

Development of Infographic-Based Textbooks for Mathematics Learning Materials in Class IV Sdn Sebaung 1 Probolinggo.

Wahyu Agustya M. Sulthon Masyhud, Nuriman

Department of Elementary School Teacher Education, the University of Jember.

Corresponding Author:- Prof. Dr. M. Sulthon Masyhud, M.Pd

Address:- Department of Elementary School Teacher Education, The University of Jember

(Email: msulthon59@gmail.com)

Abstract: *The use of infographics as learning media can affect students' academic performance in the cognitive domain. The problem is how to develop an effective infographic-based textbook for learning mathematics with flat shapes for 4th grade students so that effective learning outcomes can be obtained? For this reason, development research was carried out on 4th grade elementary school students at Sebaung 1 State Elementary School Probolinggo-Indonesia. The objectives of this research are; (1) produce an effective infographic-based textbook for learning mathematics on flat shapes for 4th grade elementary school students; (2) describe the effectiveness of infographic-based textbooks for learning mathematics on flat shapes for 4th grade elementary school students. The research procedure is carried out through the following stages: (1) preliminary study and problem formulation; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trial; (7) product revision; (8) trial use; (9) product revision; and (10) mass production. The results showed that (1) the results of the development of information-based textbooks were very effective for learning mathematics in 4th grade elementary school students, and (2) the indicators of the effectiveness of the developed textbooks were: (a) the validity of the product was achieved at 86.3 with the category very feasible, (2) the relative effectiveness of textbooks obtained by 44.7% is included in the moderate effectiveness category, and the results of the student response questionnaire with a value of 95.53 fall into the very effective criteria.*

Keywords: Infographic based textbooks, mathematics learning materials

INTRODUCTION

The achievement of learning objectives cannot be separated from the important role of a teacher in preparing teaching materials or materials. The world is developing very rapidly with many advanced technologies that have an impact in all aspects of life. Education is one aspect of life that receives the impact of technological developments. According to Susanto (2014), education is a systematic way in which the process is carried out continuously with the aim of forming perfect students, mature students, and students who have good civilizations. Quality education will be able to form perfect students. The formation of perfect students cannot be separated from three important aspects that must be fulfilled, namely cognitive aspects, affective aspects, and psychomotor aspects. The success of students in understanding the material cannot be separated from the efforts of the teacher in preparing teaching materials or materials that facilitate students in the learning process. Learning resources should not only come from one book, but use a variety of learning sources so that the information obtained by students is more complete and adequate. The government has provided math textbooks for high grades. Teachers carry out learning based only on book packages prepared by the government.

Learning resources should not only come from one book, but use a variety of learning sources so that the information obtained by students is more complete and adequate. This is the reason that a teacher can prepare new

teaching materials in the form of learning resources that do not only contain learning materials for students, so that later it can make it easier for students to understand the concept of learning materials in order to achieve learning goals. Mathematics is included in a subject that is a little difficult. The concept of flat shapes in fourth grade elementary school mathematics is one of the materials considered a little difficult by students. Flat shape in fourth grade elementary school mathematics discusses the definition of flat shape itself, understanding of various types of quadrilaterals and triangles, formulas for finding the area and perimeter of rectangles and triangles. One of the branches of mathematics that is also the subject of discussion is geometry. According to Nur et al. (2017) geometry is one of the fields of mathematics that studies points, lines, planes, and spaces, as well as their properties, sizes, and relationships with one another. The polygons can then be used to construct spatial shapes and have angles (Prihandoko, 2005). According to Purba (2014) geometry studies about shapes, shapes, angles, lines, and so on. Geometry has many elements, some of which are flat shapes, polygons, spatial shapes, congruence and similarity, transformations, and others. According to Gustafson and Frisk (1991) flat wake is wake uptwo-dimensional or flat plane. The following are types of flat shapes.

The development of textbooks can be designed by wrapping the material in an attractive visual for students. In this case, infographics can be an alternative for teachers in packaging learning materials. According to (Wicandra, 2006) suggests that infographics can help the public to more easily

understand, understand again, and produce a clear understanding of the content of the news. Infographics have proven to be effective in helping students understand the material and have an impact on students' memory and reasoning in the understanding process. Seeing these conditions, teachers can design infographic-based teaching materials as a means of supporting students in understanding the material. The use of infographics will support students in visualizing learning materials, making it easier for students to receive and remember.

Based on the problems described, it is necessary to develop creative and innovative textbooks. Therefore, the research entitled "Development of Infographic-Based Textbooks for Mathematics Learning Materials for Mathematics in Class IV at SDN Sebaung 1 Probolinggo"

RESEARCH METHOD

This research design is a research and development design. This development research is very suitable, because it is closely related to solving educational problems that are creative and innovative. According to Seals and Richey (in Masyhud, 2016: 222), they describe that development research is a systematic study involving several things, namely, programs, design, development and evaluation, processes and products that must meet the criteria for validity, practicality, and effectiveness. Product. Development research is research that has the aim of producing an innovative product which will later be tested for its effectiveness for maximum results and provide benefits to the community. This research develops products in the form of innovative teaching materials and promotes the efficiency of learning mathematics for elementary school students. This research is in the form of "development of an infographic-based textbook for improving mathematics learning outcomes for grade IV graders of SDN Sebaung 1". The place for conducting research on the development of infographic-based textbooks for improving mathematics learning outcomes for flat-shaped materials is held at SDN Sebaung 1 Probolinggo. The subjects in this infographic-based textbook research are fourth grade students of SDN Sebaung 1 Probolinggo.

