

Ekoraya: Biodiversity Flipbook Based on Science Literacy

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Abstract: This research is motivated by the fact that scientific literacy in learning in Indonesia is still very lacking. The learning media that have been used so far are less varied and limited, teachers have also never applied learning media based on scientific literacy in the classroom. The objectives of this study are: (1) to find out the process of developing learning media, (2) to find out the feasibility of learning media and, (3) to find out the practicality of learning media. This study uses the Research and Development (RnD) method. Media development uses the ADDIE model. The subjects in this study were 27 students of grade V at SDN 007 Samarinda Ulu. Data collection techniques used interviews, questionnaires and documentation. The research instruments used were material expert feasibility assessment questionnaires, student response questionnaires and teacher response questionnaires. The results of this study were; feasibility tests by material experts of 94% with the category "Very Feasible", feasibility tests by media experts of 86% with the category "Very Feasible". Then, the assessment of media by small groups was 91.77% in the category of "Very Practical", the large group test was 88.35% in the category of "Very Practical", and the results of the media assessment by teachers were 96.47% in the category of "Very Practical" for use in learning.

Keywords: Research Development, Digital Flipbook, Science Literacy

PRELIMINARY

Modern technology is developing rapidly and changing drastically, especially with the presence of technology 5.0 (Fricticarani et al., 2023). In today's era, technology has become a necessity for every human being. In the 5.0 era, the learning process directly involves information technology such as interactive PowerPoint presentations, digital videos, and animations (Rozi, 2020). The rapid advancement of science and technology has a significant impact on every area of people's lives (Dewa, 2022). Students are prepared to face technological developments by improving their critical and creative thinking skills. The things needed as student skills are Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation (Septicasari & Frandy, 2020). Specifically, 4C skills are a form of skill that is much more useful in everyday situations (Ekawati et al., 2019). There are six categories of literacy in education

in the 21st century, one of which is scientific literacy. Science literacy in Indonesia is very low, as shown by the results of the Trends in Mathematics and Science Study (TIMSS) 2015 survey, stating that Indonesia was in fourth place out of 43 participating countries. Indonesia was also ranked third last out of 72 countries by PISA in the same year when the average science scores were announced (Khotimah, 2019). Based on the results of the PISA tests of Indonesian students conducted in 2006, 2009, 2012, and 2015, the average value of Indonesian students' science literacy was relatively low, ranging between 382 and 403 points (Hidayah et al., 2019). This presents that students' literacy skills tend to be low. Interviews with grade V teachers yielded information that teachers did not yet know about science literacy, the learning media that had been used so far were less varied and limited, and teachers had never implemented science literacy-based learning media in class. In addition, science learning, which is the right content in developing science literacy, has not been utilized by teachers to internalize students' science literacy competencies. Scientific literacy is the ability to understand social and natural events in the environment around students and use that knowledge to make scientific decisions (Marlina et al., 2022). The phenomenon of rapid progress in science and technology throughout the world, as seen from the environment, problems, or innovations in the field of technology, shows the importance of scientific literacy to understand and deal with these changes. Therefore, scientific literacy is very important for students around the world.

The use of technology as a teaching medium to improve students' learning capacity is one of the needs of modern education. (Nurwidiyanti and Sari, 2022). Teachers must create learning media in learning activities. Teachers can use the media as a tool to help students understand information related to their lessons (A. P. Wulandari et al., 2023). Based on the analysis of student needs with a learning style questionnaire, information was obtained that the majority of class V C students at SDN 007 Samarinda Ulu have a visual learning style. This is in line with the media that will be developed, namely a digital flipbook based on scientific literacy. Media in the learning process can function as a communication tool and intermediary for educators to disseminate ideas and messages to students. (Alifah et al., 2023: 104).

Digital flipbooks are an example of learning media that can match various learning styles to meet learning objectives (Afwan et al., 2020: 1004). Flipbook is an

innovative form of traditional textbook, including various interactive features and navigation systems that change smoothly from page to page (Syamsuri et al., 2023). Flipbook has many benefits, such as the ability to display educational content in the form of text or images, have color and animation, are versatile and effective, and can combine audio and animation. (Purnamadewi and Wiyasa, 2022). Everyone can access this flipbook via a laptop or smartphone. Because flipbooks can be opened flexibly, flipbooks can make learning activities more comfortable for students (Santi et al., 2016)

In line with the research conducted (Febrianti, 2021) said that digital flipbook media based on Flip PDF Professional makes students active in learning activities, so that their scientific literacy skills increase. This is because Flip PDF Professional is equipped with various features that support scientific literacy skills. In addition, Nurwidiyanti & Sari, (2022) said that flipbooks can be used as learning tools that can be accessed by students at different times, locations, and conditions. Between these two studies, there are differences related to the material and socio-scientific issues raised. The development of this learning media uses the IPS material on biodiversity in grade V chapter 6 with the title "My Indonesia is Rich in Life" and the socio-scientific issues raised are related to environmental quality.

