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# Developing Pop up Book Media on Solar System Material to Improve the Understanding of Grade VI Students at SD Muhammadiyah 1 Padas

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#### **Abstract**

This study aims to develop a Pop up book to improve student understanding and identify the eligibility of Pop up book being developed to improve student understanding. This type of research method is Research and Development (R&D). The development model used is the ADDIE model, the data collection used is documentation, questionnaires, and tests. The result of the eligibility data analysis shows that the Pop up book is eligible to be used with the percentage of eligibility by media expert at 50% in revision 1, 73.3% in revision 2, and 93.3% in revision 3, eligibility by material expert of 91 .7%, and eligibility by pretest posttest experts of 80%. The increasing of understanding using Pop up book media can be seen from the analysis of the pretest and posttest data by comparing the average values obtained. The pretest value data before learning using the Pop up book shows an average result of 70. Meanwhile, the posttest value after learning using the Pop up book shows an average result of 83.28.

Keywords: Development, Pop up Book, Understanding

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#### **INTRODUCTION**

Media is a tool used to deliver a message to the recipient (Chasanah et al., 2021). Media in schools is a tool as an intermediary from teachers to students to support learning when learning takes place. Learning media can generally be an aid to the teaching-training process. In addition, learning media is anything that can stimulate students' thoughts, feelings, attention, and abilities or skills to encourage learning techniques. These limitations are broad and deep and include the resources of understanding, environment, people, and methods used for learning/training purposes.

Learning media plays a very important role as one of the components of the learning system because the learning process is a communication process that takes place within the system. Without media, there will be no communication, and both the learning process and the communication process will not function optimally. Learning media is an integral part of the learning system. Learning media makes it easier for teachers to deliver material, the use of media is needed to achieve planned goals. In addition to achieving learning objectives, effective learning media can also be used to develop students' abilities (Mulyaningsih, S.H. & Zubaidah, E., 2021).

Based on the urgency of using media in learning, there is a need for media development that must be carried out continuously. This media development is carried out with the aim that the media used by teachers in learning must be relevant to the existing curriculum materials and components. In terms of meaning, media development is creating or improving an existing media with a needs analysis, where the media is a delivery of messages from the message source to the message receiver, and the message is a learning material to make learning more effective and achieve learning objectives. One of the media developments that can be done is the development of Pop-up book media.

According to Ellend G Kreiger Rubin, an expert in the field of paper engineering that Pop-up book is an illustration that when the page is opened, pulled, or lifted will arise layers with a 3D impression. In its development, the role of media is very important to support the establishment of students' creativity in exploring learning, such as this Pop-up book media can help students in facilitating problem-solving. This will make a special impression on the reader so that it will be easier to remember when using this media. Navi Atul Gempita adds that Pop-up book is very synonymous with the world of children, namely playing (Putri et al., 2019). Based on this explanation, a Pop-up book is very eligible to be developed in learning for students of Elementary School or Madrasah Ibtidaiyah.

Several studies have described the development of Pop-up book learning media, some of which is a study conducted by Sentarik and Kusmariyatni with the results showing that the scores obtained for each aspect of the four media professionals are known to range from 4.01: X≤5.01 with very good qualifications (Sentarik, K & Kusmariyatni, N., 2020). In addition, the results of a study conducted by Putra and Negara showed that content experts reached 87.50 percent with very good qualifications, design expert test scores reached 93.75 percent with very good qualifications and communication professional test scores reached 91.66 only very good quality. Then for the individual test results taken on 3 (three), students obtained a ratio of 92.30 with very good qualifications (Putra, P.W., 2021).

