Development of Pop-UP Book Learning Media on Ecosystem Topics in Elementary School Science Learning

Erika Amelia Triyana[1], Aan Yuliyanto[2]✉, Neng Wuilan Evi Juliani[3], Bunayah4, Ade Sumini[5], Nur Afifah Tussholihati[6]
[1,2,3,4,5,6] PGSD STKIP Pangeran Dharma Kususma, Indramayu, Indoensia
✉aanyuliyanto16@gmail.com

Abstract. Learning media is a tool that contains information on a learning topic that can attract the attention and interest of students in following the learning process in class and achieving learning objectives. This research is motivated to increase enthusiasm and enthusiasm in learning science on the topic of elementary school ecosystems so that students can understand the importance of maintaining the balance of the ecosystem and achieving learning objectives. This research aims to develop and produce a pop-up book learning media to assist students in understanding the topic of ecosystem learning. This research was conducted by the R&D method. The initial stages in making a pop-up book are determining the storyline, designing images, printing images, and cutting images, and the last is making a slide pop-up book and pasting the cut-out images into the slide pop-up book. By using the pop-up book learning media, students are expected to understand the concept of an ecosystem. This living environment interacts and depends on each other, consisting of biotic elements consisting of living and abiotic creatures consisting of inanimate objects such as the sun, concretely and effectively.

Keywords: Learning Media, Pop-Up Book, Ecosystem, Science Elementary School.

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INTRODUCTION

Science learning is not only mastering a collection of knowledge, but also a process of discovery that stimulates students to be actively involved in it (Kelana & Wardani, 2021). Science learning is one of the learning subjects that has an important role in teaching students about the universe (Fitri & Noviyanti, 2022). Thus science learning subjects are subjects that must be implemented in elementary schools, science learning materials include the universe and its components.The lack of interest and interest in learning science in elementary schools is influenced by the lack of learning media in learning science so that the learning process has an impact on students' lack of interest and enthusiasm in participating in class learning. The success factor of the learning process certainly cannot be separated from the role of the teacher in terms of opening learning, carrying out the core of learning, providing assessments, and closing learning. But there are also other supporting factors such as supporting learning media. Media is a tool that can help the learning process which contains information about a topic or learning theme to be conveyed (Heinich, Molenda, and Russell in Daryanto, 2016). Meanwhile, Gagne & Briggs said that learning media includes tools that are physically used to convey the contents of learning material consisting of books, tape recorders, video camera cassettes, video recorders, films, slides, photos, pictures, graphics, television, and computers. . In other words, media is a learning resource or physical vehicle that contains instructional material in the student's environment that can stimulate students to learn (Chotimah & Fathurrohman, 2018). Learning media has various types to be used as learning aids. There are several types of media, namely print technology, audio-visual technology, computer-based technology, and combined technology (Arsyad, 2015).

Learning media is anything that is used to convey the contents of learning material to make it easier for students to acquire knowledge, skills and attitudes according to learning objectives (Dewanti et al., 2018). Thus it can be concluded that learning media is a tool that contains information on a learning topic that is able to attract the attention and interest of students in participating in the learning process in class and can achieve learning objectives. The pop-up book learning media is not just an ordinary book learning media but a three-dimensional pop-up book

learning media. A pop-up book is a book that has moving parts or has three-dimensional elements and provides a more interesting story visualization, starting from the display of moving images when the page is opened (Dzuanda, 2011). According to (Bluemel & Taylor, 2012) said that a pop-up book is a book that displays the potential for movement and interaction through the use of paper as a material for folding, scrolling, shapes, wheels, or rotation. Pop-up book media is a type of 3D media that is capable of providing interesting effects, because each page is opened will reveal an image that appears and the material contained in the pop-up book can be adjusted according to the teaching material to be conveyed (Solichah & Mariana, 2018). It can be concluded that the pop-up book is different because the visual pop-up book has many colors, contains information, views, and images that are more attractive because they can appear upwards. So that this pop-up book media can be used as an elementary school science learning media on the topic of ecosystems. Therefore researchers will develop pop-up book learning media to increase enthusiasm and enthusiasm in learning natural sciences on the topic of elementary school ecosystems so that students can understand the importance of maintaining ecosystem balance, and achieving learning goals.

