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A Flipbook on Waste Recycling Based on the Problem-Based Learning Model: An Effort to Improve Students' Understanding of Explanatory Texts

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ABSTRACT

Purpose of the study: This study aims to: (1) describe the design of a flipbook media for teaching explanatory text comprehension; (2) present the results of the flipbook's feasibility testing; and (3) analyze its effectiveness in enhancing students' understanding of explanatory texts.

Methodology: The research employed the Research and Development (R&D) method using the Borg & Gall model, encompassing the stages of analysis, design, development, implementation, and evaluation. The study was conducted at Elementary School Nongkosawit 01, Semarang City, involving both teacher and student participants.

Main Findings: The developed flipbook was designed to be visually appealing, pedagogically relevant, and responsive to the needs of teachers and students. Feasibility testing yielded very high validation scores 93.00% from media experts and 95.00% from material experts placing it in the "very feasible" category. Teacher and student responses indicated that the flipbook significantly supported engagement and comprehension. Effectiveness trials showed improvement rates of 84.16% in small-scale and 81.26% in large-scale trials, confirming its suitability for Grade V explanatory text learning.

Novelty/Originality of this study: The innovation of this study lies in the integration of Problem-Based Learning (PBL) with locally relevant recycled waste content into a digital flipbook format. This combination not only strengthens students' mastery of explanatory texts but also embeds values of responsibility, environmental care, and sustainability. By contextualizing literacy learning with environmental education, the flipbook serves as both an academic and character-building tool. This model provides a replicable, culturally grounded, and eco-conscious approach to literacy instruction in primary schools.

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1. INTRODUCTION

In the current era of globalization and rapid advances in information technology, the education sector is required to continuously innovate in order to produce learning that is relevant, contextual, and adaptive to the demands of the times. Educational transformation today not only involves technological integration but also emphasizes the cultivation of critical thinking, literacy competence, and social–environmental awareness in

students. Effective learning must connect classroom knowledge to real-world situations, shifting from purely theoretical delivery to approaches that are applicative, participatory, and meaningful [1]-[5].

At the elementary school level, Indonesian language learning plays a crucial role in building the foundation of students' literacy skills. Literacy extends beyond reading and writing; it encompasses understanding, analyzing, and logically conveying information [6]-[9]. One key component of the Indonesian curriculum is the explanatory text, which describes the process of a phenomenon natural or social in a logical, structured, and sequential manner. Mastery of explanatory texts requires not only vocabulary and grammatical competence but also scientific reasoning, the ability to identify cause–effect relationships, and the skill to rewrite information coherently.

However, observations at Elementary School Nongkosawit 01 Semarang reveal that students' understanding of explanatory texts remains low. Many struggle to identify the complete structure (general statements, explanatory sequences, conclusions), link information causally, interpret implied meanings, and rewrite content logically. These difficulties reflect a gap between material delivery and students' depth of understanding. Contributing factors include teacher-centered approaches, limited engaging and contextual materials, and the predominance of static government-issued textbooks [10]-[16]. Without relevant and interactive learning media, students fail to connect material with their lived experiences, leading to reduced motivation and suboptimal knowledge internalization.

The Independent Curriculum provides an opportunity to address this issue by promoting differentiated and locally contextualized learning [17]-[19]. It encourages educators to integrate relevant real-life issues—such as environmental challenges and waste management into lessons. This aligns with the *Pancasila Student Profile* values of mutual cooperation, independence, and critical thinking. Waste management and recycling, in particular, are highly relevant themes that can be linked directly to students' daily lives while fostering environmental responsibility [20]-[24]. Yet, this theme remains underutilized in Indonesian language learning, especially in explanatory text instruction, despite its strong potential to connect cognitive, affective, and practical domains of learning.

One innovative solution is the integration of digital flipbook media with the Problem Based Learning (PBL) model. Flipbooks combine text, images, audio, and video in an interactive format that caters to Generation Z's visual-digital learning preferences. PBL, meanwhile, trains students to solve real problems through investigation, discussion, and reasoning making it highly suitable for explanatory text learning. Combining flipbooks with PBL on the theme of waste recycling can improve literacy skills while simultaneously cultivating environmental awareness, collaboration, and critical thinking. Previous studies (e.g., Hasibuan; Zahroh; Fitriani) have shown that flipbooks and environmental themes can enhance learning outcomes, contextual relevance, and student engagement [25]-[27]. However, most prior works focus on either the use of flipbooks as standalone media or environmental content as thematic material, without fully integrating (1) PBL pedagogy, (2) flipbook multimedia features, and (3) local wisdom-based environmental content in a single framework. Furthermore, earlier studies often lacked varied practice activities and did not strongly emphasize character education values such as responsibility and environmental stewardship.

