



Development of Jumbar Media (Jumanji Bangun Datar) in Improving Learning Outcomes of Grade V Elementary School Students

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ABSTRACT

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This study aims to develop Jumbar media for grade V elementary school in mathematics subjects by testing the level of validity of learning media in terms of feasibility, practicality and effectiveness. The type of method used is Research and Development (R & D) through the ADDIE model with quantitative and qualitative data analysis techniques. The resulting product is in the form of Jumbar media that can be applied to mathematics learning at the elementary school level. The results of Jumbar media research and development obtained a media feasibility percentage of 90.6% with very feasible criteria, a media practicality level of 94.5% with very practical criteria, and an effectiveness rate of 94.5% with a very effective category. Based on the results of the assessment, Jumbar media is declared valid and has been empirically tested to be used as a learning medium that can improve mathematics learning outcomes of grade V elementary school students.

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INTRODUCTION

Education is the government's effort in forming a young generation who are ready to face the development of the times, as written in Law No. 20 of 2003 article 1 paragraph 2, concerning the National Education System, that education is based on Pancasila and the Constitution of the Republic of Indonesia of 1945 which is based on religious values, national culture and is responsive to the demands of changing times (Depdiknas, 2003). Therefore, education that is held must run optimally in accordance with the needs of the times. The efforts made by the government in achieving this are one of them by making changes or perfecting the education curriculum. In the curriculum there is learning that is seen as something interrelated, while the purpose of the curriculum in learning is to develop knowledge about the curriculum and the curriculum system (Sudin, 2014).

Learning is an activity carried out by individuals to gain understanding, abilities, and positive values through learning resources (Rohani, 2020: 1). In classroom learning, mathematics is one of the subjects that must be taken by students. Because, mathematics is the basis for the development of modern science and technology (Sudrajat, 2008). So that mathematics becomes an urgent thing to be given to all students in Indonesia, especially elementary schools as the basic institution of children's education.

But often mathematics is considered to be a complicated and less interesting subject (Hartono, 2015). The reason is because generally mathematics learning in the classroom is only teacher-centered and the delivery of teacher material that is abstract or unreal (Dahlan, 2018), so that students have minimal opportunities to participate in developing their strategic thinking skills. Another cause is because the mathematics learning process is less pleasant (Agustina & Rusmana, 2019). Because based on Jean Piaget's theory of cognitive development, children aged 7-11 years belong to a concrete operational period. In that period, the child's mind is limited to something concrete and has not been able to solve abstract problems (Santrock, 2007: 49-50). These problems result in low student mathematics learning outcomes.

Learning outcomes are skills achieved by children after following the learning process (Amir & Risnawati, 2016: 5). Meanwhile, according to Novita et al. (2019) stated that learning outcomes are an achievement of student success targets set by teachers in learning activities that refer to the cognitive, affective and psychomotor domains. Thus, the results of learning mathematics are skills achieved by students in the cognitive, affective and psychomotor domains after carrying out a series of learning processes in mathematics subjects.

Based on the results of Hartono's research (2015) in one of the elementary schools in Indonesia, as many as 36.7% of students completed their studies by obtaining an average score of 63 in mathematics subjects after going through learning with conventional methods. That is, many students are still found who still do not understand mathematics subjects through these learning methods. These problems show the need for supportive learning innovation. These innovations can be related to the child's world, through learning that is interesting but does not leave the substance of the subject matter (Yanti et al., 2022). Because according to Piaget, children's desire, activeness, and independence determine students' learning abilities (Abdullah Sani, 2022).

The presentation of mathematics that is concrete and fun can be associated with game-based learning. Learning while playing is able to provide opportunities for students to seek and discover new knowledge independently through fun and inspiring learning (Ferryka, 2017). Learning mathematics will be more effective if you use fun

learning media. Because according to Bruner quoted by Sukayati (2009) (in Mashuri, 2019: 4), in learning mathematics, children will go through three stages, namely (1) enactive (learning by manipulating concrete objects), (2) iconic (learning through pictures), and (3) symbolic (learning with symbols or symbols). So that in learning mathematics, children will easily understand information if assisted by learning media.