METHOD

The research entitled "Development of Pop-Up Book Media on Ecosystem Topics in Elementary School Science Learning" uses the research and development method of R&D (Research and Development). The research was conducted using research steps that refer to the Borg and Gall model, this research model includes: potentials and problems, data collection, product design, design validation, design revision, product trial, product revision trial use, product revision, mass production (Sugiyono, 2017). Data collection techniques used interviews and observations on homeroom teachers and students at one of the public elementary schools in Indramayu district, then interviewed documentation and the school environment.

Data collection techniques were carried out by interviews, pre-tests and post-tests in the form of questionnaires. Data collection techniques are processes used to obtain data from a product in development research. Interviews are a method of collecting data that is used to obtain information directly from the source (Yara, Y.S. & Taufik, 2021). Interviews were conducted with class V teachers and fifth grade students, in this study the questions were in the form of a questionnaire which was conducted with a pre-test before treatment and a post-test was carried out after treatment to collect data from students and find out the success of pop-up book instructional media in motivating students to following the lessons in class, then dialysis using a Likert scale. Data collection is a very important process in order to obtain the data needed in product development (Sulastri, 2016).

The data collection instrument in this study used instruments that were validated by material experts, media experts and subject matter teachers. The following were data collection instruments. Validity is the degree of accuracy between the data that occurs in the research object and the power reported by the researcher (Winarni, 2021). Data analysis is an activity after collecting data from all respondents or other data sources (Sugiyono, 2017). The data analysis technique used in this study is descriptive qualitative and quantitative descriptive data analysis techniques. Qualitative descriptive analysis method is a way of processing data in the form of sentences or words about an object (Agung, 2014). A qualitative descriptive analysis method is used to represent the data that has been collected in the form of input, responses, criticism, and suggestions from the results of reviews by media experts which are developed thoroughly, the results of the analysis are then used to revise the product. Quantitative descriptive analysis is used to process data obtained through questionnaires and observation sheets in the form of descriptive percentages (Mahardika & Siswoyo, 2021).

RESULTS

This research resulted in a Pop-Up Book learning media product that can be used as learning media regarding natural science learning on the topic of ecosystems. For teachers, it can be input and material for consideration in utilizing pop-up book learning media as a medium in the learning process in class to increase enthusiasm and provide learning experiences for students

in science learning on the topic of ecosystems. The process of developing pop-up book learning media is carried out using the ADDIE model design (Analysis, Design, Development, Implementation, Evaluation).

The following are the stages in making pop-up book learning media using the ADDIE model design. The data collection analysis phase was carried out by observing and interviewing. Observations were made to see the conditions and processes of using instructional media in schools while interviews were conducted to obtain information directly from informants. Thus researchers can see directly the learning process at school as well as the involvement and enthusiasm of students in following learning in class. So that researchers can find problems that occur in the field such as the lack of learning media that supports the learning process in class so that it has an impact on the lack of student involvement and lack of student enthusiasm in participating in the learning process in class, so researchers find solutions to these problems with pop-up book learning media. students can be more interested and enthusiastic in learning science on the topic of ecosystems.

The selection of learning media must be appropriate, through appropriate learning media the learning objectives will be achieved. The selection of media in learning must be adjusted to the classification of learning material. Because each type of media has different capabilities (Allen, 1956). Each learning media has advantages and disadvantages, while the advantage of pop-up book media is that it provides a special experience for students because it involves students such as sliding, opening and folding parts of the pop-up book. This will make a distinct impression on the reader so that it will be easier to remember when using this media. Setyawan, et al (2014) (in Safri et al., 2017). As for other opinions, among others: a) giving an interesting story starting from the presence of a dimensional display, namely in the picture and when the page of the book is opened certain parts can later shift. b) Providing a surprise that can invite awe when the pop up book page is opened which the reader will wait for a surprise on the next page. c) the impression conveyed in a story is getting stronger. d) a display that has dimensions that make the story seem real by adding surprises on the next page (Dzuanda, 2011).