The development of this electronic media is packaged in the form of technology created with the Canva application and integrated with a corporate flip pdf intended for grade V of elementary school. This electronic learning media is equipped with materials, images, learning videos and quizzes. Students can also use the internet network to access this electronic learning resource flexibly by clicking the link on a laptop or smartphone. This study aims to develop learning media entitled Ekoraya: Flipbook Biodiversity Based on Science Literacy that is valid, practical and effective for use in learning in elementary schools.

METHOD

The type of research used is Research and Development (R&D), using the ADDIE model. The purpose of this study is to produce a product, namely Ekoraya; Biodiversity Flipbook Based on Science Literacy. This research was conducted at SDN 007 Samarinda Ulu, Samarinda City. The research time was May 15-16, 2024. Product trials were carried

out using feasibility tests by media experts and material experts. In addition, a practicality test was also carried out by conducting a large group trial on 27 students and a small group on 5 students. Data collection techniques and instruments in this study include interviews, observations, and questionnaires which include learning style test questionnaires, media expert questionnaires, materials, student and teacher responses. Data analysis was carried out by calculating the results of expert validation tests and practicality tests on teachers and students. The following formula can be used to analyze the results of expert instruments and student and teacher responses:

$$P = \frac{\sum R}{N} \times 100 \%$$

Information:

P : Percentage of score sought

$\sum R$: the number of points awarded

N : Maximum score

The results of the calculations above are compared with the following product test criteria.:

Table 1. Validation Criteria for Feasibility and Practicality

No	Skor dalam persen (%)	Kriteria Validasi Kelayakan	Kriteria Validasi Kepraktisan
1.	< 21%	Sangat Tidak layak	Tidak Praktis
2.	21-40 %	Tidak Layak	Kurang Praktis
3.	41-60 %	Cukup layak	Sedang
4.	61-80 %	Layak	Praktis
5.	81-100 %	Sangat Layak	Sangat Praktis

Sumber: Arikunto (Ernawati, 2017: 207)

RESULTS

1. Results of the Analysis Phase

The analysis stage is carried out in two stages, namely performance analysis & needs analysis. The results of the performance analysis based on interviews with teachers obtained information that in the science subject, teachers had never taught using digital learning media, especially flipbooks. Teachers have also never applied science literacy-based learning media in class. Meanwhile, the results of the needs analysis were carried out with a learning style questionnaire test which obtained the results that most (16 out of 27) students have a visual learning style. Based on this

analysis, flipbooks are declared to meet the requirements to be student learning media. Good learning media can be explained as media that is able to adapt to various student learning styles to meet learning objectives, one of which is digital flipbooks.

2. Results of the Design Stage (Designing)

At this stage, the researcher made a storyboard, then developed it into a digital book using *flip pdf professional*.

