

## RESEARCH ARTICLE

# The development of kobatar learning media for learning mathematics in elementary school

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**Abstract:** The objective of this study is to develop Kobatar learning media and assess the viability of the products derived from the creation of Kobatar learning media for teaching mathematics in third-grade elementary classes. This research falls under the category of research and development (R&D). The development process adheres to the Borg and Gall development procedure theory, encompassing seven distinct steps. The findings of this investigation indicate that the product meets the stipulated eligibility criteria. Practicality is evidenced by material expert validation yielding a final percentage of 92.59%, followed by media expert validation with a final percentage of 95.62%. Additionally, the practicality of the response questionnaire from three students resulted in a final percentage of 95.13%. All these percentages align with the eligibility criteria, categorizing the product as “Very Eligible”. In conclusion, Kobatar learning media in third-grade elementary school demonstrates its potential as a versatile tool for learning mathematics in this educational setting.

**Keywords:** comic, elementary school, mathematics

## 1 Introduction

According to [Wiryanto \(2020\)](#), mathematics is one of the contents of thematic learning in elementary schools. According to [Sulistiyawati et al., 2020](#), learning mathematics is a process of interaction between students, teachers and learning resources in a learning environment with efforts to help, facilitate, encourage, and support students in learning mathematics. Learning mathematics in elementary schools can be interpreted as providing learning experiences to students through a series of activities that have been planned, and students will gain competency in the mathematics material being studied as the final result is achieved. According to [Susanto \(2013\)](#), mathematics is a teaching and learning process containing two inseparable activities. These activities are learning and teaching. These two aspects will collaborate in an integrated manner to become an activity when there is interaction between students and teachers and students and their environment. According to Permendiknas No. 22 of 2006 in [Istiqlal \(2017\)](#) concerning Content Standards, one of the objectives of learning mathematics at all levels of primary and secondary education is for students to solve problems which include the ability to understand problems, design mathematical models, complete models, and interpret solutions that are obtained. From these learning objectives, the objectives of learning mathematics emphasize solving mathematical problems ([Dahal et al., 2022](#)).

According to [Muniroh et al. \(2021\)](#), learning that is currently being carried out is less effective and efficient ([Papadakis, 2023](#); [Bounou et al., 2023](#)). This will affect the quality of education. The quality of learning will be achieved if the teacher pays attention to the learning process that will be carried out. Students can be observed in implementing learning or teaching and learning activities ([Irfan et al., 2023](#); [Kallivokas, 2023](#)). Conclusions can be drawn based on the results of observations, observation according to Patton in [Nimatutzahroh and Prasetyaningrum \(2018\)](#) confirms that observation can be an essential data collection method, especially in qualitative research, and interviews, interviews according to [Hansen \(2020\)](#) interview techniques were used to collect subjective data such as opinions, attitudes and behaviour of sources related to a phenomenon being researched, which was held on December 5, 2022, at SD Negeri 3 Brosot, Galur, Kulon Progo, D.I.Yogyakarta towards third-grade elementary school teachers. Teaching and learning activities for mathematics content generally use the group discussion method with problem-solving and using media only on fractional material due to limited material and creative ideas. However, students are particularly interested in media images. It is unfortunate that the lack of use of learning media especially media images, which students prefer ([Dahal et al., 2022](#)). Grade III Elementary School rarely or never uses comic media to teach mathematics,

incredibly two-dimensional figures. As in the statement by [Manalu et al. \(2017\)](#), comics are rarely or rarely used as learning tools or media for mathematics lessons at school.

In the plane (mathematics) or two-dimensional figure math material, it will be even easier to understand if the way to introduce it is perfect. In line with the opinion, according to [Mutia \(2021\)](#), the characteristics of elementary school-age children like to apply logic to physical objects, just as third-grade or low-grade students easily accept two-dimensional figure mathematics lessons if they get examples that are close to everyday life ([Nugroho et al., 2022](#)). With learning media in the form of comics, which contain two-dimensional figures of mathematical material, according to [Amalia \(2019\)](#), two dimensional figures are flat objects or planes and only have two sizes (two dimensions) which are presented through various pictures or illustrations of things that are what they often encounter in everyday life is that students are expected to master two-dimensional figure mathematics more efficiently. According to [Saputro and Suharto \(2015\)](#), comics are one of the most popular reading books not only by children readers but also by some adults ([Maharjan et al., 2022](#)). Comic learning media is also engaging because it has features that visually contain many illustrations and story content is concise, clear, and more accessible for students to understand because of explanatory pictures ([Zourmpakis et al., 2023](#)).