The research procedure is carried out through the following stages: (1) preliminary study and problem formulation; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trial; (7) product revision; (8) trial use; (9) product revision; and (10) mass production. The planned time for carrying out the research is carried out in the odd semester learning of the 2021/2022 academic year. The time of the study was carried out 5 times in learning meetings.

1. Observation

Observations were carried out with the aim of knowing the initial conditions of fourth grade students at SDN Sebaung 1 Probolinggo, obtaining data about the mathematics learning carried out.

2. Documentation

Documentation aims to capture the moment and copy the data needed during the research process.

3. Validation

Validation in this study serves as a valid assessment sheet whether or not infographic-based textbooks are being developed which will later be used as learning materials for students at school.

4. Test

The test was conducted with the aim of measuring student learning outcomes using infographic-based textbooks. The posttest questions given to fourth grade students at SDN Sebaung 1 are in the form of essay questions with a total of 21 questions.

5. Questionnaire/questionnaire

Questionnaires or questionnaires are indirect data collection techniques. The research instrument used was a questionnaire containing questions about learning resources used by students during learning at school.

Data analysis techniques in research are used as a way to describe the data that has been obtained. The following are the data that will be presented in this study.

1. Infographic-Based Textbook Validation

The score obtained from the assessment given by the validator on the development of infographic-based textbooks needs to be analyzed by providing a value in each textbook instrument. The assessment data provided by the validator is determined by an average of 4 indicators with each value. The value that has been obtained by the validator will later be used as a reference for every aspect for the validity of the infographic-based textbook using the validity formula. The formula that will be used in calculating the percentage of product validity is.

$$Valpro = \frac{srt}{smt} \times 100$$

Description:

Valpro = Product validation

Srt = Real score achieved (mean of validators)

Smt = Maximum score that can be achieved (calculated from the number of statement points associated with the maximum score that can be achieved). (Masyhud, 2016:242).

2. Test t-test

The effectiveness of infographic-based mathematics textbooks can be seen from the results of the t-test using the t-test analysis technique. The calculation of the t-test test is carried out using the following formula.

$$t = \frac{M_2 - M_1}{\sqrt{\frac{EX_1^2 + EX_2^2}{N(N-1)}}}$$

Description:

M1 = group average value X-1 (experimental group)

M2 = group mean score X-2 (control group)

X-1 = Deviation of each X-1 value from the average X-1

X-2 = Deviation of each X-2 value from the average X-2

N = Number of subjects / research samples (Masyhud, 2016: 256)

3. Relative Effectiveness Test

The presentation of the data on the achievement of student learning outcomes becomes a reference for determining the value of the effectiveness of using textbooks based on math infographics on flat-shaped materials. The formula for Relative Effectiveness according to Masyhud (2016) is as follows.

$$ER = \frac{MX_2 - MX_1}{\left(\frac{MX_1 + MX_2}{2}\right)} \times 100\%$$

Description:

ER = The relative effectiveness of the experimental group treatment compared to the control group

MX1 = Mean or mean value in the control group

RESEARCH RESULTS AND DISCUSSION

The results and discussion will discuss: (1) an overview of the research, (2) the process of developing an infographic-based textbook on mathematics with flat shapes, and (3) the results of the development of an infographic-based textbook.

General description

This study uses the Research and Development (R&D) development research method with the Borg and Gall model. There are ten stages in the use of the Research and Development (R&D) model. The research was conducted at SDN Sebaung 1 Probolinggo, with the research subjects being students in grades IV A and IV B. IV A as the experimental class who will receive learning by using a new product, namely "Teaching Books Based on

Description:

Sas = Student questionnaire scores

St = Score achieved

Smt = Maximum score that can be achieved (Masyhud, 2021:278)

Infographics in Learning Mathematics in Bangun Datar" while class IV B as the control class will get mathematics learning with student textbooks that are available at school.

The Process of Developing Infographic-Based Textbooks on Mathematics for Flat Shapes

The process of developing infographic-based textbooks on flat-shaped mathematics uses Research and Development development research with the Borg and Gall model, where 10 stages of research methods are carried out, namely; potential and problem stage, data collection stage, product design stage, design validation stage, usage trial stage, product revision stage, product trial stage, design revision stage, final product revision stage, and mass production stage.

MX2 = Mean or average value in the experimental group (Masyhud 2016:257)

4. Student Response

One way to find out the effectiveness of the Infographic-Based Textbook product is to look at it through questionnaires or student responses to the textbooks used. Data analysis was carried out by calculating the response scores given by students (Masyhud, 2021: 278). The formula to find the result of 100 from the student's questionnaire value uses the following formula.

$$Sas = \left(\frac{st}{smt} \times 100\right)$$

Results From the Development of Infographic-Based Textbooks

1. Comparative Test of the Effectiveness of Student Learning Outcomes

The effectiveness of student learning outcomes is measured by going through a posttest test to determine the cognitive abilities of students from the two test classes, namely the class taught using product development textbooks, with infographic-based textbooks and classes taught using ordinary textbooks, namely textbooks. mathematics provided by the school.

