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The Development of Student Worksheets (LKPD) Based Higher Order Thinking Skill (HOTS) with Nuance of Numeracy Literacy in Mathematics Subjects for Elementary School Class V Students

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ABSTRACT

This study is motivated by the low level of students' numeracy literacy skills and the suboptimal use of instructional materials that facilitate higher-order thinking skills in elementary mathematics learning. Teacher-centered learning practices tend to limit students' active participation and hinder their ability to solve contextual problems. This study aims to develop a Student Worksheet (LKPD) based on Higher Order Thinking Skills (HOTS) with a numeracy literacy orientation on plane geometry material that meets the criteria of validity and practicality. This research employed a Research and Development (R&D) approach using the 4-D model, which includes the stages of define, design, develop, and disseminate. The subjects of this study were fifth-grade students of SDN 3 Golong. Data were collected through expert validation sheets for content and media, as well as questionnaires on students' and teachers' responses. The results indicate that the developed LKPD has good feasibility, with a material expert validation score of 73% (feasible) and a media expert validation score of 91% (very feasible). Furthermore, the practicality level is categorized as practical, as indicated by small group trials (77%), large group trials (81%), and teacher responses (75%). Therefore, the HOTS-based LKPD with numeracy literacy nuance is considered valid and practical to be used as instructional material in elementary mathematics learning and contributes to improving contextual and meaningful learning quality.

KEYWORDS

Higher Order Thinking Skill
LKPD
Literacy Numeracy
Plane Shapes
Research and Development

1. Intoroduction

21st-century education requires students not only to master basic knowledge but also to possess critical thinking, creativity, communication, and collaboration skills, which are known as the 4C competencies. These competencies have become the main focus of the implementation of the Merdeka Curriculum, which emphasizes student-centered learning through active and meaningful learning experiences (Apriliyani et al., 2021). In this context, numeracy literacy is considered an essential competency because it relates to the ability to use mathematical concepts and procedures to understand, analyze, and solve problems encountered in daily life (Rahmawati et al., 2021).

Numeracy literacy is defined as the ability to use numbers and mathematical symbols to analyze information and present data in various forms of representation as a basis for decision-making (Cahyani, 2025). This competency is highly needed in facing global challenges and therefore becomes an important part of 21st-century skills (Golda & Rosinda, 2024). However, the condition in Indonesia indicates that students' numeracy literacy skills are still relatively low. This can be seen from the results of the Programme for International Student Assessment (PISA) 2022, which placed Indonesia at rank 73 out of 81 countries, with mathematics scores below the OECD average (OECD, 2023). A similar condition can also be observed in West Nusa Tenggara, where numeracy achievement remains in the low category based on the 2023 Education Report Card. These data indicate that students still experience difficulties

in relating mathematical concepts to real-life contexts and in applying critical and analytical thinking skills.

These problems were also found in mathematics learning in Grade V at SDN 3 Golong. Based on classroom observations, learning activities were still dominated by the use of procedural textbooks that had not yet encouraged students to think critically. Students tended to copy examples and follow solution steps without deeply understanding mathematical concepts. In addition, Student Worksheets (LKPD) had not been optimally utilized, so exploratory and student-centered learning activities remained limited. Interviews with teachers revealed that out of 20 students, only 7 students (35%) achieved the Minimum Mastery Criteria (KKM), while 13 students (65%) had not yet achieved mastery. This condition indicates that students' numeracy literacy skills still need improvement. However, low mathematics achievement is not influenced solely by numeracy literacy; previous studies show that learning motivation, problem-solving skills, self-efficacy, teaching strategies, and the quality of instructional materials also significantly affect students' mathematics performance. Several studies reported that numeracy-based learning materials and HOTS-oriented worksheets can improve students' critical thinking and conceptual understanding, yet most previous research examined these variables separately and focused on junior or secondary education contexts rather than elementary schools (Hidayat et al., 2022).

