



Development of Indonesian teaching materials based on thematic learning model to improve higher order thinking and numeracy literacy of elementary school students

(Pengembangan bahan ajar bahasa Indonesia berbasis model pembelajaran tematik untuk meningkatkan higher order thinking dan literasi numerasi siswa sekolah dasar)

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Abstract: Improving Higher Order Thinking and numeracy literacy of elementary school students is indispensable in facing the challenges of 21st century education. The goal of this study is to Indonesian teaching materials based on a thematic learning model designed to strengthen these two skills in elementary school students. This study uses a research and development (R&D) approach with a 4-D model, namely Define, Design, Develop, and Disseminate. The subjects of this study include fourth grade students of SD Thomas Alva Edison Medan. The data collection method in the study uses questionnaires, questionnaires are used to analyze student needs, product validity tests by experts, and product trials. The analysis technique used in this study is quantitative descriptive. The results of the study show that the teaching materials developed are valid and effective, as evidenced by a percentage of 83% with a good category from material experts. The results of the validity test from teaching material design experts showed a percentage of 85% with a good category. The results of the validity test from linguists showed a percentage of 90% with a very good category. The results of the effectiveness test conducted in individuals and small groups showed that the percentage of effectiveness of individuals was 90% with the very good category and the small group was 94% with the very good category. This shows that the teaching materials developed have excellent effectiveness. The results of this study prove that Indonesian teaching materials designed with a thematic approach have great potential in supporting more integrated and contextual learning.

Keywords **High-level thinking skills, Indonesian teaching materials, Literacy & numeracy, Thematic**

Abstrak: Peningkatan keterampilan berpikir tingkat tinggi (Higher Order Thinking) dan literasi numerasi siswa sekolah dasar sangat diperlukan dalam menghadapi tantangan pendidikan abad ke-21. Penelitian ini bertujuan mengembangkan bahan ajar bahasa Indonesia berbasis model pembelajaran tematik yang dirancang untuk memperkuat kedua keterampilan tersebut pada siswa sekolah dasar. Penelitian ini menggunakan pendekatan penelitian dan pengembangan (R&D) dengan model 4-D yaitu Define, Design, Develop, dan Disseminate. Subjek penelitian ini meliputi siswa kelas IV SD Thomas Alva Edison Medan. Metode pengumpulan data dalam penelitian menggunakan kuesioner, kuesioner digunakan untuk menganalisis kebutuhan siswa, uji validitas produk oleh ahli, dan uji coba produk. Teknik analisis yang digunakan dalam penelitian ini adalah deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa bahan ajar yang dikembangkan valid dan efektif, yang dibuktikan dengan persentase sebesar 83% dengan kategori baik dari ahli materi. Hasil uji validitas dari ahli desain bahan ajar menunjukkan persentase sebesar 85% dengan kategori baik. Hasil uji validitas dari ahli bahasa menunjukkan persentase sebesar 90% dengan kategori sangat baik. Hasil uji efektivitas yang dilakukan dalam pada individu dan kelompok kecil menunjukkan bahwa persentase efektivitas individu sebesar 90% dengan kategori sangat baik dan kelompok kecil sebesar 94% dengan kategori sangat baik. Hal ini menunjukkan bahwa bahan ajar yang dikembangkan memiliki efektivitas yang sangat baik. Hasil penelitian ini membuktikan bahwa bahan ajar Bahasa Indonesia yang dirancang dengan pendekatan tematik memiliki potensi besar dalam mendukung pembelajaran yang lebih terintegrasi dan kontekstual.

Kata Kunci **Bahan ajar Bahasa Indonesia, Kemampuan berpikir tingkat tinggi, Literasi & numerasi, Tematik**

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INTRODUCTION

Education is the main foundation in forming an intelligent, critical, and innovative generation. In today's global context, students are not only required to master basic skills, but also higher-order thinking skills (HOTS) (Tindangen, 2018), and literacy which includes aspects of numeracy and basic literacy (Suprawata & Riastini, 2022). These skills are essential to prepare students for the challenges of an increasingly complex and dynamic future. However, in reality, the results of several educational surveys, such as PISA (Programme for International Student Assessment) and other national surveys, show that the ability of Indonesian students, especially at the elementary school level, in literacy, numeracy, and critical thinking is still relatively low (Utomo et al., 2019).