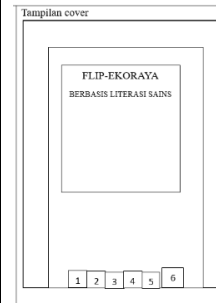
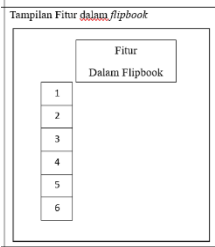
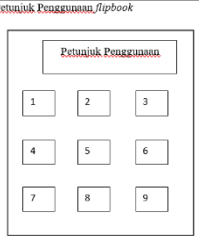
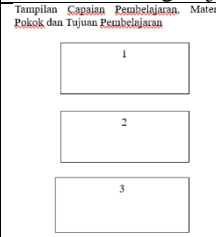
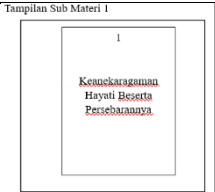
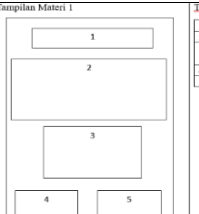
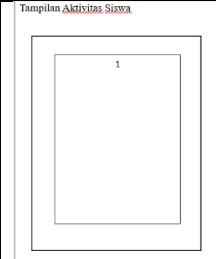
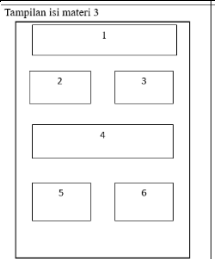
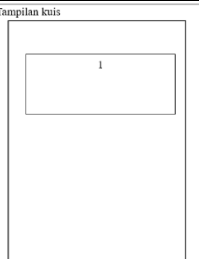
Tampilan cover	Tampilan fitur <i>flipbook</i>	Tampilan petunjuk penggunaan
<p>Tampilan cover</p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. Fitur thumbnail 2. Fitur <i>autoflip</i> 3. Fitur Zoom 4. Fitur audio 5. Fitur search 6. Fitur share 	<p>Tampilan Fitur dalam <i>flipbook</i></p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. Fitur <i>Proyek Bersama</i> 2. Fitur <i>Kamus Mini</i> 3. Fitur <i>Pojok Informasi</i> 5. Fitur <i>Kolom Aktivitas</i> 6. Fitur <i>Pojok Kuis</i> 7. Fitur <i>Pojok Video</i> 8. Fitur <i>Pojok Isu Sosial</i> 	<p>Petunjuk Penggunaan <i>flipbook</i></p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. Ikon zoom 2. Ikon thumbnail 3. Ikon <i>autoflip</i> 4. Ikon sound 5. Ikon first 6. Ikon previous 7. Ikon next page 8. Ikon last 9. Ikon fullscreen
CP display, materials and learning objectives	Sub material display	Display of content material
<p>Tampilan <i>Capaian Pembelajaran Pokok dan Tujuan Pembelajaran Materi</i></p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. <i>Capaian Pembelajaran</i> 2. <i>Materi Pokok</i> 3. <i>Tujuan Pembelajaran</i> 	<p>Tampilan Sub Materi 1</p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. <i>Judul Sub Bab 1</i> 	<p>Tampilan Materi 1</p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. <i>Judul materi</i> 2. <i>Isi materi</i> 3. <i>Pojok video pembelajaran</i> 4. <i>Pojok informasi</i> 5. <i>Kamus mini</i>
Student activity display	Display of content material	Quiz view
<p>Tampilan <i>Aktivitas Siswa</i></p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. Fitur <i>Kolom Aktivitas</i> 	<p>Tampilan isi materi 3</p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. <i>Judul materi sub bab 4</i> 2. <i>Gambar</i> 3. <i>Gambar</i> 4. <i>Isi materi</i> 5. <i>Gambar</i> 6. <i>Gambar</i> 	<p>Tampilan kuis</p>  <p>Terdapat:</p> <ol style="list-style-type: none"> 1. <i>Fitur Pojok Kuis</i>

Figure 1. Storyboard

2. Development Phase Results

The product is realized in accordance with the outline design of the media program that was created in the previous stage and is adjusted to socio-scientific issues, namely environmental quality that focuses on a global scope.


<p>Cover view</p> 	<p>Feature view</p> 	<p>Display instructions for use</p> 
<p>CP display, materials and learning objectives</p>	<p>Sub material display</p>	<p>Display of content material</p>
		
<p>Display of content material</p>	<p>Student activity display</p>	<p>Quiz view</p>
		

Figure 2. Prototype

Next, the researcher conducted a validation process with experts before the digital flipbook product was tested on research subjects. The goal is to identify deficiencies in the product that will be produced later. Then the product can be further improved based on input from experts.

Table 2. Results of Validation by Material and Media Experts

Areas of expertise	Aspect	Total score	Maximum score	Percentage	Category
Social Sciences Material Expert	Context Competence Knowledge	47	50	94%	Worth testing without revision
Social Sciences Media Expert	Interface Navigation Robustness	86	100	86%	Worth testing with revisions

The results of the assessment by the material experts obtained a score of 47 with a percentage of 94%, namely "Very Eligible". It was concluded based on the assessment by the material experts that the Ekoraya learning media: Flipbook Biodiversity Based on Science Literacy is "Eligible" to be tested on students. Then, the results of the assessment by the media experts obtained a score of 86 with a percentage of 86% with the category "Very Eligible" with revisions. The things that need improvement are fixing fonts that are difficult to read, resetting the layout, removing the answer key feature and adding several images. After the revision stage, it can be concluded based on the assessment by the media experts that the Ekoraya media: Flipbook Biodiversity Based on Science Literacy is "Eligible" to be tested on students.