Further study was conducted by Ningrum, Dewi, and Parmin with the results showing that the results of the N-gain score obtained moderate to high criteria of 93.75% and students got a posttest score ≥75 of 84.4% (Ningrum et al., 2018). According to Sari and Suryana based on researcher observations at Khaira Ummah Islamic Kindergarten Padang, Pop-up books can be a medium to generate student learning motivation, reading Pop-up books can also develop creativity and stimulate student imagination, improve knowledge, instill students' love of reading, and be more active in learning the contents of the book. The 3D display that can move in the Pop-up book can present the real world in students' learning activities, so this is in accordance with the stage of cognitive development of students which is concrete operational. The use of Pop-up book will also help students and teachers in the learning process. Through the use of appropriate and tailored Pop-up book, the goals can be easily achieved (Sari, E. S. & Suryana, D., 2019). Based on previous research, Pop-up book is considered eligible learning media to be developed.

Based on the preliminary results conducted at the research site, namely SD Muhammadiyah 1 Padas, it shows that the grade VI teachers at the school rarely develop learning media. The process of implementing learning about the solar system material is generally done by teachers using still images that are already available in textbooks to explain. Students tend to be passive and uninterested, resulting in a lack of reciprocal interaction, thus leading to a lack of student understanding and uninteresting learning processes for students. Lack of learning needs can have an impact on students' learning outcomes and understanding. These learning needs can be used as an option to enhance students' understanding by providing learning needs through learning media, namely Pop-up book (Arip, M. & Aswat, H., 2021).

Based on the background explained above, the author intends to conduct research on "The Development of Pop-up Book Media on Solar System Material to Improve the Understanding of Grade VI Students at SD Muhammadiyah 1 Padas". Based on the title above, the problems can be formulated as follows: how is the development of Pop-up book media in grade VI at SD Muhammadiyah 1 Padas? How is the eligibility of Pop-up book media in the grade VI at SD Muhammadiyah 1 Padas? How is the improvement of understanding of Pop-up book media in grade VI at SD Muhammadiyah 1 Padas?

From the three problem formulations above, this study aims to identify the development of Pop-up book media in grade VI at SD Muhammadiyah 1 Padas, describe the eligibility of Pop-up book media in grade VI at SD Muhammadiyah 1 Padas, and explain the improvement of understanding of Pop-up book media in grade VI at SD Muhammadiyah 1 Padas.

#### **METHOD**

This research uses the research and development (R&D) method. Research and development (R&D) is research conducted to validate and develop a product. The research aims to develop or improve a product through planned stages so that it can be used in learning. From this research and development, a product will be produced, namely a learning media and its eligibility will be tested. The intended learning media is a Pop up book to enhance students' understanding of the subject matter of the solar system in Natural Science (Branch, M. R., 2009).

This research and development will result in a product, namely learning media, and its eligibility will be tested. The model used for this research and development is the ADDIE model (Analyze, Design, Develop, Implement, and Evaluate). According to Robert, ADDIE is an acronym for Analyze, Design, Develop, Implement, and Evaluate. ADDIE is a product development paradigm and not a model per se (Branch, M. R., 2009).

In this research and development conducted by the researcher, the development of a creative Pop up book learning media to enhance students' understanding of the topic of outer space exploration in the Natural Science subject in grade VI at SD Muhammadiyah 1 Padas is carried out. This research is conducted in a step-by-step process, starting from the planning stage, and research preparation, then followed by data collection in the field as the core activity of this research, and ending with the research report.

The approach used in this research is a combination of qualitative and quantitative approaches. The research approach that combines both approaches is also called research and development (R&D). The research and development approach is used because it aligns with the objective of this research, which is to produce a specific product based on needs analysis and test the eligibility of the product to function as intended (Sugiyono, 2018).

#### FINDINGS AND DISCUSSION

#### **Research Results**

## 1. Development of Pop up Book Media

This research and development of a product was conducted at SD Muhammadiyah 1 Padas. The developed product is a learning media in the form of a Pop up book. The Pop up book was developed to improve the understanding of grade VI students. The following are the data presented in this research:

## a. Analysis Phase

The analysis phase is the activity of needs analysis conducted by the researcher at the research site. The analysis activities conducted include analyzing the characteristics of the students, analyzing the curriculum, and analyzing the media used by the teachers. Based on observations and interviews, it was found that students lacked enthusiasm for learning and had a lack of understanding or mastery of the material on the solar system. This was due to the boring teaching and learning process, where the teacher only used lecture, discussion, question and answer methods, and the use of learning media that had not been determined. Students used textbooks provided by the government. The researchers found a problem with the student's learning outcomes, which had not reached the maximum score in the science subject due to the student's lack of understanding of the material. Only 60% of the total number of students met the minimum passing criteria of 75.