In this study, researchers tried to develop learning media, namely comics, to meet the needs of illustrative learning media, while the definition of media according to Sadiman et al. in [Syafri \(2016\)](#), “media is something that can be used to channel messages from sender to receiver so that it can stimulate the mind, feelings, interests and attention of students in such a way that the learning process occurs”. With the advantages of comic media, according to [Devista and Kadafi \(2021\)](#), namely involving the ability to understand the literacy of students, according to [Ginting \(2020\)](#), literacy is a person’s ability to use skills and potential in managing and understanding information when carrying out activities of reading, writing, calculating and solving problems in everyday life. Moreover, it is expected to be able to understand two-dimensional figure mathematical material by involving concentration; according to [Nusufi \(2016\)](#), concentration is a person’s ability to focus on a selected stimulus (one object) in a specific time and focus when reading, according to [Arunda \(2020\)](#) focus is a condition in which a person experiences a deep sense of relaxation and total concentration within himself ([Dahal et al., 2023](#)). This comic, KOBATAR, is expected to assist the teaching and learning process and act as a liaison between teachers and students, especially grade III. The results of observations and interviews that have been conducted show that students need comic media for learning mathematics to support the achievement of the goals of learning mathematics with two-dimensional figures in class.

## 2 Methods

The type of research used in this study is research and development (Research and Development). According to [Hanafi \(2017\)](#), Research and Development is a research method that aims to produce specific products and test the validity and effectiveness of these products in their application. According to Borg and Gall in [Hanafi \(2017\)](#), educational research and development (R&D) is a process used to develop and validate educational products. According to [Purnama \(2013\)](#), development research attempts to develop and validate the products used in the learning process.

This research’s procedure or development steps are similar to the R&D cycle, as stated in the development theory of Borg and Gall in [Sugiyono \(2012\)](#). They are then limited to 7 development steps to produce a final product ready to be implemented. These steps include: (1) Potential and problems, (2) Data collection, (3) Initial product development, (4) Expert Validation, (5) Design revision, (6) Limited product trials and (7) Revision of limited product trial results. However, the researchers modified these steps due to time and financial constraints.

The first step is potential and problems. The potentials and problems in this research are preliminary or references based on objective evidence in the field, which is used as a reference for developing research products.

The second step is data collection. The data collection with literature studies can be used as material for product planning and is expected to be able to find a concept or foundation that strengthens a product, such as completing an understanding of the material to be used namely flat mathematics.

The third step is initial product development—the process of making learning media with pre-production, production and post-production stages. The information data that has been collected is used as material for consideration for analyzing the needs of a new learning resource in the form of a two-dimensional figure (Kobatar) mathematical comic that will be developed.

The fourth step is expert validation. Expert validation helps identify and correct errors in the comic media being developed. The validation party includes material expert validation and

media expert validation. After the experts stated it was feasible, comic media could be used for further trials.

The fifth step is design revision. Design revisions were made based on findings from material and media experts' validation results and suggestions and input given to the comic media products being developed.

The sixth step is limited product trials. Limited product trials were conducted on a small scale by 2-3 students to determine product quality from functions and benefits, product display components, and product characteristics as comic-based learning media.

The last step is a revision of limited product trial results. Revision of Limited Product Trial Results with the data obtained above is then analyzed and corrected or perfected according to the results of limited-scale field trials of 2-3 students to test the feasibility of comic media.

The subjects or respondents in this study were class III students at SD Negeri 3 Brosot for the 2022/2023 academic year, consisting of 6 students. Researchers will use research subjects as limited product trial subjects. This research was conducted at SD Negeri 3 Brosot, Galur, Kulon Progo. In addition, this research was conducted from December 2022 to April 2023. This research started from the observation and interview stages to the product revision stage.

The final product design for kobatar comics (two-dimensional figure comics) is the result.

Qualitative and quantitative data were obtained from assessments and suggestions in validator and student questionnaires. According to Arikunto in [Anesia et al. \(2018\)](#), research data was collected using a questionnaire and data analysis using a Likert scale—questionnaire response to product 4 choices according to the question score content. The validator questionnaire is used to determine the feasibility of the developed media. Converting scores into assessment statements can be seen in [Table 1](#).