Mean while the weakness of the weakness of the pop-up book media is. The manufacturing process takes a long time, the printed teaching material is too thick so that children are lazy to study it, and the media is easily damaged and easily torn if the material used is paper that is of poor quality. So that in the process of working on the media it takes a long time and is easily damaged when using poor paper materials (Indriana, 2011). From this opinion it can be concluded that the advantage is that the pop-up book learning media is 3D-shaped media so that when the book page is opened, the image will shift and reveal an image that matches the learning material presented. The conclusion of the weaknesses of the pop-up book learning media is that it takes quite a long time to make a pop-up book and the materials used must be of good enough quality so that the pop-up book is not easily damaged.

Furthermore, the second stage is design, after finding a solution to the idea of making pop-up book learning media for the problems found during observations and interviews, then the author designs the stages in making pop-up books. The first thing to do is to determine the storyline that is appropriate to the learning material and learning objectives in science lessons on the topic of ecosystems in fifth grade elementary school. After determining the storyline, the next step is the image design that will be used as the pop-up book media.

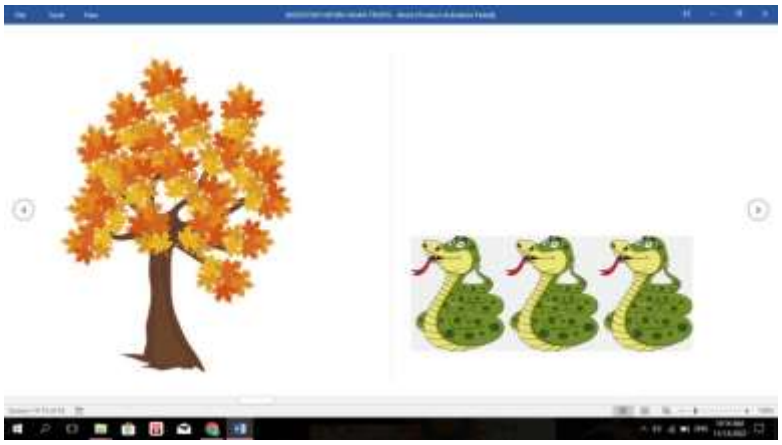

Figure 1. Drawing Design

After determining the storyline and designing the finished image, the next stage is the development stage by printing the image, cutting the image following the image pattern, making a slide pop-up book and pasting the clipped image on the pop-up book. Then the tools and materials for making pop-up book learning media, namely; scissors, cutter, double tip, glue, cardboard, asturo paper, manila paper, and hvs paper.
Tahap Pengembangan Media Pop-Up Book:

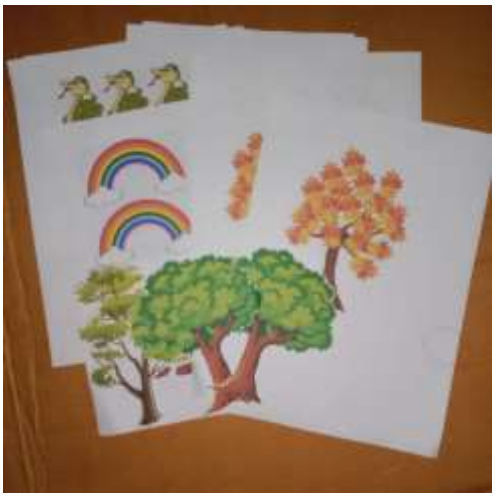

Figure 2. Image that has been printed

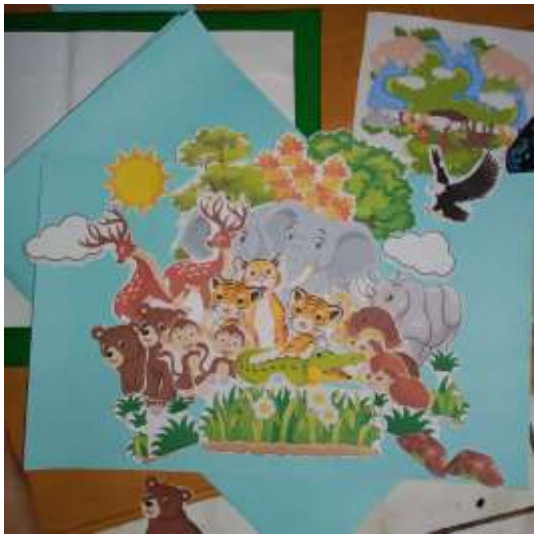

Figure 3. Image that has been cutting

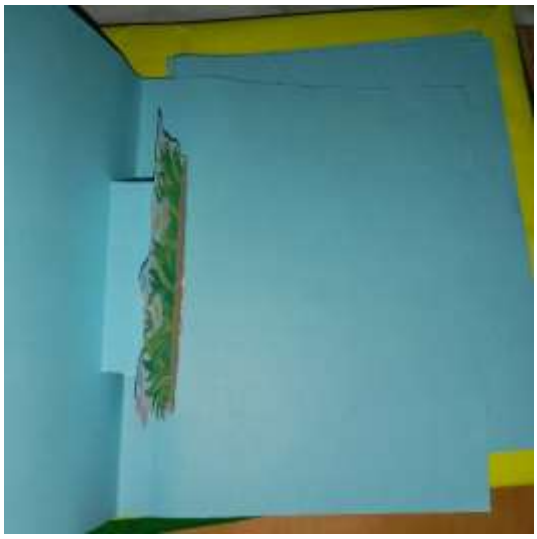

Figure 3. Pop-Up Book Slide

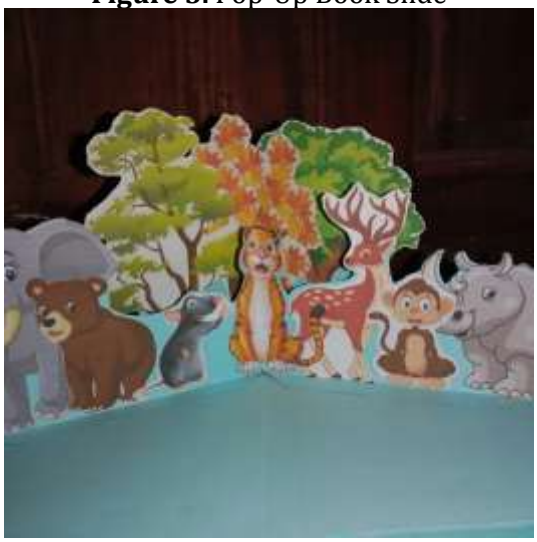

Figure 4. Image Atacched to Pop-Up Book

The development process produces a pop-up book with the title development of pop-up book learning media on the topic of ecosystems in elementary school science learning.