### b. Design Phase

The design phase is the beginning of the process of creating a product until the final result of the created product. The detailed explanation of the design phase steps that need to be done are as follows:

## 1) Determining the Type of Media

This media is a 3D-based book media that will discuss the material on the solar system for grade VI students in Elementary School or Madrasah Ibtidaiyah, with the following details: a) The product contains material on the solar system for sixth grade. b) The product is developed

in the form of a 3D book or Pop up book. c) The developed product consists of two components, namely the learning module (exploring outer space) and the Pop up book (solar system).

## 2) Minimizing difficulties in design

Minimizing difficulties in design by preparing a draft of the necessary media, with the following details: a) Choosing clear fonts, using the Argent font for the content and the Agrandir Narrow Black font for the subheadings or new material on each page. b) Using images taken directly from Canva, and using legally obtained backgrounds from the Pinterest application. c) Choosing colors that are attractive to the media. The background color on each page is made to match the theme. The selection of colors is also varied to attract students. d) Choosing the Pop up technique to determine the technique to be used in developing the Pop up book media. The technique used is the technique of paper popping up when opened, based on each attached paper.

## 3) Creating the basic framework

In this stage, the researcher creates the content of the learning media to be adjusted to the characteristics of the students at SD Muhammadiyah 1 Padas. The researcher uses the Canva application to create the Pop up book design.

### c. Development Phase

The media development phase is the process of preparing things related to the use of the product, including designing, creating, refining, and developing a product used to support the learning process. The following are the stages of development: 1) Arranging 2) Creating the media 3) Creating validation instruments.

## d. Implementation Phase

#### 1) Media Validation

The validation of the Pop up book learning media was conducted by validators from March 7, 2023, to May 11, 2023. The assessment data for the development of the learning media product was conducted by three expert validators. The first data was obtained from the research on the learning media product conducted by one of the lecturers from the Department of Madrasah Ibtidaiyah Teacher Education at IAIN Kediri as a media expert. The data obtained were quantitative and qualitative data. The quantitative data came from the assessment questionnaire using a Likert scale, while the qualitative data consisted of criticisms and suggestions from each validator.

#### 2) Material Validation

The validation of the science learning material was conducted by validators from March 7, 2023, to May 11, 2023. The material expert validator was Mrs. Ratna Wahyu Wulandari, M.Pd., a lecturer in Madrasah Ibtidaiyah Teacher Education at IAIN Kediri. The data obtained were quantitative and qualitative data from the material expert validation. The quantitative data came from the assessment questionnaire using a Likert scale, while the qualitative data consisted of criticisms and suggestions from each validator.

#### a. Evaluation Phase

In this phase, the researcher evaluated the product that had been tested by the material and media experts in order to make improvements based on the suggested follow-up actions. When using the learning media during the learning process, the students were very happy and enthusiastic about the media used, making it easier for them to understand the material with the new media. This media also allowed students to learn to the maximum, and the response received was positive, as shown by the students' enthusiasm in using the Pop up book learning media. Based on the results described by the researcher, the learning media was revised based on the criticisms and suggestions given.