From the literature review, there is a clear gap in the development of Indonesian language learning media that simultaneously, Integrates PBL with a digital flipbook format to support explanatory text comprehension. Embeds local wisdom-based environmental content (waste recycling) to enhance contextual and meaningful learning. Explicitly incorporates character-building values into literacy instruction, making the learning process both academically rigorous and socially transformative. This research offers novelty by merging three dimensions media innovation (flipbook), pedagogical innovation (PBL), and contextual innovation (waste recycling theme with local wisdom) into one integrated learning approach. This synergy is expected to strengthen students' mastery of explanatory texts while developing environmental care, problem-solving skills, and 21st-century competencies. Accordingly, this study aims to: 1) Design a PBL-based flipbook on waste recycling aligned with students' needs; 2) Assess the feasibility of the developed media through expert and user validation; and 3) Evaluate its effectiveness in improving fifth graders' comprehension of explanatory texts.

2. RESEARCH METHOD

The type of research method used is Research and Development (R&D). According to Winayarti et al, research (R&D) is a type of research method that focuses on producing certain products and testing the feasibility of the product to be implemented in the learning process and the product is developed by other researchers [28]. The purpose of using this research method is to provide systematic stages in designing, developing, and testing products. The type of research chosen is adjusted to the product being developed, namely in the form of a flipbook with a waste recycling theme based on Problem Based Learning (PBL). The product was developed to be useful for improving students' understanding of explanatory text material. This development research is driven by the Borg & Gall development model which uses eight main steps, including. (1) Potential and Problems. (2) Data Collection. (3) Product Design. (4) Design Validation. (5) Design Revision.

(6) Product Trial. (7) Product Revision. (8) Product Trial. Based on the eight stages of Borg & Gall development research where researchers have limitations in terms of time and cost in producing media for mass production. This approach allows researchers to produce valid, feasible, and effective products for use in the context of Indonesian language learning in elementary schools [29].

This research was conducted in the even semester of the 2024/2025 academic year, which took place at Elementary School Nongkosawit 01 Semarang City. The subjects of this study were 30 fifth grade students of Elementary School Nongkosawit 01 Semarang City, fifth grade teachers of Elementary School Nongkosawit Semarang City and expert lecturers in media and materials. Meanwhile, the object of this research was a flipbook with the theme of waste recycling based on Problem Based Learning (PBL). The population in this study were all fifth grade students, while the sample used was a purposive sampling technique where sampling was based on certain considerations. The students selected consisted of 2 top-ranking students, 2 middle-ranking students, and 2 lower-ranking students. The purpose of the sample selection was so that the waste recycling flipbook media based on Problem Based Learning (PBL) could be used by students with three different levels of academic achievement [30]. After testing the development of the quality of the flipbook media that supports the learning process, the next stage is the implementation of the media to determine the level of feasibility of the flipbook media. Before implementing the media in the field, the media that has been developed is assessed by two validator lecturers, namely a media expert lecturer and a material/language expert lecturer. The researcher also conducted an evaluation question which was carried out in two stages, namely Pretest (Before being given media treatment) and Posttest (After being given media treatment). Then the researcher provided a response questionnaire which was distributed to students and teachers to find out whether or not the media was suitable for long-term use.

Data collection was carried out using various techniques, including tests, observations, interviews, questionnaires, and documentation. Tests were used to measure students' understanding of explanatory texts through pretests and posttests. Observations were conducted to record students' activities and responses during the learning process. Interviews with teachers and students provided qualitative information regarding the needs and responses to the media. Questionnaires were used to assess teacher and student responses after using the media, while documentation was used to record activities and results during the research process. The instruments in this study were compiled based on indicators of understanding explanatory texts and media feasibility, and were tested for validity and reliability before use.