**Table 1** Guidelines for changing the average score into qualitative data

Score Range	Criteria
$0\% < x \leq 25\%$	Weak
$25\% < x \leq 50\%$	Enough
$50\% < x \leq 75\%$	Eligible
$75\% < x \leq 100\%$	Very Eligible

### 3 Results

The result is kobatar learning media (two-dimensional figure comics) in learning mathematics on two-dimensional figure material in grade III elementary schools. This research was conducted to determine the validity and practicality of kobatar learning media. Based on the research procedure, the research results can be described as follows:

#### 3.1 Potential and problems

The potentials and problems in this study are the introduction or reference for compiling the product to be developed, namely kobatar learning media. Based on teacher observations and interviews, as well as an analysis of student needs, it was concluded that students need a variety of mathematics learning media.

#### 3.2 Data collection

Data collection was used for product planning, which was carried out by observing and interviewing class III teachers at SD Negeri 3 Brosot. The results and conclusions are that it is necessary to develop two-dimensional figure comic learning media to meet students' needs and assist teachers in providing two-dimensional figure mathematics material. However, in this study, the material for two-dimensional figures was limited by only taking material for two-dimensional figures of triangles, squares, circles and rectangles.

#### 3.3 Initial product development

Initial Product Development after obtaining the data, then designing a comic called kobatar or a two-dimensional figure comic by paying attention to the components, namely curriculum analysis material analysis, which is limited to mathematical material for two-dimensional figures of triangles, squares, circles and rectangles, analysis of student needs, product analysis (theme, content, title, character, image design, colour, typeface, book format and size as well as book printing techniques).

#### 3.4 Expert validation

Material expert validation is divided into several aspects, including content feasibility, presentation, and language. These three aspects were assessed using a questionnaire instrument.

Material expert’s assessment can be understood in [Table 2](#).

**Table 2** Material expert assessment

No	Aspect	Validator			Total Score	Validity Percentage	Criteria
		1	2	3			
1	Content feasibility	15	16	16	47	97.91%	Very Eligible
2	Presentation	29	31	30	90	93.75%	Very Eligible
3	Language	11	10	10	31	86.11%	Very Eligible
Percentage Average					92.59%		
Criteria					Very Eligible		

From this assessment, it can be concluded that the language aspect has the lowest total score but already meets the criteria. The results of the material expert’s assessment for comic books obtained a final percentage of 92.59% with Very Eligible criteria. They were declared worthy of being tested in the field with revisions according to the validator’s suggestions or input.

Media expert validation is divided into several aspects: use of comics, appropriateness of the contents, and presentation and design of the comics. Three aspects were assessed using a questionnaire instrument. The material expert’s assessment can be understood in [Table 3](#).

**Table 3** Media expert assessment

No	Aspect	Validator		Total Score	Validity Percentage	Criteria	
		1	2				
1	Useable Comic	8	8	16	100%	Very Eligible	
2	Appropriateness	18	20	38	95%	Very Eligible	
3	Presentation	18	19	37	92.5%	Very Eligible	
4	Design Comic	18	20	38	95%	Very Eligible	
Percentage Average					92.62%		
Criteria					Very Eligible		

From this assessment, the presentation aspect has the lowest total score but already meets the criteria. The results of the media expert’s assessment for comic books obtained a final percentage of 95.62% with Very Eligible criteria. They declared it feasible to be tested in the field with revisions according to the validator’s suggestions or input.

### 3.5 Design revision

The design revision is a follow-up to the suggestions or input given by the validator, which contains an evaluation of the needs that still need to be met in the comic product being developed. After revision, the results of comic media products will be perfect and can be utilized by students properly.

### 3.6 Limited product trials

The Limited Product Trial was carried out on a small scale by three students from SD Negeri 3 Brosot on Friday, April 14 2023, which aimed to find out the practicality of the product after being applied to students; students were asked to fill out a response questionnaire whose aspect indicators were student understanding, realistic images, student interest and things that students get when using. The practicality assessment can be understood in [Table 4](#).