As the primary subject in elementary school, Indonesian plays a crucial role in enhancing both literacy and numeracy skills (Hastuti et al., 2019). This subject is not only a means to develop language skills, but also a medium to introduce students to various concepts of critical, analytical, and solutive thinking (Rahmat et al., 2022). The development of learning methods has led to the introduction of the thematic learning approach as a solution to address the fragmentation of subjects at the elementary school level (Mulyani et al., 2022). Besides that, along with the setting up of the Independent Curriculum which focuses on thematic approaches and strengthening 21st century skills, the thematic learning model is one of the approaches that is considered to be able to integrate various disciplines in one learning (Setiawan et al., 2021). This model is expected to improve students' understanding of the concepts taught while relating them to real-world contexts (Ananda & Fadhilaturrahmi, 2018), which will ultimately support the improvement of students' Higher Order Thinking skills and numeracy literacy (Fauzan, 2024). Along with the development of learning methods, the thematic learning approach has been introduced as one of the solutions to overcome the fragmentation of subjects at the elementary school level (Mutiani et al., 2021). Thematic learning allows the integration of various concepts across subjects in one theme, so that students can read and understand the information in a more holistic and applicable way (Ridha et al., 2021). This approach is considered very effective in improving students' critical thinking skills because it challenges students to see the connections between concepts, as well as to relate learning to real life.

Looking into the growth of Indonesian teaching materials and thematic learning models is currently abundant, yet it primarily concentrates on fundamental skills like reading comprehension and writing. Studies that specifically combine Indonesian teaching materials with thematic learning models to develop Higher Order Thinking Skills (HOTS) and numeracy literacy at the elementary school (SD) level are rare. In addition, the development of teaching materials that focus on integrating content with thematic learning is also minimal, especially those that utilize innovative learning models to meet the demands of the curriculum and the digital era. Therefore, research is needed that is able to close this gap by designing teaching materials that are not only effective for thematic learning, but also improve students' higher-order thinking skills and numeracy literacy.

Several The studies that have already been done highlight the development of Indonesian learning media such as those conducted by Daniar et al., (2022); Chadijah (2023); Siregar & Bahri (2021); Zakiyah et al., (2022); Amalia & Silalahi (2021); Widodo (2022); Hulu & Bawamenewi (2023) which reviewed the development of Indonesian learning media. Some research on thematic learning models conducted by Lestari et al., (2018); Hesti et al., (2022); Kurniawati & Mawardi (2021); Kunaini (2017); Sari (2018); Deswita & Amini (2022) which reviews the thematic approach carried out at the elementary to secondary school levels. Another study on Higher Order Thinking Skills (HOTS) was also conducted by Li et al., (2024); Purnomo et al., (2024); Mat et al., (2024); Ismail et al., (2024); Maclean & Bayley (2024), All of these studies emphasize how Higher Order Thinking Skills (HOTS) are one of the must-have skills in the 21st century. However, research that combines thematic learning models with the development of Indonesian teaching materials oriented to Higher Order Thinking

and numeracy literacy is still very limited. Many existing teaching materials have not fully utilized the potential of thematic approaches to develop these two skills. In fact, this integration can be an innovative solution in making Indonesian learning better at the elementary school level. These are the goals of this research: (1) to test the validity of Indonesian teaching materials based on the thematic learning model, and (2) to test the effectiveness of Indonesian teaching materials based on the thematic learning model. People think that the study's results will enhance understanding of the development of integrated teaching materials with thematic learning models, aimed at enhancing HOTS skills and numeracy literacy, particularly in the context of Indonesian education at the elementary school level.

METHOD

A research and development (R&D) method is used in this study to test and create products, especially teaching tools with a theme. The process follows the 4-D model, which includes four main stages: Define, Design, Develop, and Disseminate. At the Define stage, a needs analysis is carried out by examining the curriculum including CP, TP, and ATP, as well as textbooks to determine appropriate learning objectives. Curriculum analysis focuses on specific themes and subthemes, for example Theme 4 (Various Jobs) Subtheme 3 (My Parents' Work) Class IV Semester I.