The media expert evaluation focused on three key aspects: alignment of the media with learning objectives, language accuracy, and usability. These aspects were operationalized into sixteen indicators serving as criteria for assessing media feasibility. Data collected from the media expert validation questionnaires were analyzed using a simple percentage formula. Subsequently, the results were categorized into predefined feasibility levels.

Table 1. Media Expert Validation Assessment Criteria

Percentage	Criteria
81 – 100	Very Feasible
61 – 80	Worth
41 – 60	Decent Enough
21 – 40	Less feasible
0 – 20	Not Feasible

The validation process conducted by material experts encompassed three dimensions: content feasibility, presentation feasibility, and language feasibility. These dimensions were further broken down into thirteen specific indicators to guide the evaluation of the material content within the media feasibility assessment. Data collected from the material expert validation questionnaires were analyzed using a simple percentage calculation method. The resulting scores were then classified into categories, as presented in Table 2

Table 2. Criteria for Material Expert Validation Assessment

Percentage	Criteria
81 – 100	Very Feasible
61 – 80	Worth
41 – 60	Decent Enough
21 – 40	Less feasible
0 – 20	Not Feasible

The data analysis in this study was conducted through three primary phases: product data analysis, preliminary data analysis, and final data analysis. The initial phase focused on assessing the feasibility of the developed learning media and analyzing teacher feedback. Material feasibility was evaluated through expert

validation of the local wisdom-based mobile game learning media, considering both media validation criteria and content quality. Scores provided by validators were interpreted using established feasibility classifications to determine the appropriateness of the media for educational use. Additionally, teacher responses obtained via questionnaires were analyzed to gauge the media's effectiveness and utility within the learning context.

The second phase, preliminary data analysis, aimed to establish a comparative baseline for measuring differences and improvements in student learning outcomes. This included conducting normality tests on pretest and posttest scores, using the Shapiro-Wilk method implemented through SPSS version 30. Data were considered normally distributed if the significance value exceeded 0.05; otherwise, data were regarded as non-normal. This step ensured the validity of data prior to further statistical testing.

The final phase encompassed inferential statistical analyses, including paired sample t-tests and N-gain calculations to assess learning improvements. The paired t-test evaluated whether the difference between pretest and posttest means was statistically significant, with a significance threshold of 0.05. Values below this threshold indicated a significant difference, whereas values above suggested no significant change. The N-gain analysis quantified the degree of improvement by comparing pretest and posttest scores relative to the ideal maximum score.

3. RESULTS AND DISCUSSION

This study aims to develop flipbook-based learning media that carries the theme "Waste Recycling" and applies the Problem Based Learning (PBL) model in an effort to improve students' understanding of explanatory texts. The focus of the study was on fifth grade students of Elementary School Nongkosawit 01, Semarang City. Thus, this study is structured according to three research objectives, namely (1) Design; (2) Validation/feasibility test results; (3) Effectiveness test results. Can be explained below.

3.1. Design

This research activity was carried out through several systematic stages, including media design planning, validation by experts, small and large scale trials, to analysis of the effectiveness of using flipbooks on students' understanding of explanatory text material. The problems encountered at Elementary School Nongkosawit 01 Semarang City were low understanding abilities in students, the use of conventional learning models that focused more on lecture methods, lack of awareness of the surrounding environment, and lack of learning resources that interested students, resulting in only 51.62% of 30 students achieving a score above the Learning Objective Achievement Criteria (KKTP) set by the school, which was 70. The researcher provided a solution to this problem to teachers and students according to their needs by developing recycled waste flipbook media based on the Problem Based Learning (PBL) learning model. The development of flipbook media is adjusted to the needs of teachers and students/ the following are the results of the recapitulation of the needs of teachers and students for flipbook media to understand explanatory text.

Table 3. Recapitulation of Teachers' Needs for Flipbook Media Understanding Explanatory Texts

No.	Category	Percentage (%)
1	The need for media	14.6%
2	Media effectiveness	30.7%
3	Expectations for the media	35.1%
	Mean	80.05%

Based on table 3 regarding the results of the recapitulation of the teacher needs questionnaire, it shows a mean or total of 80.05% where in the learning process according to student needs that learning explanatory text material requires suitable media to achieve the learning objective of understanding explanatory text. The media developed must also be in accordance with the capacity of student needs from accessing it, using it, until students understand the contents of the material. It can be concluded that teachers need media or other technology-based tools to increase innovation in the learning process.

