (3) Bernadus Hallo, (4) Roland Buaya, (5) Inta Korois

Product Trial Results

The trials included in the implementation activities carried out after the learning device was declared worthy to be tested with revision by experts. The data used to determine the quality of the Learning Implementation Plan, Student Activity Sheets, and Learning Outcomes Tests are developed. Following this is an explanation of the data obtained from the results of discussions and testing of tools developed.

Validity Data

Validity data obtained from the results of the assessment of experts or validator.

Practicality Data

Practicality data was obtained from the results of evaluating student responses and the feasibility of learning.

Student Assessment Data

Student assessment data were obtained from 39 students in class VII SMP 22 West Halmahera. This assessment is obtained after students carry out mathematics learning using the Student Activity Sheet and Learning Outcomes Test that was developed.

Learning Implementation Data

During the learning process, observations were made to find out the implementation of the learning in the Learning Learning Plan that was developed.

Effectiveness Data

The effectiveness data was obtained from the results of the achievement tests conducted at the end of mathematics learning. The test questions given to students are post-test questions, which consist of two problem descriptions.

Product Revision

Based on the stages that have been made, also obtained some suggestions regarding the learning tools developed. The researcher evaluates the Learning Implementation Plan, Student Activity Sheets, and Learning Outcomes Tests that are developed.

Things done to improve the Learning Implementation Plan, Student Activities (LKS), and Learning Outcomes Tests that researchers encountered during the trial.

Revised Learning Implementation Plan

After conducting an expert assessment of the Learning Implementation Plan that was developed, there are some suggestions that need to be revised so that the Learning Implementation Plan that is developed is feasible to be used in mathematics learning using Cooperative Script learning models. The revised Learning Implementation Plan according to experts is as follows.

Table 2. Revised Learning Implementation Plan According to Experts

| | |
|---|---|
| The revised part | Before being revised |
| Assessment of learning outcomes | The assessment instrument was not attached |
| The division of time in learning activities | The division of time in the steps of learning has not been detailed |

Revision of Student Activity Sheets and Learning Outcomes Test. After conducting an expert assessment of the Student Activity Sheet and Learning Outcomes Test developed, there are some suggestions that need to be revised, namely in writing so that the Student Activity Sheet and Learning Outcomes Test that is developed is suitable for use in mathematics learning.

Final Product Review

Based on the research results described above, the product is obtained in the form of a Learning Implementation Plan, Student Activity Sheets, and Learning Outcomes Tests with a valid, practical, and effective Cooperative Script model.

The steps in preparing and developing the Learning Implementation Plan and Student Activity Sheet are carried out with the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation).

Conducting analysis which includes: (1) Needs analysis: analyzes the need to determine the basic problems faced in learning mathematics in social arithmetic material, (2) Curriculum analysis: analyzes subject matter class VII Middle School 22 West Halmahera, (3) Analysis of student characteristics: analyze the condition of students at SMP N 22 Halmahera Barat based on the results of an interview with a mathematics teacher at SMP N 22 Halmahera Barat.

Designing Learning Implementation Plans, Student Activity Sheets, and Learning Outcomes Tests which include: (1) Designing RPP, LKS, and THB: RPP is made in two RPP according to the process standard, while LKS is made based on material / content aspects, process standards, requirements construction, and technical requirements and (2) Designing an assessment instrument that is, the researcher prepares an instrument for evaluating teaching materials as a tool to measure the feasibility of the resulting lesson plans, worksheets, and THB.

Development of Learning Implementation Plans, Student Activity Sheets, and Learning Outcomes Tests which include: (1) Development of research instruments in the form of validation sheets filled out by expert lecturers, practicality assessment sheets filled out by teachers and students, learning observation sheets filled by observers to measure product effectiveness, (2) Development of Learning Implementation Plan according to the design at the design stage, (3) Development of Student Activity Sheets and Learning Outcomes Tests according to the design at the design stage.

Implementation of Learning Implementation Plans and Student Activity Sheets: conducted in June. Evaluation of Learning Implementation Plans, Student Activity Sheets, and Learning Outcomes Tests: RPP, LKS, and THB are evaluated in terms of validity, practicality, and effectiveness.

Implementation

Test the Device

After the learning device is declared feasible by the expert, the learning device is implemented which can be used in learning activities. The results of the trial will be used as a reference for revising the developed learning device. The product trial was conducted at SMP N 22 west Halmahera with the subject of the research being Grade VII students.

In implementing learning, the use of tools in their learning activities can be grouped. The group was chosen heterogeneously and consisted of 2 people. In addition to working on group discussion activities, they also conduct student activities together and discuss if there are students in the group who are experiencing difficulties. In this study, it appears that students are interested and motivated to solve existing problems LKS and THB. This can be seen when students experience difficulties in resolving the difficulties they are facing.

After students reach their conclusions and write them on the answer sheet, the teacher reinforces the conclusions that students have obtained by first asking one of the students to reveal the conclusions they have reached. With the conclusions confirmed by the teacher, students can better understand the material they are learning.