## 2. Eligibility of Pop up Book Media

The validation of the Pop up book learning media was conducted by validators from March 7, 2023, to May 11, 2023. The assessment data for the development of the learning media product was conducted by three expert validators. The first data was obtained from the research on the learning media product conducted by one of the lecturers from the Department of Madrasah Ibtidaiyah Teacher Education at IAIN Kediri as a media expert. The data obtained were quantitative and qualitative data. The quantitative data comes from the assessment questionnaire using a Likert scale questionnaire, while the qualitative data consists of criticisms and suggestions from each validator, with the following results:

Table 1: Analysis of assessment results by media expert

No	Statement	$X_1$	$X_2$	<b>X</b> 3	
1	Suitability of the size of the Pop up book learning media with the A4 standard (21cm x 29.7cm).	3	3	4	_
2	Suitability of size with the content material of the Pop up book	2	3	4	
3	The arrangement of layout elements on the front cover in accordance/harmony gives a good impression.	1	3	3	
4	The arrangement of layout elements on the back cover appears good and harmonious.	1	3	3	

5	The color of the book title contrasts with the background color.	2	3	4
6	The font size on the cover is proportional	2	4	4
7	The cover illustration depicts the content/material in the Pop up book	2	4	4
8	Consistent placement of layout elements based on writing patterns	2	3	3
9	Proportional margin size	1	2	4
10	Spacing between paragraphs, text, and illustrations is appropriate	1	2	4
11	The placement of titles, subtitles, illustrations, and image descriptions does not interfere with understanding	2	3	3
12	Font size appropriate to the level of education of the students	2	2	4
13	Font type appropriate to the content material	3	3	4
14	Line spacing and letter spacing are normal	3	2	3
15	Creative and dynamic	3	3	3
	Total	30	44	56
	P			93,3%

Based on the table above, the results of media expert validation were obtained with a revision percentage of 50% (Not Eligible) for revision 1, 73.3% (Sufficiently Eligible) for revision 2, and 93.3% (Eligible) for revision 3. Therefore, it can be said that the media to be used is "Eligible" for use.

The validation of the science learning material was conducted by validators from March 7, 2023, to May 11, 2023. The material expert validator was Mrs. Ratna Wahyu Wulandari, M.Pd., a lecturer in Madrasah Ibtidaiyah Teacher Education at IAIN Kediri. This quantitative data is derived from the assessment questionnaire using a Likert scale. With the following results:

Table 2: Analysis of assessment results by material expert

No	Statement	x	$\chi_{\rm i}$	P	Eligibility Level	Description
1	Eligibility of the	4	4	1000/	T21: - 21-1 -	No Revision
1	material for KD class VI	4	4	100%	Eligible	
	Material about the					
2	solar system is in accordance with	4	4	100%	Eligible	No Revision
	the science subject					
3	Depth of material	4	4	75%	Sufficiently	No Revision
	scope				Eligible	
4	Utilization of the	4	4	75%	Sufficiently	No Revision
	material can	<b>-</b>	-		Eligible	

	broaden students' understanding of the solar system Accuracy of					
5	selecting various images in the pop- up book media Selection of	4	4	75%	Sufficiently Eligible	No Revision
6	illustration images in accordance with the student's character	4	4	100%	Eligible	No Revision
7	Use of language in accordance with EYD (Indonesian Spelling Standard)	3	4	100%	Eligible	No Revision
8	The language used is easily understood by class VI students	3	4	75%	Sufficiently Eligible	No Revision
9	Clarity of language use in providing information Selection of	3	4	75%	Sufficiently Eligible	No Revision
10	language in accordance with the student's developmental	3	4	100%	Eligible	No Revision
11	level The use of Pop up book media can motivate students to learn about the solar system	4	4	100%	Eligible	No Revision
12	Pop up book media can facilitate understanding of the solar system material	4	4	75%	Sufficiently Eligible	No Revision
13	Attracting students to learn the solar system in the science subject	4	4	75%	Sufficiently Eligible	No Revision
14	Pop up book media can provide interaction between educators and	3	4	100%	Eligible	No Revision
15	students Pop up book media can provide stimulus to students	4	4	75%	Sufficiently Eligible	No Revision

Total	55	60	91,7%	Eligible	No Revision
10111	00	00	J = // / O	21161210	

Data from the validation results with media experts can be said that the developed Pop up book learning media has an "**Eligible**" level. This is proven by the score on each question item 1-15 on the questionnaire given by the validator to the Pop up book, which is 55 with an eligibility percentage of 91.7%.