Media is a messenger or intermediary of messages given by the sender to the recipient (Rohani, 2020: 5). While learning is an activity to compile experiences with the aim of obtaining new experiences in themselves (Ibrahim, 2014). So mathematics learning media is an intermediary tool in providing mathematics learning information in adding new experiences.

Based on observations at SDN Karang Setia 01, researchers found that mathematics learning conditions in class V, teachers are less able to innovate learning media such as game media that can increase student motivation and participation. So that the data shows that the mathematics learning results of grade V students of SDN Karang Setia 01 are less than optimal. Based on these problems, researchers raised a research theme entitled "Development of Jumbar Media (Jumanji Bangun Datar) in Improving Mathematics Learning Outcomes of Grade V Elementary School Students". By raising the problem of low learning results, grade V students of SDN Karang Setia 01 can be resolved. Thus mathematics learning in the classroom can run optimally.

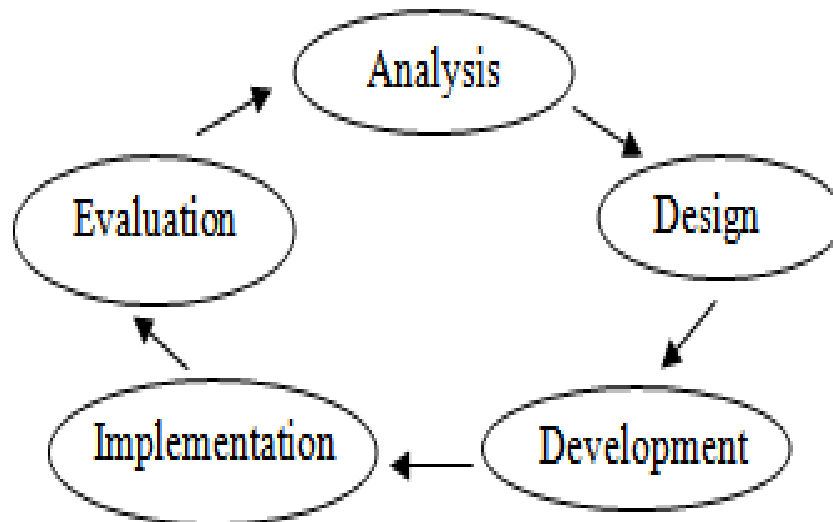
From the background description above, the objectives of this study can be determined, namely: 1) Knowing the design of Jumbar media in improving the mathematics learning outcomes of grade V elementary school students, 2) Knowing the results of using Jumbar media in improving the mathematics learning outcomes of grade V elementary school students, 3) Knowing the effectiveness of the development of Jumbar media in improving the mathematics learning outcomes of grade V elementary school students.

RESEARCH METHOD

The type of research method used is the Research and Development (R&D) method. Research and development method, is a research method that produces a product in certain disciplines by creating by-products that have effectiveness value (Saputro, 2017: 8). Meanwhile, according to Nana Syaodih (2005: 164) (in Fitriyani et al., 2022), explained that research and development is an activity / stage in producing new products or developing existing products but can be accounted for. The resulting product is able to facilitate teachers in providing knowledge information to students.

The stages of R&D research in the development of Jumbar media use the ADDIE model by Dick and Carey which was developed in 1996, with 5 stages

including: 1) Analysis, 2). Design, 3) Development, 4) Implementation, and 5) Evaluation.



Picture 1.
ADDIE Model Stages

The techniques for collecting data used consist of observation, interviews, questionnaires or questionnaires and documentation. The research instruments used consist of media validation sheets, language validation, and questionnaire-shaped material validation given to validators in assessing media feasibility. Furthermore, there is a user response questionnaire given to teachers and students to determine the level of practicality of media in learning. The form of the questionnaire used is a closed questionnaire, meaning that respondents only need to choose the answers that have been provided to answer the statements on the questionnaire. The data collection technique can be explained through the table of stages of data collection as follows.