One effort that can be made to overcome these problems is to develop teaching materials in the form of Student Worksheets (LKPD) that can stimulate higher-order thinking skills. LKPD is a learning tool containing instructions and activities designed to help students construct knowledge through structured learning tasks (Prastowo, 2021). To be more effective, LKPD should be developed based on Higher Order Thinking Skills (HOTS), namely thinking abilities at higher cognitive levels such as analyzing, evaluating, and creating. The integration of HOTS and numeracy literacy in LKPD enables students not only to understand concepts but also to relate them to real-life contexts and solve problems critically and logically (Amalia, 2022).

Several previous studies have shown that HOTS-based LKPD can improve students' critical thinking and problem-solving skills (Hidayah, 2020; Mardiani et al., 2021). In addition, the numeracy literacy approach has been proven to improve students' ability to understand and analyze contextual problems (Nari & Mardhiyah, 2022). However, studies integrating HOTS and numeracy literacy simultaneously in a single LKPD, particularly on plane geometry material for Grade V elementary students, are still limited. Moreover, no similar study has been conducted at SDN 3 Golong, so the learning needs that match the characteristics of students in the school have not been fully addressed.

Based on the explanation above, the main problem of this study is the unavailability of teaching materials in the form of LKPD specifically designed based on HOTS and numeracy literacy to support contextual and meaningful mathematics learning. Therefore, this study aims to develop HOTS-based LKPD with numeracy literacy orientation that meets the criteria of validity and practicality. This research is expected to contribute to the development of teaching materials and become an alternative for teachers in improving the quality of more contextual and meaningful mathematics learning.

2. Method

This study employed a Research and Development (R&D) approach. Research and development is a research method used to produce a specific educational product and to examine its feasibility and practicality before implementation. The product developed in this study was a Higher Order Thinking Skills (HOTS)-based Student Worksheet (LKPD) integrated with numeracy literacy on the topic of plane geometry for Grade V students at SDN 3 Golong.

The development model applied in this study was the 4-D (Four-D) model proposed by Sivasailam Thiagarajan, which consists of four stages: Define, Design, Develop, and Disseminate. This model was selected because it provides systematic and structured procedures that are appropriate for developing instructional materials, starting from needs analysis, product design, expert validation, revision, and dissemination. In addition, the 4-D model has been widely used in educational development research due to its effectiveness in producing valid and practical learning materials (Kurniawan et al., 2022).

2.1. *Define*

The define stage aimed to determine the initial needs in product development. At this stage, a preliminary analysis was conducted through classroom observations and interviews with the Grade V teacher of SDN 3 Golong to identify the condition of Mathematics learning, the use of teaching materials, and students' learning needs. In addition, student characteristics analysis, task analysis, concept analysis of plane geometry materials, and the formulation of learning objectives were carried out in accordance with the learning outcomes of the Merdeka Curriculum.

2.2. *Design*

The design stage was carried out by preparing the initial draft of the LKPD to be developed. At this stage, the researcher designed research instruments consisting of expert material validation sheets, expert media validation sheets, and teacher and student response questionnaires. The material validation instrument was used to assess the accuracy of concepts, relevance to curriculum objectives, suitability of HOTS-oriented activities, language clarity, and the integration of numeracy literacy content. The media validation instrument evaluated layout quality, visual appearance, typography, illustrations, consistency, and readability. Meanwhile, the teacher and student response questionnaires were used after product trials to measure practicality, ease of use, attractiveness, usefulness, and user acceptance of the LKPD. In addition, the design process included selecting Canva as the design platform. The use of validation and response instruments is important in development research to ensure that learning products meet validity and practicality criteria before implementation.