In the Design stage, teaching materials are made according to the predetermined curriculum format and integrate HOTS-based content and numeracy literacy. The Developing stage includes evaluating the validity of the content and structure of teaching materials to ensure alignment with thematic learning. Observers, including teachers and researchers, fill out questionnaires and observation sheets to assess the practicality of teaching materials, while student learning activities measure their effectiveness. The Disseminate stage checks how well the teaching materials at SD Thomas Alva Edison Medan work. This is done by having experts check their validity and having users (students) try out the products. Questionnaires were used to collect data for the study. Questionnaires are used to find out what needs students, as well as product trials and validity tests by experts. Students try out products on their own and in small groups to make sure they work. A questionnaire is being used to gather information for this growth study. Following are some tables that show how the assessment tool for Indonesian training materials works: Table 1, 2, 3, & 4. The questionnaire was made using a test based on the Likert scale, which can be seen in Table 5.

Table 1
Expert Assessment Instrument for Teaching Materials

No	Aspects	Criterion	Expert	Percen	Category
1	Curriculum	How well teaching tools match up with learning goals			
		How well the teaching tools match the learning goals			
		How well the teaching tools fit with the learning goals			
2	Material	That the information fits the student's needs and interests			
		How much teaching information there is			
		The material does not contain gender bias			
		The material is better when it is taught with the right tools			
		The lessons are simple to understand			
		Teaching materials do not contain elements of sara			
		Teaching materials represent real-life contexts			
3	Evaluation	Teaching materials use the right and consistent language			
		How well the evaluation fits with the teaching tools			
		How well the level of difficulty of the problem matches up with the level of ability			
		The questions presented have accommodated the HOTS Questions			

(Source: Puspitasari, 2021)

Table 2
Assessment Instrument for Teaching Media Design Experts

No	Aspects	Criterion	Expert	Percen	Category
1	Technical	Ease of use of teaching materials			
		Materials for teaching can help students understand what they are learning			
2	Display	Materials used in the classroom can inspire children			
		Good display quality of teaching materials			
3	Texts of Teaching Materials	Harmonious and balanced display layout of teaching materials			
		Image clarity			
		How well the typefaces used in teaching tools are used			
		Correct use of font size in educational texts			
4	Picture	How well word spacing is used in teaching materials			
		How dense and brief the teaching tools are			
		The use of pictures in teaching tools helps students learn			
		How good the teaching tools are			
		Teaching material cover design quality			
		The quality of how the content of teaching tools is put together			

(Source: Puspitasari, 2021)

Table 3
Linguist Assessment Instrument

No	Aspects	Criterion	Expert	Percen	Category
1	Language Eligibility	Communicative			
		Dialogical and interactive			
		Language compatibility with PUEBI			
		Clear use of terms and symbols			

(Source: Puspitasari, 2021)

Table 4
Tools for Individual and Small Group Tests

No	Aspect	Criterion	Score	Responden	Percentage	Category
	Display Design	Display of teaching materials				
		Readability of texts in teaching materials				
		Image clarity in teaching materials				
		Clarity of instructions for using links (Google Form & Youtube)				
	Material	It is simple to understand what is written in the training materials				
		Clarity of material descriptions in teaching materials				
		Teaching materials encourage students to learn				
		Materials used in the classroom help students understand it better				
	Evaluation	These teaching tools are fun to use				
		Clarity of instructions in every question				
		Questions are structured based on the material presented				
		The language in each question is easy to understand				

(Source: Puspitasari, 2021)

Table 5
Likert Scale

No	Score	Criterion
1	Score 1	Very Less
2	Score 2	Less
3	Score 3	Enough
4	Score 4	Good
5	Score 5	Excellent

(Darmadi, 2011)

The quantitative data analysis method is used in this study. The quantitative descriptive method is a way to look at data by putting numbers and figures in a planned way to draw broad conclusions (Agung, 2014). We got information from validation assessment questionnaires filled out by content experts, teaching material design experts, and linguists, as well as from individual test subjects' answers and small group tests. We then used quantitative analysis methods to look at the information. A formula will be used to figure out the percentage of each factor in the results of the tests given by experts and by test subjects themselves. The information gathered from figuring out the percentage of each questionnaire will be looked at to make decisions about the quality and usefulness of the teaching tools that were made. The rules shown in Table 6 are used to decide on the percentage of assessment results.