Table 4. Recapitulation of Students' Needs for Flipbook Media to Understand Explanatory Texts

No.	Category	Percentage (%)
1	Students' initial understanding.	20.39
2	The need for media	27.05
3	Learning methods	35.45
	Mean	82.89

Based on table 4 regarding the recapitulation results of the student needs questionnaire, it shows a mean of 82.89% that students have difficulty understanding explanatory texts in the Indonesian language learning

content and need media in the form of digital teaching materials which can later be accessed on students' cellphones easily so that the learning process provides an active and enjoyable atmosphere. So it can be concluded that students' responses to the need for media as a learning support, namely this learning media is designed with bright colors and equipped with images according to the theme.

It can be concluded that the results of the analysis of the needs of students and teachers above, researchers developed flipbook media to understand explanatory text. Before continuing the design process, researchers made a flipbook media design to understand explanatory text. Then after designing the media through the application, exporting the design or designing the media through the flipHtml 5 web to change the file into an electronic book. The following is a picture of the media design and the results of media development.

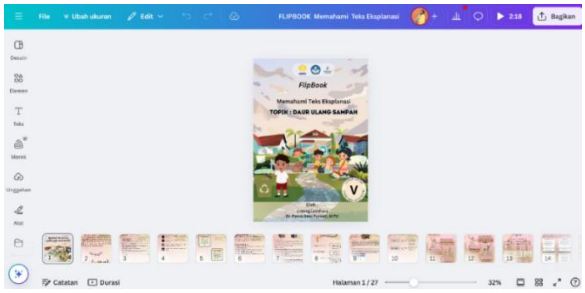

Figure 1. Flipbook media planning understands explanatory text on the Canva application

Figure 2. Flipbook media development understands explanatory text on the flipHtml5 web

In developing this design, the researcher used the Canva application for the visual arrangement process and flipbook display, as well as the FlipHTML5 platform as a digital publishing media that allows flipbooks to be accessed interactively. The design of this learning media was designed by considering the principles of effective learning design, such as clarity of content, layout efficiency, ease of navigation, and responsiveness to various digital devices, both smartphones, tablets, and computers. The flipbook media design developed contains explanatory text content that is integrated with local wisdom issues, namely regarding waste recycling. The learning materials in this flipbook are arranged systematically by referring to the structure of the explanatory text, namely general statements, explanatory sequences, and conclusions. The flipbook structure is divided into three main parts [31]. The pre-content section includes elements such as an attractive cover, table of contents, instructions for using the flipbook, and learning objectives. The content section contains the main material consisting of the definition of explanatory text, structure and linguistic characteristics, and various examples of explanatory texts based on local phenomena. This material is presented in the form of a combination of text, visual illustrations, and short interactive videos to make it interesting and easy for students to understand. Next, the post-content section contains a summary of the material, practice questions based on high-level thinking skills (HOTS), and learning reflections to evaluate students' understanding independently [32].

3.2. Validation/Feasibility Test Results

After the design process is complete, the flipbook is then validated by experts to measure the feasibility of the content, presentation, visual appearance, and language aspects. Validation was carried out by two expert lecturers in the field of learning media and elementary school teachers who understand student characteristics and curricular needs. The results of the recapitulation of Material Experts and Media Experts on the presentation of the flipbook can be seen in the table below.

Table 5. Recapitulation of Media and Material Validation Results for Flipbook Presentation

Expert	Total score	Maximum score	%	Criteria
Media	63	68	93	Very worthy
Material	111	116	95	Very worthy

Based on table 5 shows the validation results that in terms of the feasibility of presentation and language in the flipbook. The feasibility of presentation or media carried out by Mrs. A, a lecturer in the Elementary School Teacher Education study program, Semarang State University, got a score of 93.00% which is included in the very feasible category, while the feasibility of language or material carried out by Mrs. Dr. S, a lecturer at the Elementary School Teacher Education Department, Semarang State University, received a score ofof 95.00% which is included in the very feasible category. All scores from the validation results indicate that the developed flipbook is very feasible to be used as a learning medium, especially in explanatory text material for elementary school students. Based on the assessment of media and material experts on the development of flipbook media, understanding explanatory text using the Problem Based Learning learning model can be continued to the next stage with revision. The following is a design revision that has been assessed based on the opinions of experts.