Product Revision

Products that have been tested are then revised again based on input or suggestions from the student response questionnaire after using the learning products that have been developed.

Evaluation Stage

The evaluation phase is the final stage of the ADDIE development model. Evaluation is carried out by researchers by analyzing the research data obtained by the validity analysis of the equipment from expert lecturers and teachers. Student response data to learning activities to determine the response or response of students to the learning device developed.

Data Analysis and Discussion

Data analysis and the results of the intended trial are student responses to learning activities and learning outcomes tests. Data analysis of the results of the testing of social arithmetic learning tools developed includes validity analysis, practicality analysis, and effectiveness analysis of learning devices.

Validity Analysis of Learning Devices

Lesson plan

Based on the evaluation by the Validator the results of the expert validation of the Learning Implementation Plan (RPP) are presented in the table in the appendix. After the validation process has been carried out by the validator, it can be seen that five validators give an assessment of 3 and above with an average, meaning that the components in the lesson plan get good and very good ratings and can be used with a few revisions to the lesson plan.

Student Activity Sheet

The validator's evaluation of the worksheet includes: the worksheet format, the worksheet content, language and writing. After the validation process has been carried out by the validator, it can be seen that five validators gave ratings of 3 and above, meaning that the components in the worksheet received good and very good ratings and could be used.

Learning Outcomes Test

The results of expert validation on the Learning Outcomes Test are presented in the appendix table. From the assessment table above, the five validators gave good ratings so that they met valid criteria for content validity, were very understandable for language and writing questions, and could be used with little revision.

Analysis of Practicality of Learning Devices

Analysis of Student Response Questionnaire

Based on data from the student response questionnaire that was filled by 39 students after participating in class learning for social arithmetic material using the Cooperative Script model, the results obtained How do you feel about: (1) Learning material, 37 students are happy and 2 students are not happy, (2) Student activity sheets, 38 students are happy and only 1 student is not happy, (3) The atmosphere of learning in class is all happy, (4) The way the teacher teaches is also happy all of them.

What do you think of: (1) The subject matter, 37 students

are happy and 2 students are not happy, (2) Student activity sheets, 37 students are happy and 2 students are not happy, (3) The atmosphere of learning in class is all happy, (4) How to the teaching teacher is also happy everyone. Are you interested in participating in the next learning activity as you are currently taking part? All are interested.

What do you think about: (1) The language used in the worksheets and THB stated both 37 students and stated that it was not good only 2 students. As for the Appearance (writing, drawing, location of the drawings) contained in the worksheet and THB, it stated both 37 students and stated that it was not good only 2 students.

Analysis of Teacher Ability to Manage Learning

The results of observations of the learning manager by the teacher during the learning activities are presented in the table in the appendix, showing that based on the teacher's ability criteria outlined in chapter III, the teacher's ability to manage learning at the first to second meeting reaches the "Good" category, which is located at interval 3, 50KG <4.50. Thus the Teacher's Ability to Manage Learning has reached the good category, then this learning device does not undergo revisions based on the results of observations of the ability to manage learning.

Analysis of the Effectiveness of Learning Devices

The effectiveness of the learning tool seen from the completeness of the results of the Student Learning Outcomes presented in the table in the appendix. Based on the above table, it appears that the number of students who achieved mastery learning was 34 students or 87.18%. Based on the assessment criteria, it can be said that the device developed meets the effective category.

Analysis of Learning Outcomes Test Data

The learning outcomes test aims to obtain data on the validity of test items that will determine whether the developed test needs to be revised or not. The results of the analysis of the two indicators are as follows.

Validity

Based on the product moment correlation formula, the validity of each test item is obtained that all items are valid.

Reliability

Based on the calculation results (can be seen in the appendix), the reliability coefficient = 0.724 is obtained. From the results obtained, the reliability of the Learning Outcomes Test instrument developed was included in the "high" category and could be said to be reliable.

Based on the previous description, that the learning tools that have been developed are valid based on expert validation, it is said to be practical based on the results of the teacher's ability to manage learning in the classroom and student responses to learning activities, as well as effectively based on classical learning outcomes.

Thus, a social arithmetic learning tool has been developed with the Cooperative Script learning model in class VII SMP N 22 west Halmahera.

Research Limitations

Research on the development of learning tools is inseparable from a number of limitations. The mathematics learning tools developed in this study were limited to the

Learning Implementation Plan, Student Activity Sheets, and Learning Outcomes Tests on social arithmetic material for grade VII of SMP N 22 west Halmahera. The trial was only conducted in one class, which consisted of 39 students.

4. Conclusion

1. Learning tools have been developed using Cooperative Script learning models on social arithmetic materials for grade VII students of West Halmahera 22 Middle School and meet valid, practical, and effective criteria.
2. The validity of the device based on the Cooperative Script learning model is shown from the results of the validators' validation of the device.
3. The practicality of the device based on Cooperative Script learning models is shown from the results of observation.

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