Data analysis in this research and development through two data analysis techniques, namely: quantitative and qualitative. Quantitative data were obtained based on the results of the calculation of media validation questionnaires, language validation and material validation in feasibility analysis, teacher and student response questionnaires in practicality analysis and learning outcomes tests in effectiveness analysis. While qualitative data is in the form of interpretation of category assessment guidelines to determine product quality.

The results of the data from the questionnaire obtained in the form of scores, then analyzed the percentage of answers through the following formula (Sources: Sugiyono, 2018).

$$P = \frac{f}{n \times 100\%}$$

Information:

P = Percentage value per aspect

f = Score obtained

n = Maximum score

The formula is used to determine the percentage of the validity value of the Jumbar media. Media Jumbar is said to be valid if the validation score obtains a minimum result of 61%. In measuring the results of the percentage of validity through quantitative data results, media validity criteria are needed. The table of media validity categories is as follows.

Table 1.
Media Validity Criteria

Score	Category
0,00% - 20,00%	Very invalid
21,00% - 40,00%	Less valid
41,00% - 60,00%	Quite valid
61,00% - 80,00%	Valid
81,00% - 100,00%	Very valid

RESULTS AND DISCUSSION

The result of this research is a game-based learning media called Jumbar. The purpose of developing Jumbar media is to improve the mathematics learning outcomes of grade V students. The explanation that will be discussed in this section is related to the results of Jumbar media, which consists of: aspects of feasibility, practicality and effectiveness of Jumbar media.

Jumbar media is used in mathematics subjects grade V semester 2 flat building material with Competency Standards: Determining the properties of wakes, and relationships between buildings. Contains Basic Competencies: 1.1 Identify the types of flat wakes, 1.2 Identify the properties of flat wakes, 1.3 Identify the implications of flat wakes with objects in the student environment, and 1.4 Solve problems related to flat wakes.

The stages of developing Jumbar media through the ADDIE model, with 5 stages including: 1) Analysis, 2) Design, 3) Developmnt, 4) Implementation, and 5) Evaluation (Yusuf, 2022).

Analysis

The core activity of this stage is to analyze the urgency of product development in learning activities, so that the media developed has conformity with the competencies, characteristics of students and the material. In the work analysis, researchers conducted interviews with teachers and grade V students of SDN Karang Setia 01 and obtained information related to student learning outcomes in mathematics subjects that obtained low and less optimal scores, because the learning methods applied were only limited to

conventional methods and the lack of availability of mathematics learning media. The method used is only teacher-centered and minimal student participation, so researchers make learning media in mathematics subjects.

In the facta analysis, concepts, principles and procedures of learning materials, information was obtained that the curriculum used at SDN Karang Setia 01 was the 2013 curriculum. After obtaining this information, researchers analyzed the mathematics course book grade V elementary school curriculum 2013 to be able to determine the material and media based on student characteristics. The results of class

V material analysis are flat building materials with Competition Standards: 1. Determining the properties of the building and the relationship between buildings. Basic Competencies: 1.1 Identify types of flat wakes, 1.2 Identify the properties of flat wakes, 1.3 Identify the implications of flat wakes with objects in the student environment, 1.4 Solve problems related to flat wakes. The material was chosen because it can be analogous as an achievement step that represents the nature, formula, practice questions and their implications with objects in the student environment that are presented as the content of questions in the game.

Analysis of the needs of students with an age range of 10-11 years according to Piaget (in Oktasavira & Subagio, 2020), namely children like to do activities related to games and work with teams. So that the media developed is a medium that is able to transfer knowledge or messages based on games.

Based on the results of the analysis activities, researchers developed Jumbar media on flat building material to improve students' mathematics learning outcomes, which in its application requires the active role of students as their main role.

Design

At the design stage, the media design is designed so that the results are different from existing media. The design results are in the form of the initial concept of the Jumbar game media and become a reference in the next stage. The product design in this study is in the form of Jumbar game media equipment which includes box boards, character pieces, gameplay designs, question cards, usage manuals and learning materials.