Table 6
Product Development Eligibility Criteria

No	Eligibility Criteria	Golongan	Product Quality Information
1	1 – 54	Very bad/Invalid	Remaking Product
2	55 – 64	Bad/Less Valid	Many Revision
3	65 – 74	Enough/Acceptable	Revised Sufficiently
4	75 – 89	Good/Valid	Less Revision
5	90 – 100	Very good/ Highly valid	No Revision

(Source: Tegeh & Kirna, 2010:83)

RESULTS AND DISCUSSION

The validity and effectiveness test of the development of Indonesian teaching materials based on a thematic learning model to improve elementary school students' ability to think critically and do math is shown in this part. The point of this study is to make sure that the training materials that are made are highly valid, both in terms of what they say and how they are presented, and that they can really help students get better at HOTS and math. As part of the validity test, experts look at the training materials and decide if they are appropriate in terms of content, design, and language. Also, the effectiveness test was done by looking at data from trials where students worked alone and in small groups. The outcomes of the effectiveness test were used to figure out how these teaching tools affected the learning process. The talk about these results will show how well the teaching tools meet the criteria for being valid and useful, as well as what these results mean for making learning better in elementary schools.

Results of Validation of Indonesian Teaching Materials Based on Thematic Learning Model

First, experts have to make sure that training materials are correct before they can be used. Validation is the process of making sure that the teaching materials are good by getting approval from people who are experts in the subject, designing teaching materials, and languages. The validation of the topic experts is done by two experts who know a lot about Indonesian subjects, especially those that are taught to elementary school students. The outcomes of verifying material experts, teaching material design experts, and linguists can be seen in Tables 7, 8, and 9.

Table 7
Expert Assessment Instrument for Teaching Materials

No	Aspects	Criterion	Exp		Percen	Category
			1	2		
1	Curriculum	How well teaching tools match up with learning goals	4	4	83%	Good
		How well the teaching tools match the learning goals	4	4		
		How well the teaching tools fit with the learning goals	4	4		
		That the information fits the student's needs and interests	4	4		
		How much teaching information there is	4	4		
2	Material	The material does not contain gender bias	4	4		
		The material is better when it is taught with the right tools	4	4		
		The lessons are simple to understand	4	4		
		Teaching materials do not contain elements of sara	4	4		
		Teaching materials represent real-life contexts	4	4		
		Teaching materials use the right and consistent language	4	4		
3	Evaluation	How well the evaluation fits with the teaching tools	5	4		
		How well the level of difficulty of the problem matches up with the level of ability	5	5		
		The questions presented have accommodated the HOTS Questions	4	5		

The two validators' scores on the teaching materials show that they have great topic validity. The study results show that 83% of the material experts were able to reach their goals. Indicators covering (1) curriculum, (2) material, and (3) evaluation yielded the results. These results show that the factors used to make the teaching materials are good. These study results make it even more clear that good learning materials are ones that can adapt to the different stages of cognitive growth that students are going through [Asdar & Barus, \(2023\)](#); [Novita et al., \(2023\)](#), and teaching materials that have content relevant to learning objectives that are in line with the Kurikulum Merdeka [Lathif & Suprpto, \(2023\)](#); [Gafari et al., \(2024\)](#), So that with such a presentation of teaching materials, students can easily understand the subject matter ([Audina et al., 2023](#); [Sarita et al., 2021](#)).

