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Development of Hots-based LKPD on Material Changes in the Form of Objects for Class IV Elementary School Students

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A B S T R A C T

This study aims to determine the validity, practicality, and effectiveness of HOTS-based LKPD on the material of Changes in Object Forms for grade IV elementary school students. The development model used is the 4D model (Define, Design, Develop, Disseminate). Data were collected through interviews, validation sheets, teacher and student response questionnaires, and higher-order thinking tests (Pretest and posttest). The validation results showed a score of 91% from the material expert and 89.5% from the media expert, which is included in the very valid category. Regarding practicality, the teacher response questionnaire score was 94.2% and the students' 90%, indicating that the LKPD is efficient. The effectiveness of the LKPD is seen from the N-Gain result of 0.64, which is in the medium category. Thus, this HOTS-based LKPD is considered valid, practical, and effective enough to be used in learning science on the material of changes in the form of objects.

1. Introduction

The education system needs to be updated to suit the demands of the times that continue to develop. This aligns with the skills required and must be mastered by students in facing the challenges of the 21st century. The Development of the times in the 21st century requires students to have the ability and skills of higher-order thinking (HOTS) to create students with critical thinking skills, creative thinking, and metacognitive skills (Purba et al., 2023). Some of these skills are part of higher-order thinking skills (HOTS), which require individuals to perform more complex thinking when facing a situation or solving problems (Sitompul et al., 2023). HOTS (Higher Other Thinking Skills) is a learning concept that emphasises and makes students think critically and apply their knowledge and skills better (Wandini et al., 2021).

Conklin (2011) states that higher-order thinking skills (HOTS) include critical thinking and creative thinking that require learners to play an active and not passive role. HOTS (Higher Other Thinking Skills) is a concrete thinking ability, thinking that is not just knowledge and memorisation. Still, thinking processes are needed to make decisions and provide answers. The thinking process can parse information and analyse until finally deciding on problem-solving options based on correct concepts (Winarti & Istiyono, 2020). So high-level thinking skills or HOTS can be interpreted as more complex and in-depth thinking skills, including critical thinking, creative thinking, and problem-solving.

The primary purpose of Higher Order Thinking Skills (HOTS) is how to improve students' thinking skills at a higher level, especially those related to the ability to think critically in receiving various types of information, think creatively in solving a problem, use their knowledge and make decisions in complex situations (Ali, 2019). Cognitive thinking skills are divided into low-level and high-level thinking skills. In these two parts of skills, the dimensions of the mental process are six categories, namely the ability to remember, understand, and apply, which are low-level thinking skills, while the ability to analyse, evaluate, and create, including high-level thinking skills (Ariyana et.al., 2018). This is in line with the opinion of Anderson and Krathwohl (2010) in the revision of Bloom's taxonomy, stating that indicators to measure higher-order thinking skills include analysing (C4), evaluating (C5), and creating (C6). Analysing is the ability to decompose something into smaller parts to obtain a deeper meaning. Suppose the ability to analyse leads to a critical thinking process so that a person can make the right decision. In that case, that person has reached the level of evaluating thinking. When someone can produce new or different ideas, the level of thinking is called the level of thinking to create (Setiawati et al., 2019). Therefore, HOTS is thinking at a higher level that requires the ability to analyse, evaluate, and create with the results of one's thinking and reasoning.

Higher-order thinking skills are a must-have for learners. These skills test their intellectual abilities and ability to analyse, evaluate, and create solutions to problems. Therefore, it is not just about the ability to memorise material in learning but more about its application. Unlike low-level questions that test memorisation or basic understanding, HOTS requires students to understand and apply basic concepts in various situations, analyse, and evaluate possible answers (Lubis et al., 2025). Regarding Higher Order Thinking Skills (HOTS), one of the ways that teachers can do this is to train them in learning activities. Higher-order thinking can be learnt and used in everyday problem-solving (Anas, 2023). Through learning activities that develop Higher Order Thinking Skills (HOTS) abilities, it is hoped that the thinking process of students who are usually only in the form of memorising and understanding, can be improved in processing more complex knowledge information (Muzayyanah et.al, 2020). High-level thinking is needed because it is essential to determine students' understanding of the material by providing continuous practice problems to train students' abilities and help complete tasks in many ways.

The results of interviews with class IV teachers at SD Negeri 0118 Sibuhuan Julu show that educators have stimulated students to play an active role in learning. However, teachers only use books as teaching materials and evaluation tools. However, even so, students remain less interested in the learning process, one of which is science subjects. Teachers who have an essential role in the learning process need to pay attention to the learning resources used in the learning process. However, educators have not developed LKPD independently, and the lack of test questions designed to train the use of higher-order thinking is one of the needs identified by students.