2.3. *Develop*

At this stage, validity and practicality testing were conducted on the developed product. The validity test was carried out by expert validators, namely a material expert and a media expert. The material expert evaluated content suitability, language appropriateness, learning activities, and the implementation feasibility of the LKPD. Meanwhile, the media expert assessed the cover design, content layout, illustrations, and language use in the LKPD. After obtaining the validation results, the product was revised based on the suggestions and feedback from the validators. Furthermore, a limited trial (small-group trial) was conducted with six Grade V students of SDN 3 Golong to determine the readability, ease of use, attractiveness of the LKPD, and students' initial responses to the developed product. To determine the results of the validity and practicality tests, the data were analyzed using the formula (1):

$$\boldsymbol{P = \frac{F}{N} X\ 100\%} \quad (1)$$

Description:

P = Persentase
F = Score obtained
N = Maximum score

2.3.1. Product Feasibility Test

After obtaining the percentage analysis results from the expert validators, the next step was determining the product feasibility category. The feasibility criteria were used as a reference to identify whether the LKPD was appropriate for use or still required revision. The product feasibility criteria are presented in the following table (Rawa 2020).

Table 1. Product Feasibility Criteria

Assessment (%)	Category
$81 < N \leq 100$	Very Feasible
$61 < N \leq 80$	Feasible
$41 < N \leq 60$	Fairly Feasible
$21 < N \leq 40$	Not Feasible
$0 < N \leq 20$	Very Unfeasible

Based on the table (1), the HOTS-based LKPD integrated with numeracy literacy can be considered feasible for use if it achieves at least the "Feasible**"** category, with a percentage score ranging from 61% to 80%.

2.3.2. Product Practicality Test

After the LKPD was declared feasible by the expert validators, a practicality test was conducted involving the teacher and students. The practicality test aimed to determine the ease of use, attractiveness, implementation of learning activities, and usefulness of the LKPD in the learning process. The results of the teacher and student response questionnaires were analyzed using percentages and then interpreted based on the following practicality criteria (Krisnanti et al., 2020).

Table 2. Product Practicality Criteria

Assessment (%)	Category
$81 < N \leq 100$	Very Practical
$61 < N \leq 80$	Practical
$41 < N \leq 60$	Fairly Practical
$21 < N \leq 40$	Impractical
$0 < N \leq 20$	Very Impractical

Based on the table 2, the product is considered practical if it obtains an average percentage score of more than 60%. If the percentage falls within the range of 81%–100%, the product is categorized as very practical and highly suitable for use in the learning process.

2.4. *Dissaminate*

The dissemination stage was carried out on a limited scale involving the teacher and 20 Grade V students of SDN 3 Golong. At this stage, the LKPD was implemented in the learning process to determine the practicality level of the product more broadly through the responses of the teacher and students after using the LKPD.

3. Result and Discussion

The results of this study on the development of a Higher Order Thinking Skills (HOTS)-based Student Worksheet (LKPD) integrated with numeracy literacy for Mathematics learning on the topic of plane geometry for Grade V elementary school students are presented based on the 4-D (Four-D) development model, which consists of four stages: define, design, develop, and disseminate. The following is a description of each stage in the LKPD development process:

3.1. *Define*

Based on the results of the analysis conducted at SDN 3 Golong through classroom observations and interviews with the Grade V teacher, it was found that the mathematics learning process was still dominated by the use of textbooks as the main learning resource. The use of LKPD in learning activities had not been optimal, and the available LKPD mainly contained routine exercises that had not yet been able to develop students' higher-order thinking skills or numeracy literacy.

Information from the teacher also indicated that a number of students still experienced difficulties in understanding word problems, solving contextual problems, and relating plane geometry concepts to daily life. Based on the teacher's classroom records, approximately 65% of students had difficulty understanding word problems, 50% of students experienced problems in solving contextual tasks, and around 60% of students were unable to relate plane geometry concepts to real-life situations. In addition, student involvement in the learning process was still relatively low, with only about 35% of students actively participating during classroom activities, because learning was more focused on procedural problem-solving.

These conditions indicate that the teaching materials used need to be improved in order to become more attractive, contextual, and capable of encouraging students to think critically. Therefore, the researcher developed a HOTS-based LKPD integrated with numeracy literacy as a learning material that can help students understand plane geometry concepts more meaningfully, while also fostering higher-order thinking skills and numeracy skills in Mathematics learning.

