



Validity of the Development of Problem Solving Oriented Electronic Booklet (E-Booklet) Teaching Materials for Class V Students

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ABSTRACT: Penelitian ini bertujuan untuk meningkatkan validitas bahan ajar elektronik booklet (e-booklet) berorientasi pemecahan masalah pada pembelajaran IPA kelas V di sekolah dasar. Jenis penelitian yaitu penelitian pengembangan dengan menggunakan model ADDIE yang terdiri dari tahapan analisis, desain, pengembangan, implementasi, dan evaluasi. Subjek dalam penelitian ini yaitu peserta didik kelas V sebanyak 25 orang. Instrumen yang digunakan yaitu lembar validasi ahli materi dan media. Teknik analisis data dilakukan untuk melihat tingkat validitas dari bahan ajar elektronik booklet (e-booklet) berorientasi pemecahan masalah. Berdasarkan analisis data pengisian instrument uji ahli menunjukkan bahwa lembar validasi media dan materi dinyatakan layak atau valid dengan tingkat validitas sebesar 1 yang berada pada kriteria sangat tinggi.

Abstrak: This research aims to increase the validity of problem solving-oriented electronic booklet (e-booklet) teaching materials in fifth grade science learning in elementary schools. The type of research is development research using the ADDIE model which consists of analysis, design, development, implementation and evaluation stages. The subjects in this research were 25 class V students. The instruments used were material and media expert validation sheets. Data analysis techniques were carried out to see the level of validity of problem-solving oriented electronic booklet (e-booklet) teaching materials. Based on data analysis of filling out expert test instruments, it shows that the media and material validation sheets are declared feasible or valid with a validity level of 1 which is in the very high criteria.

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INTRODUCTION

The national education system in the 21st century faces various challenges in preparing the nation's next generation who have creativity and quality (Nuragnia et al., 2021). 21st century learning is a learning transition where the curriculum currently being developed requires a change in approach that is student-centred (Asari, 2021). The demands for changes in human thought patterns in the 21st century demand very big changes in national education, we know that our education is a legacy of the old education system whose content was just memorizing facts without meaning (Solehudin et al., 2022). Teachers are required to keep up with the times because education is a very important aspect for forming a more advanced society and is a strong driver for producing quality future generations (Arviansyah & Shagena, 2022). As mandated in Law Number 20 of 2003,

concerning the National education system, the implementation of education is expected to shape and realize the personal qualities of students as future generations (Depdiknas, 2003).

The use of technology tends to help and facilitate the acceleration of every activity. Thus, in the learning process, it can encourage and facilitate independence in learning, develop students' skills, as well as change conventional learning patterns and provide learning opportunities according to ability (Sari et al., 2020). Science learning is learning that emphasizes providing direct experiences that discuss nature and events that occur in nature based on a series of scientific processes that are built on a scientific attitude and the results are in the form of scientific products, also often called science. (Pratiwi & Cari, 2019). Science is learning to scientifically discuss nature based on a collection of facts, concepts, theories and laws (Sudarto et al., 2023). Science learning content material is seen as the initial stage to provide skills so that students are able to think critically, creatively, logically and take the initiative in dealing with various issues in society caused by developments in technology and science (Nida et al., 2021). It can be concluded that science is scientific learning that discusses nature based on a collection of facts, concepts, theories and laws and emphasizes providing direct experience. Science learning content material is seen as the initial stage to provide skills so that students are able to think critically, creatively, logically and take the initiative in dealing with various issues in society caused by developments in technology and science.

According to Magdalena dan Tarigan (2023) Teaching materials can be interpreted as materials or subject matter that are prepared completely and systematically based on the learning principles used by teachers and students in the learning process. Teaching materials are systematic, meaning they are arranged sequentially so that it makes it easier for students to learn. Besides that, teaching materials are also unique and specific, unique means that teaching materials are only used for certain targets and in certain learning processes, and specific means that the content of teaching materials is designed in such a way only to achieve competency. specific targets. E-booklets are digital booklets that contain information and are accessed using electronic devices such as smartphones and laptops to make them more practical to use and store (Liyawindari et al., 2023). The e-booklet contains material that is packaged concisely, attractively and is equipped with lots of pictures (Solihatin et al., 2020). Apart from that, booklets can also help students develop further learning outcomes (Nuriyah et al., 2020).

According to Sopin dan Sanrattana (2023) Problem solving is a thought that is directed directly to determining a solution or solution to a specific problem. According to Hastuti (2022) Problem solving as an attempt to find a way out of a difficulty or problem. Fitriyah dan Ramadani (2021) Problem solving is useful for determining which information is acceptable and which information is unacceptable, so as to be able to distinguish which information is trustworthy and which is not worthy of being trusted. Problem solving abilities are very much needed in everyday life.