## 3. Improving Understanding

The next step for the researcher is to improve students' understanding by conducting a trial of using the product, which aims to determine the effectiveness of the Pop up book in learning. This test was conducted on 14 students in grade VI of SD Muhammadiyah 1 Padas with a pretest and posttest. The effectiveness of the Pop up book can be determined by comparing the pretest and posttest scores in the subject of science, specifically the solar system. Science learning at SD Muhammadiyah 1 Padas can be considered successful if the students' learning outcomes reach a minimum of 75 (KKM). In the usability test, the researcher asked pretest questions to the students before using the Pop up book and posttest questions after using the Pop up book. 81 Eligibility of the Pop up book can be evaluated by comparing the scores before and after the test, which is done by calculating the average score obtained. The learning outcomes test developed by the researcher consists of 10 multiple-choice questions and 5 essay questions. The following are the results of the pretest and posttest scores in the test phase, as shown in the table below:

**Table 3: Pretest and Posttest Results** 

No	Name	Pretest Score	Posttest Score
1	ADP	80	95
2	BGP	75	80
3	FFB	65	80
4	HQD	75	85
5	Н	80	85
6	HLQ	70	80
7	IAA	55	75
8	IYAA	40	75
9	MAP	80	95
10	MFNM	65	75
11	MIW	75	85
12	NYS	60	80

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13	RN	75	85
14	SM	85	90
	Total	980	1,165
	Average	70	83,28

From the conducted test data, the average score for the pretest is 70 and most students receive a score <75. Meanwhile, the average score for the posttest is 83.28 with 11 students receiving a score >75. Therefore, the improvement in learning outcomes can be seen from the test results, which are calculated based on the increase in students' scores.

#### **CONCLUSION**

This research and development resulted in a learning media product in the form of a Pop up book as a companion to the learning process. This learning includes the material of the solar system for grade VI students in the second semester of Elementary School. The development of this learning media was developed using a development model that refers to the research and development design, adapted from the ADDIE development model. This development model uses 5 phases, including (1) the analysis phase, (2) the design phase, (3) development phase, (4) implementation phase, and (5) evaluation phase.

This learning media development was validated by learning media experts and subject matter experts, namely lecturers of Madrasah Ibtidaiyah Teacher Education at IAIN Kediri. The analysis of the questionnaire data from the media experts obtained a revision percentage of 1 with 50% (less eligible), revision 2 with 73.3% (sufficiently eligible), and revision 3 with 93.3% (eligible). Based on the latest revision, the product is considered appropriate for use. The analysis of the questionnaire data from the subject matter experts obtained a percentage of 91.7%, which means it is eligible for use. The analysis of the pretest and posttest questionnaire data from the subject matter experts obtained a percentage of 80%, which means it is eligible to use.

The eligibility analysis of the Pop up book in the trial usage, using pretest and posttest data analysis by comparing the average values obtained. Based on the pretest data, the average score before learning using the Pop up book was 70. Meanwhile, the posttest value after learning using the Pop up book showed an average result of 83.28. Therefore, there is a difference in student learning

outcomes when using the Pop up book. It can be concluded that the Pop up book is effective for learning.

## Suggestions

1. Suggestions for Product Utilization

Suggestions for utilizing the development product of the Pop up book are as follows:

- a. Students are expected to read and understand the material in the Pop up book carefully so that they can master the material being learned.
- b. Students are expected to complete all assignments, exercises, and tests given, as well as discuss any problems in learning that they have not found the answers so that students can gain extensive knowledge.
- 2. Suggestions for Product Dissemination

This development product of the Pop up book can be distributed or used in all grade VI classes in the Elementary Schools where the research was conducted, or even in all Elementary Schools in Ngawi Regency. However, the distribution of the development product must still consider and adjust to the characteristics of the students, so that the distribution of the product will be very beneficial.

3. Suggestions for Further Product Development

As for suggestions for all parties who want to further develop the product, it can be done by studying the next material. The Pop up book developed by the researcher can also be further developed by studying the subject of Natural Sciences for all grade levels in Elementary School.

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