Table 8
Assessment Instrument for Teaching Media Design Experts

No	Aspects	Criterion	Exp		Percen	Category
			1	2		
1	Technical	Ease of use of teaching materials	4	4	85%	Good
		Materials for teaching can help students understand what they are learning	4	4		
		Materials used in the classroom can inspire children	4	4		
2	Display	Good display quality of teaching materials	4	4		
		Harmonious and balanced display layout of teaching materials	4	4		
		Image clarity	4	4		
3	Texts of Teaching Materials	How well the typefaces used in teaching tools are used	5	5		
		Correct use of font size in educational texts	4	4		
		How well word spacing is used in teaching materials	4	4		
		How dense and brief the teaching tools are	4	4		
4	Picture	The use of pictures in teaching tools helps students learn	4	4		
		How good the teaching tools are	5	4		
		Teaching material cover design quality	5	5		
		The quality of how the content of teaching tools is put together	4	5		

The experts who create teaching materials gave validation results of 85%. The results came from assessment criteria indicators that met good aspects, such as (1) technique, (2) display, (3) teaching material text, and (4) images. This percentage shows that the criteria for the teaching tools are good or valid. The results of this validation further support the statement that the attractive and

colorful appearance of teaching materials will further increase students' attention and interest in following the process of learning (Siregar & Bahri, 2021; Mat et al., 2024). In general, the attention and interest of students is one of the factors that can help people understand what they've been told better (Chadijah, 2023; Mat et al., 2024), so as to support the learning process carried out by teachers (Purnomo et al., 2024; Rahmat et al., 2022; Suprawata & Riastini, 2022).

Table 9
Linguist Assessment Instrument

No	Aspects	Criterion	Exp		Percen	Category
			1	2		
1	Language Eligibility	Communicative	5	4	90%	Excellent
		Dialogical and interactive	4	4		
		Language compatibility with PUEBI	5	5		
		Clear use of terms and symbols	4	5		

The validation results, as provided by two linguists, demonstrated a 90% success rate. The obtained percentage is based on criteria such as (1) communicative, (2) dialogical and interactive, (3) language compatibility with PUEBI, and (4) the use of clear terms and symbols. These results demonstrate that the teaching materials meet excellent criteria. In the language aspect, teaching materials have a very valuable and relevant role in helping students acquire language, especially elementary school students (Baz et al., 2024; Roehm & Angelovska, 2024). Good teaching materials are communicative, dialogical, and interactive, effectively conveying content to students while considering their cognitive level (Zhang et al., 2024; Yudinseva, 2024). This means that the teaching tools made are very helpful for teachers, students, and parents, making the learning process easier for everyone (Zakiyah et al., 2022; Puspitasari, 2021).

The Effectiveness of Indonesian Teaching Materials Based on a Thematic Learning Model

The answers students gave on surveys after trying out Indonesian teaching materials based on the thematic learning model on their own and in small groups show that the materials work. To find out how well Indonesian teaching tools based on thematic learning models worked, they were tested on individuals and in small groups. Students working alone and in small groups of 10 were the first to try out this Indonesian language training material based on the thematic learning model. Tables 10 and 11 show the results of the one-time and field tests.

Table 10
Test Instruments Used Individually

No	Aspect	Criterion	Score	Respond	Percen	Category
1	Display Design	Display of teaching materials	4	1	90%	Excellent
		Readability of texts in teaching materials	5			
		Image clarity in teaching materials	4			
		Clarity of instructions for using links (<i>Google Form & Youtube</i>)	5			
2	Material	It is simple to understand what is written in the training materials	5	1	90%	Excellent
		Clarity of material descriptions in teaching materials	5			
		Teaching materials encourage students to learn	5			
		Materials used in the classroom help students understand it better	5			
3	Evaluation	These teaching tools are fun to use	4	1	90%	Excellent
		Clarity of instructions in every question	4			
		Questions are structured based on the material presented	4			
		The language in each question is easy to understand	4			