The design of the shape in Jumbar media, arranged on a plywood board box measuring 45 cm x 35 cm with interesting creations but not much different from the Jumanji game that has been developed. Inside the Jumbar game board, contains the gameplay consisting of four start areas in each corner of the board and one finish area (Jumbar) located in the middle of the game box. The groove that connects between the starts that lead to the finish point is in the form of a circle arrangement that is numbered. Each player has a different route with a snaking circle column, so the

player's route will not be mixed. In the Jumbar board, there is a user manual along with question cards and character pieces as the player's identity. The question card contains 20 questions about getting up flat. Players must answer question cards to reach the finish. Medals and red blocks are provided as rewards and punishments. The design of the Jumbar game media applies the theme of islands which has a meaning as a characteristic of Indonesia as an archipelagic country, so that it can attract the attention of students.

The next stage is the preparation of product assessment instruments. The preparation of the instrument consists of several aspects of assessment. These aspects include: aspects of media feasibility consisting of appearance, feasibility of presentation and product effectiveness. Aspects of language feasibility, among others: suitability to student characteristics, typography and content. The feasibility aspect of the material consists of relevance to the curriculum, content feasibility, and presentation feasibility.

Development

The development stage is a description of the design of Jumbar media development. The first step is to design an image for the game board along with the question card, where the topic of the game is adjusted to the flat building material using the IbisPaint X image processing application. Next, make a game board with a size of 45 x 35 cm made of plywood. Then print the image design using sticker paper that will be pasted on the game board and print other parts such as user manuals, challenge cards and medals using HVS paper and make character pieces. The parts on Jumbar media can be depicted through the following picture.



Picture 2. Front View

The front display is the front media display or referred to as the cover.



Picture 3. Inside View Top

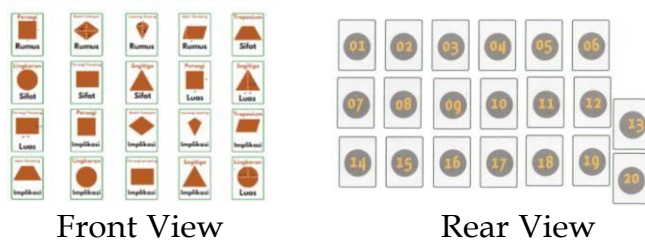
Display in the top media section containing instructions for use and rules of the game.



Picture 4.

Inside View at the Bottom

The display at the bottom of the media contains the game plan. The game plan consists of four start areas in each corner of the board and one finish area (Jumbar) located in the middle of the game box. So that the game can be done by 4 players in one game. The game is represented with character pieces as the player's identity.



Front View

Rear View

Picture 5.

Question Card

The question card contains flat material questions as a game challenge that students must answer to get to the finish area.



Picture 6.

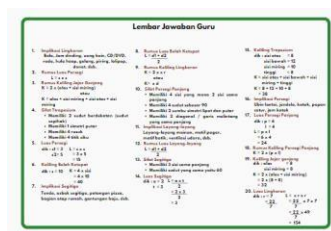
Media Equipment Jumbar media equipment consists of character pieces and dice.



Picture 7. User Manual

In Jumbar media is equipped with a user manual, the book contains guidelines

forusing Jumbar media.



Picture 8.

Answer Key Sheet for Teachers

The teacher's answer sheet contains a collection of answers from the question card that is the handle for the teacher as the guardian of the game.



Picture 9. Reward Medals

Rewards in the form of game medals as prizes for the winners.

The next stage is media validation by validators, with the aim of knowing the feasibility level of the developed media. The validator consists of three experts, including: media experts, linguists and material experts to assess the feasibility of the media on the media feasibility assessment validation sheet and write suggestions that become input for further media development improvements, so that they become guidelines for product improvement before being used in schools

Implementation

This stage is in the form of media trials to students and distribution of questionnaires to teachers and grade V students of SDN Karang Setia 01, with the aim of knowing the response to the use of Jumbar media and to gain knowledge about the practicality of Jumbar media. This test was carried out face-to-face in classroom V.