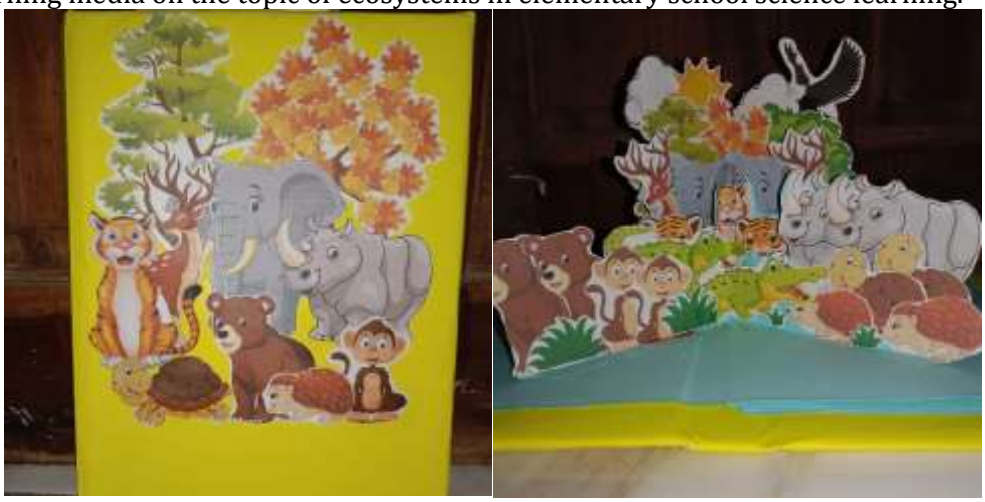

Figure 5. The Result Of The Development of Pop-Up Book learning media

Next is the implementation stage. At this implementation stage, the validity of the pop-up book learning media was tested, media experts, material experts, and teachers at one of the elementary schools in Indramayu district.

Figure 6. Use Pop-Up Book Learning Media

The table below is the result of research validation obtained from validators related to pop-up book learning media, namely the feasibility test of learning media.

Table 1. Research Validation

Validation Instrument	Assessment Indication	Validator
Instrument Material	1. Learning Aspect 2. Material Aspects 3. Visual Aspect	Material Expert
Media Instrument	1. Appearance 2. Process 3. Development 4. User	Media Epert
Teacher Instrument	1. Material and Learning Aspect 2. Media Aspect	3 Teacgers

Based on the validation results from material experts, pop-up book learning media can help students understand ecosystem material in more depth. Especially in forest ecosystem material, in the pop-up book learning media developed, images are designed with illustrations of ecosystems in forests. Even though it is only in book form, the visualizations presented are very contextual so that students get an idea of the ecosystem components in the forest.

Further validation with media experts. This assessment aims to ensure that the material presented is in accordance with the elementary school level, so there is a need for a due diligence analysis to find out the advantages and disadvantages of pop-up book learning media. The evaluation results from media experts are presented in the following table:

Table 2. Validation By Media Expert

No	Indikator	Stage 1 Before Revision	Stage 2 After Revision
1	Pop-up book design according to science material (Biology) with the theme "Ecosystem"	4	4
2	Media design in accordance with the	4	5

No	Indikator	Stage 1 Before Revision	Stage 2 After Revision
	concept of environmental preservation		
3	Media design is attractive to look at	4	5
4	Media design provides examples and images	3	5
5	Selection of colors in the media	4	5
6	Unique media selection	4	5
7	Packaging of material in teaching materials is in accordance with the relevant scientific approach (scientific approach) and interesting	4	4
8	The media display is attractive and easy to carry and move	4	5
9	Titled media caption	4	5
10	Media presentation is able to develop students' learning interest	4	5
	Amount	39	48
	Perecntage	78%	96%
	Category	Valid	Very Valid

The results of the media expert validation obtained a product eligibility percentage value of 78% in stage I which was categorized as a valid product, then increased to 96% in stage II after product revision with a very valid category and can be used without revision and all indicators in the very relevant/good category (Rachman et al., 2022). With the results of this research validation, it can be concluded that pop-up book learning media can help elementary school students in learning science on the topic of ecosystems.

The following are some studies that are relevant to this research. Other research related to pop-up books stated that the validation results by media experts obtained 93%, material experts obtained 93%, linguists obtained 95%. The teacher's response was 96%, and the small group trial at SD Negeri 1 Siliwangi received 89%, the large group trial at SD Negeri 1 Siliwangi and MI Mifthaul Falah obtained 96%. It was concluded that the pop-up book-based serial picture learning media for writing Indonesian narratives for class IV at SD/MI which was developed is suitable for use as a learning medium (Hidayah et al., 2020).