Table 11
Small Group Tests Instruments

No	Aspect	Criterion	Score	Respond	Percen	Category
1	Display Design	Display of teaching materials	5	10	94%	Excellent
		Readability of texts in teaching materials	5			
		Image clarity in teaching materials	4			
		Clarity of instructions for using links (<i>Google Form & Youtube</i>)	5			
2	Material	It is simple to understand what is written in the training materials	5			
		Clarity of material descriptions in teaching materials	5			
		Teaching materials encourage students to learn	5			
		Materials used in the classroom help students understand it better	5			
		These teaching tools are fun to use	4			
3	Evaluation	Clarity of instructions in every question	5			
		Questions are structured based on the material presented	4			
		The language in each question is easy to understand	4			

The teaching tools are checked by experts, and now they are tested to see if they are useful. In this study, the trials were done twice, once on a different day and at a different time. There were individual group trials and small group trials. Based on the results of the individual tests that were done, which were 90%, the results meet the very good standards. The test that was done with 10 students in small groups got results of 94%, which meets the very good standards and means it can be used without any changes. The effectiveness test of the teaching materials got a total score of 90% and 94%, which makes the study results even stronger and puts them in the "very valid" category. The percentage of findings is then changed to meet the practicality standards and put into the "very practical" group. We can therefore say that making instructional tools can make students more motivated to keep up with their studies.

Findings from experts and studies on how well something works do not promise that there are no mistakes in this teaching material. Questionnaires from experts and students during the trial gave feedback, ideas, and answers that were used to improve the teaching materials. The updated teaching materials have (1) clear images; (2) displays of teaching bahan; (3) correct use of typefaces; and (4) displays of teaching materials that are well-balanced and harmonious. Changes were made based on feedback, ideas, and responses from students and experts.

The research results align with several previous studies' findings, demonstrating the effectiveness of teaching materials in facilitating student learning (Amreta & Anisah, 2023; Adisaputera et al., 2023). Additionally, other research indicates that Indonesian teaching materials, which are based on thematic learning models, aid in enhancing the higher order thinking and numeracy literacy of elementary school students (Li et al., 2024; Purnomo et al., 2024; Kamaruddin et al., 2023; Safi'i et al., 2021), while also promoting a learning process that is centered on (Kusmiarti et al., 2023). This study implies that the integration of numeracy literacy skills and higher-level thinking skills in this teaching material is likely to enhance students' cognitive and social skills. Thematic and applicative teaching materials allow students to see the relationship between Indonesian learning and other subjects so that they have more comprehensive thinking skills and are ready to face challenges in various situations in the future. There are some problems with this study. For example, only 5 students can be in individual trials and only 10 students can be in small group trials. We hope that more study will help us learn more about how thematic learning models were used to create Indonesian teaching materials for elementary school students.

CONCLUSION

The validity test showed that the Indonesian teaching materials based on the thematic learning model created in this study met the standards for validity. Experts in the subject gave it a relevance test, and 83% of them gave it a good grade. The validity test from experts in designing training materials showed a score of 85%, which is in the "good" range. Linguists gave the validity test a score of 90%, which is in the "very good" group. The results of experts' validity tests show that this teaching material fits with the curriculum and combines parts of higher order thinking skills (HOT) and numeracy literacy in the best way possible. So, we can say that this teaching material is good enough to be used in basic schools.

The success test shows that this thematic learning model-based teaching material helps primary school students get better at using math and higher-order thinking skills. Students' analytical, critical, and creative skills get a lot better when these teaching tools are used. This is especially true when it comes to solving problems involving language and math. People took an effectiveness test on their own and in small groups. The results showed that 90% of the people who took the test were very effective, and 94% of the people in the small group were also very effective. The fact that this happened shows that the teaching tools that were made work very well. The study's results show that Indonesian teaching materials that are based on themes have a huge amount of promise to help students learn in a more integrated and relevant way. Teachers can use how well this material worked to improve HOTS skills and math literacy as a model for making similar materials for other topics, with the same goal of improving 21st century skills.

DECLARATIONS

Author contribution	:	Mara Untung Ritonga, as the main author, and Elly Prihasti Wuriyanii, as the second author, are responsible for writing the article, collecting data, analyzing data, then revising according to reviewer suggestions and acting as the sender of the manuscript. Rizky Fadillah Nasution, as the third author and supervisor in writing the manuscript, writing and providing feedback, as well as helping to formulate arguments in developing the writing framework.
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