The student trials are divided into two stages, 1) Group trials, namely products that have been declared valid by experts, tested into small groups of around 10-15 students. 2) Field tests, namely products that have been declared valid and effective are tested in classes with a larger number of students than the number of students in small groups.

Evaluation

The evaluation stage is in the form of an improvement stage after getting suggestions from validators and user responses. The goal is to be able to measure the achievement of the goals determined in the development of Jumbar media in mathematics subjects grade V elementary school flat building material. At this stage, measurements of the achievement of the formula in the development of Jumbar media in the subject of mathematics of flat material are also carried out.

Jumbar Media Validity Results Data

Media Jumbar is declared eligible if it obtains a score by meeting the eligibility criteria with a minimum validation score of 61%. The following is a table of value acquisition by media, language and material experts.

Table 2.
Jumbar Media Validity Results

No .	Validators	Assessment Aspect	Item Number	Value
1.	Media	Display	1, 2, 3, 4 and 5	46
		Eligibility of presentation	6, 7, 8 and 9	
		Media effectiveness	10	
2.	Language	Compliance with student characteristics	1, 2, and 3	46
		Typography	4, 5 and 6	
		Fill	7, 8, 9 and 10	
3.	Material	Relevance to the curriculum	1 and 2	44
		Eligibility of contents	3, 4, 5 and 6	
		Eligibility of presentation	7, 8, 9 and 10	
Average rating				45,3

Percentage score result:

$$P = \frac{f}{N} \times 100\%$$

$$P = \frac{45,3}{50} \times 100\%$$

$$P = 90,6\%$$

Based on the results of the calculation above, it can be seen that the average value of the feasibility of Jumbar media reached 90.6% with very feasible criteria. So, Jumbar media is said to be suitable for use as a learning medium.

Jumbar Media Practicality Results Data

Data on the practicality of Jumbar media was obtained from questionnaires given to teachers and grade V students of SDN Karang Setia 01. The results obtained are:

Table 3.
Practicality of Teacher and Students

No.	Name	Score
1.	Teacher	98
2.	Students	91
Average rating		94,5

Based on the results in the table, the scores obtained from the results of teacher and student response questionnaires reached a score of 94.5% including the very practical category. Thus, Jumbar media can be used in classroom learning.

Jumbar Media Effectiveness Results Data

Student learning tests are conducted to determine the level of effectiveness of Jumbar media. Testing was carried out on 36 students after learning using Jumbar media. The student was asked to do questions related to flat building material on Friday media that had been validated by validators. The results of the analysis of student scores obtained were as many as 34 students obtained learning completeness with an average score of 72%. Based on these results, it can be calculated that the percentage of media effectiveness reaches 94% with very effective criteria. So that Jumbar media is effectively used as a learning medium in the classroom.

CONCLUSION

Based on the results of research on the development of Jumbar media in improving mathematics learning outcomes of grade V elementary school students, conclusions can be obtained: 1) The developed Jumbar media is a type of game-based learning media made from plywood boards with a size of 45x35 cm which contains game flow, user manuals, 4 character pieces, dice, 20 question cards, 1 teacher answer sheet and medals as game rewards. The question card contains questions related to flatbuilding material. 2) the stages of developing Jumbar media used through the ADDIE research model, with stages of Analysis, Design, Development, Implementation and Evaluation. 3) The level of validity of Jumbar media is seen based on three aspects, namely: (a) The level of feasibility obtained from the results of validation assessments by media experts, linguists and material expert validation with an average percentage reaching 90.6% with a very valid category. (b) The level of practicality of Jumbar media was obtained based on the results of the assessment of response questionnaires from teachers and students with an average percentage reaching 94.5% in the very practical category. (c) The level of effectiveness of Jumbar media is obtained based on tests of student learning outcomes after the implementation of Jumbar media with a percentage value reaching 94% with very effective criteria.

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