Figure 3. Design Revision from Material Experts and Media Experts

3.3 Effectiveness Test Results

Furthermore, the effectiveness test of flipbook media was conducted in two stages, namely small-scale trials and large-scale trials. The small-scale trial involved 6 students as initial subjects to obtain initial responses to the developed flipbook and evaluate the suitability of the content and appearance to user characteristics. Meanwhile, the large-scale trial involved all 30 fifth-grade students of Elementary School Nongkosawit 01. The KKTP set by the school is 70. In this process, pretest and posttest instruments were used to measure students' understanding of the explanatory text material before and after using flipbooks, as well as questionnaires to obtain student and teacher response data. The following are the pretest scores obtained in the small-scale trial.

Table 6. Small Scale Pretest Score Results

Value Range	Category	Number of Students	Total Value	Information	Criteria
90 - 100	A	-	-	Highest score: 67	Not enough
80 – 89.9	B	-	-	Lowest score: 42	
70 – 79.9	C	-	-	Total value: 326	
0 – 69.9	K	6	326	Mean : 54.33	

Based on the small-scale pretest score data for understanding explanatory texts, it is known that before using flipbook media to understand explanatory texts, the average pretest score obtained by students was 54.33 with a less than adequate category. In this case, no students obtained a score above the KKTP. This shows the level of student understanding before being given treatment using media. After knowing the average results of students' pretest scores, the next step is to find out the average posttest scores of students after being given media treatment. The following are the posttest scores obtained in the small-scale trial.

Table 7. Small Scale Posttest Results

Value Range	Category	Number of Students	Total Value	Information	Criteria
90 - 100	A	2	185	Highest score: 95	Good
80 – 89.9	B	2	169	Lowest score : 75	
70 – 79.9	C	2	151	Total value: 505	
0 – 69.9	K	-	-	Average: 84.16	

The results of the analysis showed that the average student score in the pretest was 54.33%, while in the posttest it increased to 84.16%, resulting in an increase of 20.85%. This increase indicates that the use of flipbook media has a positive effect on improving students' understanding of the structure and content of explanatory texts. Thus, the use of flipbook media can be said to be statistically effective. After knowing the average pretest and posttest scores for understanding explanatory texts, a response questionnaire was filled out to determine whether or not the media was suitable for use on a large scale. The following are the results of the student response questionnaire.

Table 8. Student response results

Object	Score
Media Display and Design	10
Learning effectiveness	12
Material Suitability	12
Portability	24
Total Score	58
Maximum Score	66
Presentation	87.88%
Category	Very Good

Based on the results of the questionnaire, students' responses to the use of flipbook media were also very positive. Based on the results of the questionnaire, as many as 87.88% of students stated that this media really helped them understand explanatory texts more easily and enjoyably. Students feel more interested in learning because of the combination of visuals, texts, and designs presented in flipbooks, as well as interactive practice questions. In addition, teachers also gave similar responses. They considered that flipbook media was very helpful in the learning process because it was more interesting, flexible, and able to link teaching materials to real contexts that were close to students' lives. Teachers also felt helped because they did not need to rely entirely on textbooks provided by the government, and could more freely deliver materials with media that suited students' needs. The suggestions given by teachers regarding flipbook media in understanding explanatory texts are as follows.

Figure 4. Design Revision From Teacher

From the design revision carried out by the teacher, the response provided a response, namely in the content section of the material so that it is neatly arranged so that students who want to read it can more easily and understand the contents of the material of the explanatory text structures. After the design revision was carried out by the teacher and the success of the trial on a small scale, the researcher continued his research on a large scale. The following are the results of the large-scale pretest and posttest scores in the table below.

Table 9. Large Scale Pretest Results

Value Range	Category	Number of Students	Total Value	Information
90 - 100	A			Highest score: 82
80 – 89.9	B	4	324	Lowest score : 30
70 – 79.9	C	2	142	Total value: 1649
0 – 69.9	K	24	1183	Average: 54.96

Based on table 9, the large-scale pretest data shows that before using flipbook media, understanding explanatory texts obtained an average of 54.96% with a less category. From these data, only 6 students out of 30 obtained scores above the KKTP. This shows the level of student understanding of explanatory text material before being given treatment using media.