3.2. *Design*

The next stage was Design, namely the planning stage of the LKPD. At this stage, the researcher prepared the design of a HOTS-based LKPD integrated with numeracy literacy on the topic of plane geometry for Grade V in accordance with the Learning Outcomes (CP) and Learning Objectives (TP) of the Merdeka Curriculum. The LKPD was designed using Canva as a printed A4 learning medium with a simple, attractive, and user-friendly layout suitable for elementary school students. The content was systematically arranged to help students understand the material while also developing higher-order thinking skills and numeracy literacy. The differences between the previously used LKPD and the designed LKPD are presented in the following table.

Table 3. Differences Between Previous LKPD and Designed LKPD

No.	Previous LKPD	Designed LKPD
1	Contained mostly routine and procedural exercises focused on applying formulas directly.	Contained HOTS-based tasks that required students to analyze, evaluate, and solve contextual problems.
2	The appearance was simple and less attractive, with limited visual elements and less organized layout.	Designed using Canva with a more attractive layout, clear illustrations, suitable colors, and readable typography.
3	Learning activities were less connected to daily life situations and did not specifically support numeracy literacy.	Activities were contextualized with real-life situations to strengthen numeracy literacy and meaningful learning.

Based on the table above, it can be seen that the designed LKPD is more innovative and relevant to students' learning needs compared to the previous LKPD. The developed LKPD not only improves the visual appearance and organization of the material, but also emphasizes HOTS-based and contextual activities that can enhance students' critical thinking skills and numeracy literacy in Mathematics learning.

In general, the developed LKPD format consists of several sections, namely: (1) the introductory section, which includes the cover page, preface, table of contents, usage instructions, learning outcomes (CP), and learning objectives (TP); (2) the main section, which contains a summary of plane geometry material, learning activities, and HOTS-based exercises integrated with numeracy literacy; and (3) the closing section, which includes learning reflection and the author's biography. The results of the designed HOTS-based LKPD integrated with numeracy literacy on plane geometry material are presented in the following figures.

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3.2.1 Cover Page

The cover page contains the LKPD title, author identity, educational institution, and the target users, namely Grade V elementary school students. The cover design is made attractive with illustrations of plane geometry shapes that are relevant to the learning material. The design of the cover page is presented in Figure 1 below.

Fig. 1. Cover Page

3.2.2. Preface

The preface contains expressions of gratitude to God Almighty as well as a brief explanation of the purpose of developing the LKPD and its benefits in Mathematics learning. The draft of the preface is shown in Figure 2 below.

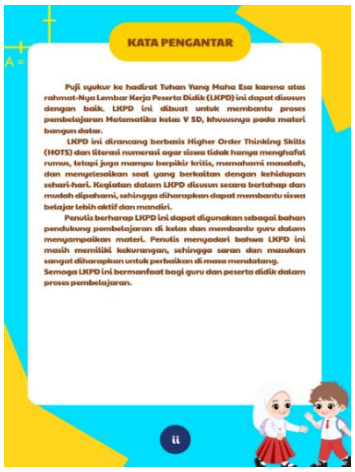

Fig. 2. Preface

3.3.3. Table of Contents

The table of contents contains the arrangement of the LKPD sections along with their page numbers to help students and teachers easily locate the content of the LKPD in a systematic way. The design of the table of contents can be seen in Figure 3.

Fig 3. Table of contents

3.3.4. Learning Outcomes and Learning Objectives

This section contains the Learning Outcomes (CP) and Learning Objectives (TP) that serve as the reference for learning plane geometry. The presentation is designed to be clear so that students can understand the competencies that must be achieved. The design is shown in Figure 4.