One of the materials developed, especially in science subjects, is material about changes in the form of objects. This material has often been studied in science lessons at all levels of education (Nasution, A. A., & Maharani, 2023). In science learning, material changes in the form of objects pose a challenge for students who lack activities to help them understand learning in the material. In the LKPD that will be developed, the material for changing the form of this object will be a learning topic as a material needed to provide understanding and increase students' higher-level thinking. Thus, the existence of LKPD is required to determine whether the help of LKPD will significantly improve high-level thinking skills on the material of changes in the form of objects of grade IV elementary school students.

In general, teaching is an effort to improve the competence and ability of children (Permata et al., 2023). LKPD is a learning tool that complements or supports delivering learning material (Sepriani et.al, 2024). LKPD can be in the form of sheets of paper containing information and questions that students must answer. LKPD is a learner guide used to conduct investigation or problem-solving activities. LKPD can guide cognitive aspect development exercises and all aspects of learning through experimental or demonstration guides (Safriandono & Charis, 2014). In addition, LKPD can be used to increase students' interest in learning and their participation in class activities and support students in learning independently (Siregar, 2024).

According to Kokasih (2021), Learner Worksheets, also called LKPD teaching materials, are worksheets or learning activities for students. In the learning process, LKPD is a teaching material that guides students to explore the subject matter so that students can express opinions and reach conclusions. Thus, LKPD is a learning resource in the form of task sheets, task implementation instructions, and learning evaluations that students must complete based on the competencies that must be achieved (Pawestri, 2020).

One of the factors teachers have not developed is the lack of teacher development in compiling material, images, instructions, and task sequences summarised into one in the learner worksheet (LKPD), which aims to facilitate the implementation of the learning process. (Bilghis, 2024) . In addition, there is also a lack of opportunities for students when arguing and solving problems because sometimes learning is monotonous and teachers do not involve students in everyday problems (Maharani et.al, 2024). One of the media used in this research is HOTS-based

LKPD to improve students' higher-order thinking skills. The LKPD compiled consists of activity sheets that contain tasks that must be completed and developed based on the process stages to enhance students' higher-order thinking based on the HOTS indicators to be achieved (Hanifah et al., 2024). LKPD not only acts as a teaching aid, but also as a facilitator to improve understanding and active involvement of students in the learning process (Octaviani et.al, 2024). In addition, designing teaching materials in the form of LKPDs can assist teachers in a more active learning process and encourage students to think complexly.

Several studies have previously carried out the Development of LKPD to improve students' higher-level thinking. Some previous studies on this research related to the use of LKPD in improving students' higher-order thinking skills, including: research conducted by (Pebriani et al., 2022) regarding the Development of HOTS-Based E-LKPD (Higher Order Thinking Skill) with a Scientific Approach to Grade V Science Learning, shows that the HOTS-based E-LKPD developed is generally categorised as very valid with an average score of 3.87, and HOTS-based E-LKPD developed is categorised as very practical for teachers and students.

Research by Pramana, Komang Tri Y. (2022) on the Development of HOTS-Based E-LKPD with Liveworksheet on Human Respiratory System Material shows that the validation results obtained a score of 85% with a very feasible category, and the results of teacher responses and student trial responses obtained a score of 84% with an outstanding category. This shows that the LKPD product developed is feasible and can be used as an additional alternative teaching material in the process of learning science in elementary schools. Meanwhile, research conducted by Nadifatinisa & Sari (2021) also shows that the Development of HOTS-based LKPD using Liveworksheet on Science Learning Ecosystem Material is feasible to use with a very good predicate as a learning resource for grade V students in elementary schools.

Furthermore, research by Maghfirah (2020) regarding the Development of HOTS-based LKPD on Caloric material in class XII MIA 1 SMA N 1 Bakongan is feasible for use by educators in physics learning based on material experts with a feasibility percentage of 80.83% and media experts with a feasibility percentage of 87%. The students' response shows that the average number is 82.5%, which is included in the outstanding category. Students are very interested in learning using HOTS-based LKPD.

Many studies have been related to the Development of HOTS-based LKPDs, but the Development of LKPDs focuses on different materials and objects. In this study, the Development of HOTS-based LKPD on the material of changes in the form of objects is different from previous studies that examine the Development of LKPD in terms of diverse materials, and there are not many studies on the same topic. Based on this, researchers are interested in conducting and developing HOTS-based LKPD on the material of changes in the form of objects that can help students to improve their high-level thinking skills. The LKPD was developed to be one of the supports in conducting a learning process to be more complex, with the success of students' learning being well achieved. The problem formulation of this research is

how the validity, practicality, and effectiveness of the HOTS-based LKPD developed in improving higher-level thinking skills in grade IV elementary school students. To know whether the use of HOTS-based LKPD is valid, practical, and effective in the learning process in improving higher-level thinking skills in grade IV elementary school students.