The solution is to use technology-based teaching materials, namely E-Booklets as a source of teaching materials in this research because E-booklets have the advantage that these learning materials are quite practical, can display interesting pictures, can add related videos to YouTube so that participants students more easily understand the learning material (Novita, et.al., 2024). With the availability of facilities and infrastructure in schools that can strengthen the learning process, namely the availability of projectors, wifi, and students who have cellphone devices. So teachers can distribute teaching materials to students via the internet network which students can access at any time via electronic devices such as smartphones and laptops. With teaching materials, teachers must be able to design and make learning more meaningful. So that teaching and learning activities are more effective and learning objectives can be achieved. This is reinforced by several theoretical studies and previous research sources which explain that using e-Booklets can arouse students' interest so that students can learn effectively and develop further learning outcomes.

RESEARCH METHOD

This research is development research using the ADDIE development model. The ADDIE model is an abbreviation (Analyze, Design, Develop, Implement, and Evaluate) (Zhang, 2024). The test subjects in this research were 25 class V students. The instrument used in this research is a validation sheet which has been tested by a validator to see the level of validity of the problem-solving oriented electronic booklet (e-booklet) teaching materials developed. To calculate the validity of validation sheet using the formula Gregory Furthermore, the categorization used is that the first category is not relevant (score 1) and less relevant (score 2) which are re-categorized into the weak

relevance category, and the second category for those which are quite relevant (score 3) and very relevant (score 4) is created as a new category of relevance. strong. The validation testing stage uses the Gregory test by 2 experts, namely material and media experts. The Gregory test validation criteria can be seen in the table below:

Table 1. Gregory Test Validation Criteria

No	Score	Validation Criteria	English Translation
1	0.8 - 1.0	Very High Validation	Very High Validation
2	0.6 - 0.79	High Validation Moderate	High Validation
3	0.4 - 0.59	Validation	Moderate Validation
4	0.2 - 0.39	Low Validation	Low Validation
5	0.00 - 0.19	Very Low Validation	Very Low Validation

The data analysis technique for practicality is to provide response questionnaires to teachers and students and then give a score for the respondents' answers. The teacher's response questionnaire contains statements that are described according to the answers to the statements. Calculate the percentage of each component using the following formula:

$$P = \frac{\sum x}{\sum xi} \times 100$$

Information:

P = Score Percentage

$\sum x$ = Total value of respondents' answers to an item

$\sum xi$ = Total ideal score

Next, test the practicality using interpretation (Arikunto, 2012) with the practicality test table, it is declared practical to use in this research if the minimum level of practicality is in the high category. as follows:

Tabel 2: Kriteria kepraktisan produk

Persentase (%)	Criteria
25-50	Not practical
51-70	Quite practical
71-80	practical
81-100	Very practical

The level of effectiveness of the product in the form of electronic booklet (e-Booklet) teaching materials is carried out by giving a test (pre-test) to students at the beginning before using the e-booklet to determine students' initial knowledge regarding the material " My Dear Earth, My Unfortunate Earth" and after using it. e-booklet (post-test) to determine the increase in student learning outcomes after using electronic booklet teaching materials in the science subject Chapter 8 "Bumiku Sayang, Bumiku Malang". The data analysis technique in this research uses the N-gain test to see the increase in learning outcomes by using booklet electronic teaching materials to increase science learning outcomes (Sukmawati, Salmia, 2023).

The pre-test and post-test results were then tested using the N-gain formula. According to Hake (1998) the formula is:

$$g = \frac{(Sf - Si)}{(100 - Si)}$$

Information:

g = N-gain

Sf = Value of the final score (post-test)

Si = Value of initial score (pre-test)

100 = The value of the maximum score

Table 3: N-gain Assessment Criteria

No	Score	Criteria
1.	$g > 0,7$	Tall
2.	$0,3 \leq g \leq 0,7$	Currently
3.	$g < 0,3$	Low

FINDINGS AND DISCUSSION

Finding This research uses the ADDIE Model, with the stages of Analysis, Design, Develop, Implementation, and Evaluation. Based on the research conducted, the following research results were obtained:

1. Analysis Results

At this stage, what is carried out is to carry out needs analysis, curriculum analysis, and analysis of student characteristics. The results obtained at this stage are as follows:

a. Results of Needs Analysis

At the needs analysis stage, the objective is to what extent Natural Sciences (Science) learning in class V SD Inpres Macciniayo is implemented. At this stage the researcher carried out observations with the class teacher, namely collecting information about what learning tools needed to be developed

b. Curriculum Analysis Results

At the curriculum analysis stage, researchers studied the curriculum used, namely the Merdeka Curriculum. At the analysis stage, the curriculum is adjusted to students' interests and learning needs using Learning Objectives (TP) which students must achieve by studying the material provided.

c. Results of Analysis of Student Characteristics

Analysis of student characteristics is a stage used by researchers to find out about the characteristics of students in accordance with the development design of the teaching materials that will be developed.