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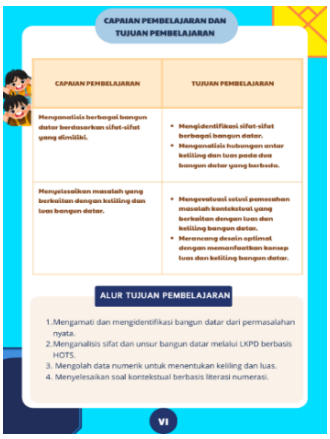

Fig 4. Design CP and TP

3.3.5. Materials and Learning Activities

The main section of the LKPD contains a summary of plane geometry materials and five structured learning activities designed in a contextual manner. Each activity is intended to train students in analyzing, reasoning, and solving mathematical problems, particularly those related to real-life situations. The design of this section aims to promote active learning and support the development of higher-order thinking skills (HOTS) and numeracy literacy in an integrated way. The structure of the main section of the LKPD is presented in Figure 5 below.

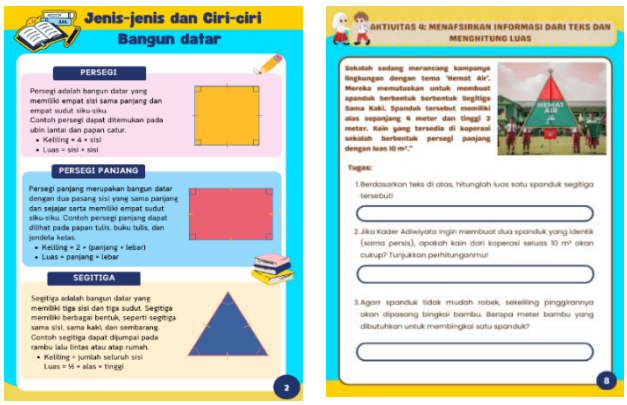

Fig 5. The main section of the LKPD

In more detail, the HOTS-based numeracy literacy orientation can be identified in each learning activity as follows:

Table 4. Activity in LKPD

No	Student Activity
1	Activity 1 (Understanding Concepts): Students identify and interpret properties of plane figures (such as squares, rectangles, and triangles) through real-life examples. This stage emphasizes *understanding and interpreting information*, which supports basic numeracy literacy skills.
2	Activity 2 (Analyzing Problems): Students analyze contextual word problems related to daily situations, such as determining shapes in objects around them. This activity reflects the HOTS level of *analysis (C4)* by requiring students to break down information and identify relevant mathematical concepts.
3	Activity 3 (Applying Concepts): Students apply formulas for perimeter and area in real-life contexts, such as calculating the area of a garden or classroom floor. This strengthens *numeracy literacy in procedural and applied reasoning*.
4	Activity 4 (Evaluating Solutions): Students compare and evaluate different problem-solving strategies provided in contextual tasks. This stage reflects HOTS at the *evaluation level (C5)*, where students justify their answers.
5	Activity 5 (Creating Solutions): Students are asked to design or create their own problems related to plane geometry in daily life. This represents the highest level of HOTS (*creation/C6*) and strongly integrates numeracy literacy through real-world problem formulation.

Through these five structured activities, the LKPD not only facilitates conceptual understanding but also explicitly integrates HOTS levels (C4–C6) with numeracy literacy by encouraging students to interpret data, analyze problems, apply mathematical concepts, evaluate solutions, and create new contextual problems.

3.3.6. Reflection and Author Biography

The closing section contains learning reflection to help students assess their understanding after learning, as well as a brief biography of the author as the developer of the worksheet (LKPD). The design of the closing section can be seen in Figure 6 below.

Fig 6. The closing design

In addition to developing the LKPD product, at this stage the researcher also prepared research instruments in the form of a material expert validation questionnaire, a media expert validation questionnaire, as well as teacher and student response questionnaires. These instruments were used to obtain data regarding the level of feasibility and practicality of the developed LKPD.

3.3. *Develop*

Next, the Develop stage is the product development phase, in which the LKPD design is realized into a tangible product. The worksheet was developed using the Canva application by paying attention to the relevance of the content, clarity of presentation, and visual appearance. After the HOTS-based LKPD with numeracy literacy nuances on the topic of plane shapes was completed, the next step was to conduct expert validation tests and practicality tests with users.The validation test aimed to determine the level of product feasibility in terms of both material and media aspects, while the practicality test aimed to assess the ease of use of the LKPD in learning activities. The results of the validation percentage analysis are presented in Table 5 below.