3. Results of the Implementation Phase

Small group tests were conducted to determine the practicality of the product from the student and teacher response questionnaires, then returned to the researcher so that the scores in the questionnaire would be processed and analyzed with the following results:

Table 3. Small Group Student Responses

Responden	Aspek Kemudahan Penggunaan	Aspek Daya Tarik	Aspek Manfaat	Skor Perolehan	Skor Max	%	Kategori
R1	35	20	35	90	90	100	Very Practical
R2	31	17	31	79	90	87.77	Very Practical
R3	32	20	35	87	90	96.66	Very Practical
R4	29	18	30	77	90	85.55	Very Practical
R5	30	18	32	80	90	88.88	Very Practical
Total skor				413	450	91.77	Very Practical

The small group trial obtained a percentage of 91.77% with a practicality level including "Very Practical". The small group trial included media revisions, namely improving the sentence structure so that it is easy for students to understand..

Table 4. Results of Large Group Student Responses

Respo-ndents	Ease of Use Aspect	Aspects of Attraction	Benefit Aspect	Earned Score	Score Max	%	Category
R1	35	20	35	90	90	100	Very Practical
R2	35	20	35	90	90	100	Very Practical
R3	35	20	35	90	90	100	Very Practical
R4	29	18	34	81	90	90.00	Very Practical
R5 dst	30	18	27	75	90	83.33	Very Practical
Total skor				2147	2430	88.35	Very Practical

Source: Results of Researcher Data Analysis

The trial on a large group obtained a percentage of 88.35% with a practicality level including "Very Practical". At this stage there was no revision of the digital flipbook learning media.

Tabel 5. Hasil Respon Guru

Aspects	Earned Score	Maximum Score
Ease of Use	33	35
Attractiveness	20	20
benefit	29	30
Total score	82	
Maximum Total Score	85	
Percentage	96,47%	
Category	Very Practical	

Source: Results of Researcher Data Analysis

The results of the assessment by teacher responses obtained a score of 82 with a percentage of 96.47% in the category "Very Practical".

4. Evaluation Phase Results

Based on the data above, the Ekoraya learning media: Biodiversity Flipbook Based on Science Literacy shows a level of practicality in the small group test of 91.77% in the "Very Practical" category, the large group test obtained a percentage of 88.35% in the "Very Practical" category and the teacher's response obtained a percentage of 96.47% in the "Very Practical" category. It can be concluded that this

learning media is "Very Practical" and is suitable for use in science learning in elementary school grade V.

DISCUSSION

1. Learning Media Development Process

This research is motivated by the low scientific literacy in Indonesia, the results of the Trends in Mathematics and Science Study (TIMSS) 2015 survey showed that Indonesia was ranked fourth out of 43 participating countries. Indonesia was also ranked third out of 72 countries by PISA in the same year when the average science score was announced (Khotimah, 2019: 87). Interviews with grade V teachers obtained information that previously teachers did not know much about scientific literacy, the learning media that had been used so far were less varied and limited, teachers had also never implemented scientific literacy-based learning media in class. In addition, science and science learning, which is the right content in developing scientific literacy, has not been utilized by teachers to internalize students' scientific literacy competencies. The researcher intends to develop learning media for learning activities to be fun, make it easier for students to understand the material and in accordance with the independent curriculum. Digital flipbooks are an example of media that adapt to different learning styles of students to meet learning objectives (Afwan et al., 2020). This is in accordance with research (Nurwidiyanti and Sari, 2022) which states that flipbooks can also be used as independent learning media and can be accessed by students at different times, locations and situations.

Flipbook is an innovative form of traditional textbook, including various interactive features and navigation systems that change smoothly from page to page (Syamsuri et al., 2023). Flipbook has many benefits, such as the ability to display educational content in the form of text or images, have color and animation, are versatile and effective, and can combine audio and animation. (Purnamadewi and Wiyasa, 2022). Everyone can access this flipbook via a laptop or smartphone. Because flipbook is a flexible media and flipbook can make learning activities more comfortable for students. (Santi et al., 2016) At the analysis stage, the researcher also analyzed the students' learning styles, to find out the media developed according to the students' learning styles.