2. Design Results

a. Preparation of the Framework for E-Booklet Teaching Materials

The preparation of the teaching material framework is based on the Learning Objectives Flow (ATP) for grade V Elementary School Science. The initial part of the teaching materials contains the cover, foreword, table of contents, how to use the Booklet electronic teaching materials, and learning objectives. The contents section contains the contents of teaching materials which are equipped with learning videos, LKPD and crossword games. At the end contains a glossary and bibliography.




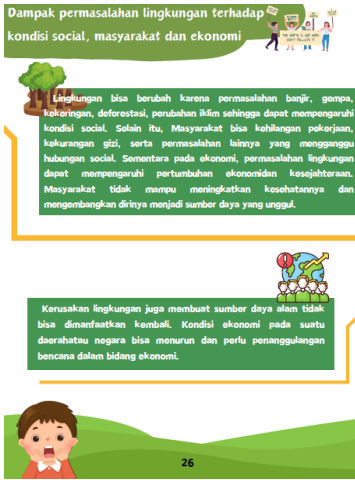
b. Design Preparation

Design preparation includes the beginning, content and end

3. Development Results

a. Instrument Validation Assessment Results

Validation is carried out to determine the suitability of a research instrument. The validation data was obtained from one material expert and one learning media expert. As for the validation results, the validity analysis based on instrument filling data by the validator shows that the booklet electronic teaching materials in the Bumiku Sayang, Bumiku Malang material are rated with a score of 1, namely "very high material validation", validity analysis based on instrument filling data by the validator shows that the electronic teaching materials The material booklet "Bumiku Sayang, Bumiku Malang" was assessed with a score of 1, namely "very high media validation". Revisions were made based on suggestions and input from material experts and learning media experts. Below are presented the results of the revision of problem-solving oriented electronic booklet (e-booklet) teaching material products.

No	Validator Suggestions	Revision	
1.	It is best to give color to consider the contrast	 <p style="text-align: center;">Before revision</p>	
	It is recommended that the font size in the first and second paragraphs be enlarged.		

4. Implementation Results

The fourth stage of the ADDIE model is the implementation stage. After being declared feasible by the validator, problem solving-oriented electronic booklet (e-booklet) teaching materials are implemented in the classroom. 25 students participated in this stage and held 8 meetings in class V for 3 lesson hours (3x35 minutes).

Table 4. Calculation of N-Gain Score

	Post-Test	Pre-Test	Post-Pre Test (sf-si)	Skor Ideal 100-Pre-test	N-gain Score	Category
Amount	2165	1215	950	1285	18.30	
Average	86.6	48.6	38	51.4	0.73	Currently

Based on the table above, there is an increase in student learning outcomes using problem solving-oriented electronic booklet (e-booklet) teaching materials, as shown by the results of the N-

gain analysis calculations. The pre-test results obtained an average score of 48.6 and after students used problem-solving oriented electronic booklet (e-booklet) teaching materials, student learning outcomes experienced an increase, namely obtaining an average score from the post-test results of 86.6. The overall N-gain value of 0.73 is in the high category. Thus, this shows that learning using problem-solving oriented electronic booklet (e-booklet) teaching materials meets the effectiveness aspect.

5. Evaluation Results (Assessment)

The fifth stage of the ADDIE model is the evaluation or assessment stage. After the implementation stage is carried out, the next stage is the assessment of problem-solving oriented electronic booklet (e-booklet) teaching materials. At this stage, the evaluation stage is carried out at each development stage. This evaluation is a formative evaluation, because its aim is for revision needs. At the analysis stage, formative evaluation helps identify student needs, curriculum and student characteristics. At the design stage, formative evaluation helps design problem-solving oriented electronic booklet (e-booklet) teaching material products. At the development stage, formative evaluation helps obtain feedback or responses from respondents regarding problem-solving oriented electronic booklet (e-booklet) teaching materials. At the implementation stage, formative evaluation helps determine the effectiveness of the problem-solving-oriented electronic booklet (e-booklet) teaching materials that have been developed.