Based on the results of the validity analysis with trials, the product in the form of a learning media pop-up book is feasible to be used as an aid to science learning media on the topic of ecosystems in elementary schools. Pop-Up Book learning media can not only be used for students for individual learning but Pop-Up Book learning media can be used for group learning (Masturah et al., 2018) Elementary school children are starting to be able to understand some abstract scientific concepts, but with concrete examples. At this stage children learn best through hands-on practice or the presence of objects. Permanent objects have begun to develop where children can learn to remember objects, their number and characteristics even though the objects are no longer in front of them. Children are interested in books that have something to do with practical science activities with several illustrations in the form of pictures. Therefore, the teacher's ability to create media is very helpful in developing children's scientific way of thinking in elementary schools (Nasrah & Siraj, 2021). Thus, the application of pop-up book learning needs to be implemented in elementary schools because it is not only for individual learning but can be used

in groups because the images provided by the pop-up book are very concrete examples of learning material so that they can develop children's scientific ways of thinking at school. Elementary school.

The pop-up book media developed was declared feasible with an average score of 4.44 from material experts and an average score of 4.80 from media experts, and an average score of 4.72 from user experts, where the overall results of the acquisition were average. -the average score is in the Very Good category. Meanwhile, the students' response to the pop up book media in the limited trial got an average of 95% in the Very Good category. Based on the results of data analysis, it was concluded that the pop-up book media on the subject matter of the appearance of the earth's surface in class III SD science subjects that had been developed was feasible to use (Mustofa & Syafi'ah, 2018). The instrument used is a media feasibility validation questionnaire sheet. The average result of the validation questionnaire obtained from 5 validators was 92.67% (very feasible). The results obtained, it can be concluded that the pop-up book learning media for petroleum material that has been developed deserves further testing to see its effectiveness in learning (Safri et al., 2017).

Training and Assistance in the Development of Science Modules in the Form of Pop-up Books Based on Local Potential for Teachers of SD Negeri 3 Peusangan Pilot The research was carried out using the R&D method, the research was motivated by 1) the incompleteness of the varied science/science learning media used in the learning process; 2) minimal use of innovative learning media such as pop-up books that can be linked to local potential contexts; 3) the teacher's ability to link Aceh's local potential with science/science learning is still low; and 4) the knowledge and skills of teachers in compiling and developing modules in the form of pop-up books that are integrated with Aceh's local potential are still very limited. The success of this activity is that each Science/Science teacher already has a science module product in the form of a pop-up book based on Aceh's local potential and is able to properly implement it in learning and teaching activities (Nasrah & Siraj, 2021). The development of pop-up book Learning Media for Class III Elementary School Science Subjects, the research was conducted using the R&D method. This development research was motivated by limited innovative learning resources and students' science learning outcomes that were not optimal. The results of the validation of pop-up book learning media research were found to be effective in improving science learning outcomes for class III A students at Mutiara Singaraja Elementary School (Diah Masturah et al., 2018).

Previous research studies explained that pop-up book learning media are considered capable of implementing the teaching and learning process and are appropriate for use, but this study is still not optimal. Thus it requires an in-depth study of previous research studies using R&D research to see how the learning process, the influence and quality of pop-up book learning media and can increase the enthusiasm and enthusiasm of students in participating in science learning on the topic of ecosystems. By completing the problems from the research that has been done before, namely by making the pop-up book more interactive, making the pop-up book into several slides so that an explanation of the material topics in the pop-up book can be conveyed, because pop-up book media is a learning media that using paper and will be used for the elementary school level, the appearance of the pop-up book must look more attractive, for example with lots of colors so that it can attract the attention of students. Therefore, researchers developed pop-up book learning media to increase enthusiasm and enthusiasm in learning science on the topic of elementary school ecosystems so that students can understand the importance of maintaining ecosystem balance, and achieving learning goals.

CONCLUSION

This research and development shows that pop-up book instructional media is declared suitable for use in learning. The benefits of using science learning pop-up book learning media on the topic of Ecosystems can help students understand the topic of learning about ecosystems so that learning objectives can be achieved.

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