Tabel 5. LKPD Validation Test Results

No	Validator	Percentage	Description
1	Material expert	73%	Feasible
2	Media expert	91%	Very Feasible
Average		**82%**	**Very Feasible**

Based on Table 5 above, a percentage of 73% was obtained from the material expert with the "feasible" category, and 91% from the media expert with the "highly feasible" category. When averaged, the overall score is 82%, which falls into the "highly feasible" category. These results indicate that the HOTS-based LKPD with numeracy literacy nuances on the topic of plane shapes has met the feasibility criteria and can be used in learning after revisions were made according to the validators' suggestions.

After being declared feasible by the validators, the LKPD was then tested for its practicality with teachers and fifth-grade students at SDN 3 Golong. The trial was conducted through a small group, a large group, and teacher responses. The results of the practicality test data analysis are presented in Table 6 below.

Table 6. Hasil Uji Kepraktisan LKPD

No	Respondents	Percentage	Description
1	Grade V Teacher	75%	Practical
2	Small Group Trial (6 students)	77%	Practical
3	Large Group Trial (20 students)	81%	Very Practical
Average		**78%**	**Practical**

Based on Table 6 above, a practicality percentage of 75% was obtained from the Grade V teacher with the "practical" category, 77% from the small group trial with the "practical" category, and 81% from the large group trial with the "very practical" category. When averaged, the overall score is 78%, which falls into the "practical" category.A learning product is considered practical if it can be easily used by users, has clear instructions, and is in accordance with classroom learning needs. (Zakiamani, et.al., 2020).

Thus, the HOTS-based LKPD integrated with numeracy literacy on the topic of plane geometry is considered practical for use in learning because it is easy for students to understand, supports teachers in the teaching process, and is appropriate for implementation in Grade V elementary school Mathematics learning. The implication of this finding is that the developed LKPD can be used as an alternative teaching material to enhance students' higher-order thinking skills and numeracy literacy through more contextual and student-centered learning activities. However, the limitation of this study is that the product was only tested on a small-scale sample at SDN 3 Golong, so its effectiveness in broader contexts and different school characteristics still needs further investigation.

3.4. *Disseminate*

The final stage in this development research is Disseminate, which is the product dissemination stage. At this stage, the LKPD that had been declared valid and practical based on expert validation and product trials was introduced for use in Grade V Mathematics learning at SDN 3 Golong. The dissemination of the LKPD was carried out according to learning needs and was directly implemented by the teacher in classroom learning activities. The LKPD was provided in printed form to facilitate its use by both

teachers and students in the classroom. Through this dissemination stage, the developed LKPD was considered ready to be utilized as a supporting teaching material on plane geometry topics to enhance more contextual and meaningful Mathematics learning.

4. Conclusion

Based on the results of the feasibility analysis, the worksheet (LKPD) based on Higher Order Thinking Skills (HOTS) with numeracy literacy nuances on the topic of plane shapes is declared suitable for use in Grade V elementary school mathematics learning. Referring to the validation results, the material expert assessment obtained a percentage of 73%, viewed from the aspects of learning suitability, content, and material presentation. Meanwhile, the media expert assessment obtained a percentage of 91%, viewed from the aspects of design appearance, media quality, readability, and ease of use of the worksheet.

In addition, the developed worksheet also shows a good level of practicality. This can be seen from the results of the trials conducted, where the small group trial obtained a percentage of 77% in the practical category, and the large group trial obtained a percentage of 81% in the very practical category. Meanwhile, the teacher response results obtained a percentage of 75%, indicating that the worksheet is easy to use, helps the learning process, and is beneficial in supporting students' learning activities.

Thus, the HOTS-based worksheet with numeracy literacy nuances that has been developed is declared valid and practical, so it can be used as a supporting teaching material to enhance student engagement and higher-order thinking skills in mathematics learning on plane shapes for Grade V elementary school students.

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