DISCUSSION

Based on data obtained through expert validation and product trials, levels can be explained of validity, practicality and effectiveness of electronic booklet (e-booklet) teaching materials towards solving problems. Data analysis aims to determine the suitability of problem-solving oriented electronic booklet (e-booklet) teaching materials for use in science learning Chapter 8 My Dear Earth, My Poor Earth. The results of the analysis are presented as follows:

1. Validity Level Data Analysis

Validity level data analysis aims to determine whether electronic booklet (e-booklet) teaching materials oriented towards problem solving are valid or not (Huang, 2024). Validity is obtained from validation by material experts and media experts through validation sheet instruments (Susanto, 2022). The results of material validation on problem solving-oriented electronic booklet (e-booklet) teaching materials obtained a score of 1 with very high material validation criteria, thus problem solving-oriented electronic booklet (e-booklet) teaching materials were declared valid and did not need to be revised (Herianto, 2022). Meanwhile, the results of learning media validation on problem solving-oriented electronic booklet (e-booklet) teaching materials obtained a score of 1 with very high media validation criteria, thus problem solving-oriented electronic booklet (e-booklet) teaching materials were declared valid and did not need to be revised (Kama, 2023). Based on data from validation results from material experts and learning media for problem-solving oriented electronic booklet (e-booklet) teaching materials in the science subject Chapter 8 Bumiku Sayang, Bumiku Malang, it can be concluded that the teaching materials that have been developed are declared valid and do not require significant overhaul and suitable for use as science teaching material in class V elementary school.

2. Data Analysis on the Practical Level of Teaching Materials

Data on product practicality levels were obtained from teacher response questionnaires and student responses in small group trials and large group/field trials. Teacher response data reached 100% in the "very practical" category, as well as student responses reaching 96.7% in the "very practical" category. These results indicate that the use of problem-solving oriented booklet electronic teaching materials meets the product practicality criteria (Rahmadani, 2023). Based on this, it can be concluded that problem-solving oriented electronic booklet teaching materials are "very practical" used as one of the science teaching materials.

The effectiveness of the teaching materials developed can be seen from the percentage of students' learning completeness, students' learning completeness can be seen from the students' post-test scores given at the evaluation stage (Jeavons, 2022). Student learning outcomes based on post-test results reached 86.6. The overall N-gain value of 0.73 is in the high category. Thus, this shows that learning using problem solving-oriented electronic booklet teaching materials has met the level of effectiveness (Pramashela, 2023). Based on the data analysis above, it can be concluded

that problem solving-oriented electronic booklet teaching materials are suitable for use as teaching materials that have valid, practical and effective qualities (Ha, 2023).

Booklet electronic teaching materials have helped a lot in solving problems faced by students. These teaching materials provide easy access (Geletu, 2022). Students can access material anytime and anywhere via electronic devices such as smartphones, tablets, or computers, this is very helpful, especially for students who have limited time or distance to attend face-to-face classes regularly with easy access, students can learn independently and repeat (Fazio, 2023). Booklet electronic teaching materials are designed with high interactivity, such as interactive quizzes, explanatory videos and interesting animations (Sujarwo, 2022). These features make learning more interesting and less monotonous, so that students are more motivated to learn (Abdi Budiningsih & Ardana, 2020). This interactivity also helps students understand complex concepts more easily, because students can view live illustrations or participate in interactive exercises. (Saxena, 2023) .

E-books provide flexibility in how students access and use learning materials (Lin, 2023) . Students can study anytime and anywhere, without being bound by time and place (Paulo, 2023). E-books are also usually equipped with a search feature that makes it easier for students to find the information they need quickly (Herianto, 2022). This of course helps in problem solving, because students can immediately look for answers or relevant concepts when they encounter difficulties.

CONCLUSION

Based on the results of product development and testing related to electronic teaching materials, the booklet (e-booklet) is problem solving oriented on the material "My Dear Earth, My Malang Earth", so the researcher concludes that:

Problem solving-oriented electronic booklet (e-booklet) teaching materials are declared feasible or valid because the validation results of solution-oriented electronic booklet (e-booklet) teaching materials from validators 1 and 2 obtained a score of 1 with very high criteria. These results indicate that the material and media validation sheet was declared feasible and valid with very high criteria. Problem solving-oriented electronic booklet (e-booklet) teaching materials were declared practical because two indicators were achieved, namely teacher responses reaching 100% in the "very practical" category, as well as student responses reaching 96.7% in the same category. These results indicate that the use of problem-solving oriented booklet electronic teaching materials meets the product practicality criteria. Problem solving oriented electronic booklet (e-booklet) teaching materials were declared effective because after students used problem solving oriented electronic booklet (e-booklet) teaching materials, students' learning outcomes experienced an increase, namely obtaining an average score from the post-graduate results. test was 86.6. The overall N-gain value of 0.73 is in the high category.

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