Based on the results of the learning style questionnaire test on class V C students, namely visually as many as 16 students, auditory as many as 7 students and kinesthetic as many as 3 students. According to research, all student learning styles - visual, auditory, and kinesthetic - can benefit from using this digital flipbook learning media. This is supported by the opinion of Afwan et al. that digital flipbooks are one example of media that is suitable for different student learning styles to meet learning objectives (Afwan et al., 2020: 1004). The design stage that the researcher carried out was to collect materials and materials to create a digital flipbook based on scientific literacy, namely biodiversity material. The reference sources used were books and the internet. Furthermore, the researcher designed a digital flipbook design using Canva which started by designing a cover for the front page and designing the appearance for the following pages until the end by inserting all the materials that had been prepared previously. Then in the final stage, the researcher combined the materials that had been designed using the Canva application into a professional flip pdf which was in the form of an E-book with html format. The flipbook was then edited again by adding button features, backsound, background and learning videos in the professional flip pdf to produce a complete digital flipbook media.

After designing the next step, namely the development stage of the Ekoraya learning media: Biodiversity Flipbook Based on Science Literacy, the researcher designed digital flipbook learning materials that centered on Indonesian biodiversity-based science literacy, which includes plants and animals. After the product was completed, media experts and material experts evaluated it to provide feedback to the researcher so that the media product could be improved so that the feasibility of the learning media product was produced before being tested on students. The development of products in the form of learning media needs to pay attention to several things, the author pays attention to one of them is the age of the students who are the subjects of the research. This needs to be considered so that the learning media developed will be suitable for operation by elementary school children. The subjects of this study were grade V students with an average age of 10-11 years, this figure is known through the national age standards for school children. This is supported by Piaget's cognitive theory, cognitive itself according to Marinda (2020) is interpreted as a child's capacity to reason, solve problems, and think more critically. The four phases that form the cognitive development

phase, according to Piaget, are the sensory, pre-operational, concrete, and normal operational stages. Concrete operational stage at the age of 7-11 years (Wahyuni, Muntari, & Anwar, 2022). When a child reaches the concrete operational stage (7-12 years), he is developed enough to use reason. During this phase, his skills in carrying out conservation tasks also increase (Juwantara, 2019). The results of this study are also supported by the opinion of Hijriati (2021) that children enter the formal operational and concrete operational phases between the ages of 10 and 12 years, which indicates that they are able to think logically and concretely. Children can only solve puzzles involving real objects that they can feel with their senses. To ensure that the results of making educational materials are in accordance with the needs and abilities of children aged 10 and 11 years, namely by making educational materials that are interesting and involve the five senses of children - eyes, ears, mouth, and touch.

2. Eligibility of Learning Media

The feasibility of the Ekoraya learning media: Flipbook Biodiversity Based on Science Literacy is obtained through a validation process of assessment by material experts and media experts. The feasibility test in this case uses a questionnaire filled out by material experts and media experts to determine the feasibility of the media created and product revisions that need to be improved to obtain maximum results. The feasibility test of the material experts obtained the feasibility status "Feasible to be tested without revision" with a score of 47, a percentage level of 94%, namely "Very Feasible". In the assessment by media experts, the feasibility status was obtained "Feasible to be tested with revision" with a score of 86, a percentage level of 86%, namely "Very Feasible". The things that need to be revised are fixing fonts that are difficult to read, resetting the layout, removing the answer key feature and adding several images. It can be concluded that the Ekoraya learning media: Flipbook Biodiversity Based on Science Literacy is feasible to use in learning activities.

3. Practicality of Learning Media

The level of practicality is seen from the assessment given through student and teacher response questionnaires. The results of the trial on 5 students obtained a percentage level of 91.77% including "Very Practical". At this stage there was a media revision, namely improving the sentence structure so that it was easy for

students to understand the meaning. Then, the trial on 27 students obtained a percentage level of 88.35% including "Very Practical". At this stage there was no revision of the digital flipbook learning media.

CONCLUSION

The development process of Ekoraya: Biodiversity Flipbook Based on Science Literacy applies the ADDIE model through the stages of analysis, design, development, implementation and evaluation. The media development process is carried out by analyzing student needs and student characteristics, collecting materials and materials to create a digital flipbook based on science literacy, namely biodiversity material. Next, the researcher designed a digital flipbook design using Canva. Then the last stage, the researcher combined the materials that had been designed using the Canva application into a professional flip pdf in the form of an E-book with html format. The feasibility of the Ekoraya learning media: Biodiversity Flipbook Based on Science Literacy by material experts obtained a percentage of 94% including "Very Feasible". While the results of the media feasibility by media experts obtained a percentage of 86% including "Very Feasible". The practicality of the Ekoraya learning media: Biodiversity Flipbook Based on Science Literacy seen from the results of the trial in small groups obtained a percentage of 91.77%, namely "Very Practical". Then the trial in large groups obtained a percentage of 88.35%, namely "Very Practical".

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