Table 10. Large Scale Posttest Results

Value Range	Category	Number of Students	Total Value	Information
90 - 100	A	5	467	Highest score: 98
80 – 89.9	B	9	757	Lowest score: 70
70 – 79.9	C	16	1214	Total value: 2438
0 – 69.9	K			Average: 81.26

Based on table 10, the data presented regarding the results of the large-scale posttest shows that after using flipbook media, 81.26% were in the good category. The data values show a significant increase compared to the pretest values before being given media treatment.

The results of the small and large scale pretest and posttest showed a significant increase in understanding of the explanatory text. This increase reflects the effectiveness of the media that not only conveys material visually and verbally, but also involves students in the process of critical and exploratory thinking. After knowing the pretest and posttest values from the small and large scales, the researcher tested the effectiveness of a media measured through the N-Gain test and T-test to determine the effectiveness of the flipbook quantitatively [33]. The results of the N-Gain test and T-test from the small and large scale pretest and posttest values can be seen below.

Table 11. N-Gain and T-test

	Requirement	Conclusion
T-Test	0.000 (sig 2-tailed)	Significant
N-Gain	0.5606	Moderate

Based on the results of the N-Gain test and the T-test using SPSS version 23, quantitative data is shown in Figures 4 and 5 that the average N-Gain value is 0.65, which is categorized as a moderate increase because it has a value of 0.5606, which can be seen from the N-Gain 0.5406.≤ 0.7. It can be said that the use of flipbooks has a positive impact on students' ability to understand explanatory text material, although the students' initial level of understanding varies. Furthermore, a Paired Sample T-test was conducted which showed a significance value of 0.000 ($p < 0.05$), which can be said that there is a difference between the pretest and posttest results. So, statistically it can be concluded that the use of flipbooks based on Problem Based Learning (PBL) is effective in improving students' understanding of explanatory texts.

This research has a significant contribution in the development of digital learning media, especially in learning Indonesian at the elementary school level. The media developed by the researcher is also adjusted to the needs of students and teachers as seen from the needs questionnaire which shows that learning to understand explanatory texts is still relatively low. Several problems encountered, the researcher found a solution to the problems experienced by grade V students by developing media in the form of flipbooks which are the basis for teaching materials with the topic or theme of waste recycling based on the Problem Based Learning (PBL) model [34]. Based on the questionnaire data distributed after the learning process, 92% of students stated that flipbooks made them more interested and easier to understand the explanatory text material. Through the responses of students who enjoyed learning with the media, they found it easier to absorb information when the material was presented in visual form and given space to practice independently. Elements in visual media such as attractive colors, recycling illustrations, and page animations make the learning process more enjoyable and less boring. The characteristics of fifth grade students who tend to prefer visual and fun learning approaches, this is able to bridge or meet students' needs by providing learning experiences that suit their learning styles, especially for visual and audio-visual students. Not only students, teachers involved in the flipbook implementation process also gave positive responses. Based on the results of interviews and questionnaires, teachers stated that flipbook

media is very helpful in delivering explanatory text material in an interesting, effective, and contextual way [35]. Teachers consider that this media makes students more active in learning, not easily bored, and able to learn independently or in groups. This is because many teachers have so far relied on conventional textbooks from the government which are textual and tend to be monotonous [36].

The development of flipbook media with the theme of waste recycling is designed as an interactive learning media that combines important elements in understanding explanatory texts, such as definitions, structures, and adding local context in the form of waste management issues that are relevant to the environment around the school [37]. This approach is very appropriate for the characteristics of elementary school students who tend to understand material more easily when given through real examples close to their lives, namely using the Problem Based Learning (PBL) approach to help achieve the learning objectives of Indonesian language content in explanatory text material that allows students to observe phenomena, analyze information, and solve problems related to real issues such as waste recycling, then connected to explanatory texts using flipbook media. The approach used in the development of this flipbook is the main foundation in a pedagogical approach that can encourage collaborative and real-world problem-based learning. This flipbook is considered a superior alternative material compared to textbooks which tend to be rigid and less contextual [38]. In addition, the use of flipbooks encourages teachers to be more open to innovation and technology in learning, as well as improving their digital literacy which is an important part of the independent curriculum. The implementation of the model is realized concretely through five main syntaxes, namely student orientation to the problem, organizing students to learn, guiding in investigating problems, developing and presenting results, and analyzing and evaluating the learning process. The implementation of the material uses media by presenting the phenomenon of waste as a real environmental issue that is close to students' lives, then directed to observe and analyze information from the available explanatory text. The next stage is that students are given space to investigate further through various exploration activities, such as finding text structures and concluding information. The last stage of this process ends with working on reflections or questions available in the flipbook.