		T	df	Sig. (2-tailed)
Learning outcomes	Equal variances assumed	12.39	54	,000
	Equal variances not assumed	12.39	41,789	,000

2. Comparative Test of Relative Effectiveness (ER)

The next step, after the t-test was carried out and the results were declared significant, was the Relative Effectiveness Test (ER). The relative effectiveness test was carried out with the aim of seeing the level of learning success of students who were taught using infographic-based textbooks compared to students who used textbooks provided by the school.

Class	Amount	mean
Class A (Experimental)	28 Students	92.5
Class B (Control)	28 Students	58.7

$$ER = \frac{MX_2 - MX_1}{\left(\frac{MX_1 + MX_2}{2}\right)} \times 100\%$$

$$ER = \frac{92,5 - 58,7}{\left(\frac{58,7 + 92,5}{2}\right)} \times 100\%$$

$$ER = \frac{33,8}{75,6} \times 100\%$$

$$ER = 44,7\%$$

(Medium effectiveness category)

3. Test Effectiveness Through Student Response

Student response data was obtained from a questionnaire given to students regarding infographic-based textbook products. Questionnaires were given to grade IV A students as an experimental class using infographic-based textbooks.

No.	Aspect	Average Result	Category
1.	Contents	95.08	Very effective
2.	Presentation	95.53	Very effective
3.	Design	94.64	Very effective
4.	Language	96.87	Very effective

The summary of student data is then calculated using the following formula for student responses.

$$Sas = \left(\frac{st}{smt} \times 100 \right)$$

$$Sas = \left(\frac{856}{896} \times 100 \right)$$

$$Sas = 95,53$$

Based on the questionnaire data and the results of the calculation of student responses, it can be seen that the result is 95.53 which is included in the very effective category.

CONCLUSION

The process of developing infographic-based textbooks for learning mathematics with flat shapes for fourth grade elementary school students goes according to the stages that have been designed. The stages of development research carried out include; (1) potential and problem stage, (2) data collection stage, (3) product design stage, (4) design validation stage, (5) design revision stage, (6) product trial stage, (7) product revision stage, (8) use trial stage, (9) product revision stage, and (10) mass production stage. The results of the validation of the three expert validators are 86.3. included in the very decent category. independent test by obtaining the final result tcount of 12.39 while ttable of 1.673 with a significance level of 0.05 and df 54. Calculation of the relative effectiveness (ER) of the posttest value obtained 44.7% in the category of moderate effectiveness. Student responses obtained results of 95.53 included in the very effective category.

BIBLIOGRAPHY

- Gustafson, RD, and Frisk, PD, (1991). Elementary Geometry (3rd ed.). United States Of America: Arcata Graphics Company. [Accessed 09 November 2021]
- Susanto, A. (2014). Theory of Learning and Learning in Elementary Schools. Jakarta: Prenada Media.
- Umami, M., Utomo, S. and Ashadi, A. (2016). The Effect of Infographics and Posters on Joyful Learning on Students' Learning Achievement in terms of Logical Ability in Chemical Equilibrium Class XI Science Odd Semester SMA Negeri Gondongrejo 2015/2016 Academic Year, Journal of Chemistry Education, Sebelas Maret University, 5(3), pp. 9-17.[Accessed April 10, 2021].
- Masyhud, M. Sulthon, (2016). Educational Research Methods, Guiding Theory and Practice of Research for Prospective Teachers, Teachers and Education Practitioners (5th ed.). Jember: Institute for Management and Educational Professional Development.
- Masyhud, M. Sulthon, (2021). Educational Research Methods, Guiding Theory and Practice of Research for Prospective Teachers, Teachers and Education Practitioners (7th ed.). Jember: Institute for Management and Educational Professional Development.
- Masyhud, M. Sulthon, (2015). Statistical Data Analysis for Educational Research. Jember: Institute for Management and Educational Professional Development.
- Nur, IL, Harahap, E., Badruzzaman, FH, & Darmawan, D. (2017). Realistic Geometry Mathematics Learning with GeoGebra. *Math Journal*. 16(2): 1-6. [Accessed 09 November 2021].
- Prihandoko, AC (2005). Understanding Mathematical Concepts Correctly and Presenting It Interestingly, PGSD Reference Book for Mathematics. Jakarta: Ministry of National Education, Higher Education, DPPTK & KPT.
- Ancient. (2014). Application of Popular Mathematical Formulas and Calculations "LAPTOP" Based on Android. Yogyakarta Publication Manuscript. College of Information and Computer Management. [Accessed 09 November 2021].
- Wicandra, OB (2006). The Role of Infographics in Printed Mass Media, Journal of Nirwana Visual Communication Design. 8(1). pp. 44-49.[Accessed April 22, 2021].