**Table 4** Product trial assessment

Indicator	Student			Total Score	Percentage	Criteria	
	1	2	3				
Understanding	14	15	15	44	91.66%	Very Eligible	
Realistic Images	4	4	4	12	100%	Very Eligible	
Student Interest	11	10	11	32	88.88%	Very Eligible	
Students Get When to Use	4	4	4	12	100%	Very Eligible	
Percentage Average					95.13%		
Criteria					Very Eligible		

From this assessment, it can be concluded that the interest indicator has the lowest total score

but already meets the criteria. The results of the student questionnaire assessment for comic books obtained a final percentage of 95.13% with Very Eligible criteria.

### **3.7 Revision of limited product trial results**

Because the results obtained in the previous stage or the limited product trial stage obtained “Very Eligible” results, the researchers did not make any more revisions. They were also supported because they had been refined beforehand according to suggestions or input from experts or validators who were competent in their respective fields.

## **4 Discussion**

### **4.1 Media development**

This research was developed through the product planning stage. The stages consist of potentials and problems as well as data collection. The potential and problems in this study were obtained from observations and interviews conducted at SD Negeri 3 Brosot, Kulon Progo. Based on the results of observations and interviews conducted, students need a variety of mathematics learning media, especially two-dimensional figure material. On the other hand, the teacher emphasizes that in the learning process, the teacher is more dominant in using conventional methods in conveying two-dimensional figure material because there is no learning media for two-dimensional figure mathematics material. Based on these potentials and problems, researchers need to develop kobatar learning media (two-dimensional figure comics) in class III SD Negeri 3 Brosot.

### **4.2 Media feasibility analysis**

Product feasibility analysis is a product feasibility test based on eligibility criteria and product practicality through assessing material experts, media experts, and class III students at SD Negeri 3 Brosot. The assessment carried out by the validator is guided by the aspects listed in the existing instrument grid.

### **4.3 Material expert product feasibility analysis**

Products are tested by material experts based on existing assessment aspects. The assessment includes aspects of the feasibility of content, presentation and language, which aims to determine the strengths and weaknesses of these aspects. In addition, the material test also intends to find errors in the material or content contained in the learning media design. Material expert validators provide suggestions or input to deepen the breadth of the material. Based on product validation data from material experts, it was stated that the material created by researchers was categorized as “Very Eligible” by obtaining an average percentage score of 92.59%. In conclusion, the kobatar learning media used in mathematics learning can help the learning process in the material.

### **4.4 Media expert product feasibility analysis**

The products are tested by media experts based on several aspects. These aspects consist of comic use, content feasibility, and the presentation and design of comics, and they aim to find out the advantages and disadvantages of these aspects. In addition, media experts provide suggestions or input to improve several parts of the comic design. Based on product validation data from media experts, it was stated that the media created by researchers was categorized as “Very Eligible” by obtaining an average percentage score of 95.62%. In conclusion, comic media that can be used in learning mathematics can be a superior medium.

### **4.5 Media practical analysis**

Product testing was carried out by giving response questionnaires to 3 class III students of SD Negeri 3 Brosot on Friday, April 14 2023. Furthermore, students were asked to use kobatar learning media in learning mathematics under direct supervision by researchers. After that, students fill out a response questionnaire with aspect indicators, namely student understanding, realistic images, student interest and what students get when using. Based on limited trials, this study was categorized as “Very Eligible” by obtaining an average score of 95.13%. Based on the analysis of validity and practicality above, it is concluded that the product developed is suitable for use in the mathematics learning process.

## **5 Conclusions and suggestions**

The development of this kobatar media uses the Research and Development (R&D) development method. The development steps used are based on the theory of Borg and Gall

development procedures, which limits this research to 7 steps because, in this study, no mass production was carried out, but this did not reduce the importance of the development itself. The development steps are potentials and problems, data collection, initial product development, expert validation, design revisions, and limited product trials and results.

To find out the feasibility of this kobatar media by conducting validation by material and media experts and practicality by class III students of SD Negeri 3 Brosot. The validation results from material experts obtained a final grade percentage of 92.59% in the “Very Eligible” category. Then, the media expert validation obtained a final grade percentage of 95.62% in the “Very Eligible” category. Then, the student questionnaire gets a final grade percentage of 95.13% in the “Very Eligible” category.

The conclusion that can be drawn is that Kobatar media is practical and feasible and can be appropriately used by students to help them in plane (mathematics) or learning two-dimensional figure mathematics for class III elementary school.

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