The feasibility of a media can be known based on the validation results by two experts, namely media experts and material/language experts. The results of the assessment by the experts stated that this flipbook is theoretically feasible, but also shows that this media is applicable in real learning practices in the classroom. The presentation of the material is very good, because the flipbook conveys information directly, which invites students to think, ask questions, and reason through various learning activities. Meanwhile, from the presentation of the media, there are complete features such as instructions for use, clear learning objectives, and student activities, namely practice questions and reflections. This media is very helpful for teachers and students from a visual aspect, attractive illustrations, clean layouts, and color combinations that are comfortable for students' eyes. This attractive appearance also plays a role in increasing student attention and making it easier for them to understand the teaching material [39]-[42]. In addition, the use of language has been adjusted to the character of school students, namely using simple, communicative, and easy-to-understand sentences. Meanwhile, the feasibility of a media can be said to be quite feasible and effective in the learning process, namely the work on pre-test and post-test questions worked on by students from a small and large scale.

The integration of the Problem Based Learning (PBL) model has been proven to encourage active student involvement in learning. Students not only read and understand the text, but also go through the process of scientific thinking, formulate solutions, and express their understanding in writing. Moreover, this approach is the basis for learning that has a major influence on improving students' understanding of explanatory texts. This finding is in line with previous research which states that interactive learning media can provide better learning outcomes than conventional or concrete media. This study also provides theoretical, practical, and pedagogical implications. (1) Theoretically, this study strengthens the study that digital media that is designed visually, interactively, and contextually can improve student understanding. Flipbooks, which are a combination of text, images, and exploratory activities, support the theory of constructivism which explains that helping students in their knowledge through meaningful learning experiences. This is in line with Piaget's view which emphasizes the importance of active interaction in the thinking process. (2) Practically, it provides a gradual solution to the problems of understanding explanatory texts. Flipbooks make solutions as alternative teaching materials or sources of enrichment that support students' digital literacy. (3) Pedagogically, flipbooks help change the role of teachers from information centers to facilitators. And also help students in strengthening high-level thinking skills (HOTS), as well as encouraging the dimensions of the Pancasila student profile.

It can be emphasized that the research on the development of flipbooks based on Problem Based Learning (PBL) is able to significantly improve student understanding, encourage active student involvement, and become an innovative, applicable, and contextual digital teaching media. This flipbook supports the achievement of Indonesian language learning phase C in the independent curriculum while strengthening local wisdom values through the theme of waste recycling. In the era of 21st century learning, this media is a symbol of digital education transformation, as well as part of the school literacy movement and strengthening student character in more meaningful learning.

4. CONCLUSION

Based onThe results of the analysis of research data and development of flipbook recycling waste based on Problem Based Learning (PBL) include (1) The design of the flipbook media developed from the design and features in it is easy to understand and liked by teachers and students. The flipbook that was designed not only presents the material in an interesting and interactive way, but also integrates local wisdom values and fosters environmental awareness in students; (2) The flipbook media developed based on a feasibility assessment by expert media validators and expert material validators who obtained the criteria "Very Feasible", with a percentage of 93% in the feasibility component of media development design and a percentage of 95% in the feasibility component of material in media development. (3) The flipbook media developed based on the results of the product effectiveness test is proven by an increase in the small scale of 84.16 while the large scale is 81.26 which is included in the good and feasible category. Thus, this research contributes to the development of science, especially in the field of developing digital-based learning media that is relevant to the local context and the needs of 21st century students and it can be concluded that this research is effective in improving students' understanding of explanatory texts. The approach taken in this research also provides space for students to think critically, solve real problems, and learn independently and in groups.

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