2. Methodology

The type of research conducted is research using the Research and Development (R&D) method, or it can be said to be development research. The research and development method, or Research and Development, is used to produce specific products and test the effectiveness of these products (Sugiyono, 2020). Development research is related to the problems or potential faced or to be solved in education and occurs about innovative efforts in learning, all forms of development products, whether media, models or learning methods, must be effective, and the products produced must pass several trials and validations conducted by experts so that the product can be accounted for (Okpatrioka, 2023).

R&D research is a type of research used to produce a particular product by testing how much influence the product has through its effectiveness. In this study, the product developed was the HOTS-based Science Learner Worksheet (LKPD). The research was conducted at SD Negeri 0118 Sibuhuan Julu, Padang Lawas Regency, on fourth-grade students of SD Negeri 0118 Sibuhuan Julu, Padang Lawas Regency, with 14 students.

The Development of this LKPD refers to the 4D development model, which stands for Define, Design, Develop, and Disseminate, developed by Sivasailam Thiagarajan in 1974. The 4D development model in Indonesian translates into defining, designing, developing, and disseminating (Waruwu, 2024). According to Thiagarajan, there are four stages of the 4D development model, namely the first stage, which is often referred to as the needs analysis stage, which is carried out to provide an overview of the LKPD needs to be developed. The second stage is Design, which is preparing or designing the LKPD framework by collecting information data related to HOTS-based materials and LKPDs and compiling assessment instruments.

This LKPD is compiled and designed using the Canva application, which has an attractive appearance and is easy for students to understand. The third stage is Development, which involves validation testing or assessing the feasibility of media in producing teaching materials with good feasibility so that they can be applied in elementary schools. The last stage is the Disseminate stage, which is the distribution or application of LKPD to the real target, namely, students (Maydiantoro, 2021). The stages of developing LKPD based on creativity with the 4D model can be seen in Figure 1.

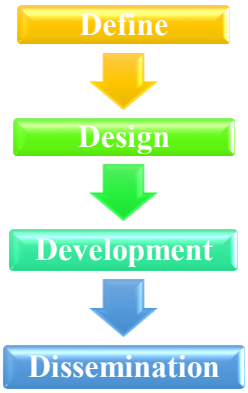

Figure 1. 4D model

Data collection techniques or instruments used by researchers in this study are interviews, media expert and material expert validation sheets, teacher and student response questionnaires. (1) The interview was conducted with the homeroom teacher before the research. This was done to obtain the information needed to develop the LKPD. The information needed is in the form of material and curriculum used in the learning process at SD Negeri 0118 Sibuhuan Julu; (2) Validation sheets addressed to media experts and material experts to determine the validity and feasibility of the developed LKPD. This validation sheet is the result of comments and suggestions on the LKPD that has been made so that the LKPD is feasible to be applied in the field; (3) High-level thinking test to determine the effectiveness of the HOTS-based LKPD developed; (4) Teacher and student response questionnaires to state whether or not LKPD products can be applied in the field from the responses or comments given by teachers and students on the questionnaire sheet.

Data Analysis Technique

In this study, the data obtained were analyzed qualitatively and quantitatively. Qualitative data analysis was obtained from the source of criticism and validator suggestions used to describe the product development process. Quantitative data analysis is based on the assessment of material experts, media experts, and teacher and student response questionnaires, which describe the product quality assessment. The results of the data analysis were used to improve the product. Data analysis techniques like a Likert scale are used in this development research (Table 1). Calculation of the percentage of validity of LKPD media on material changes in the form of objects can use the formula.

Table 1. Validation Assessment Criteria

Achievement Presentation	Criteria
81-100%	Very Valid
61-80%	Valid
41-60%	Less Valid
0-40%	Invalid

$$\text{Validity} = \frac{jumlah\ skor\ yang\ diperoleh}{jumlah\ skor\ maksimum} \text{ x } 100\%$$

To see how practical the LKPD learning media can use the practicality criteria in table 2.

Table 2. Criteria for Practicality of LKPD

No.	Value	Criteria
1.	81% < x ≤ 100%	Very practical
2.	61% < x ≤ 80%	Practical
3.	41% < x ≤ 60%	Practical enough
4.	21% < x ≤ 40%	Less practical
5.	0% < x ≤ 20%	Not practical

Source: (Annisa et al., 2020)

$$\text{Practicality (P)} = \frac{f\ (Perolehan\ skor)}{n\ (skor\ maksimum)} \text{ x } 100\%$$

Furthermore, to see the results of the effectiveness test of the developed LKPD, tests are given to students in the form of pretests and posttests before learning takes place and after students receive learning using the developed LKPD. The effectiveness test in this study used the N-Gain formula (Table 3 and Table 4)

$$N\text{-}Gain = \frac{Skorposttest - SkorPretest}{Skormaksimal - Skorpretest} \text{ x } 100$$

Table 3. N-Gain Criteria

Value	Category
g > 0,7	High
0,3 < g ≤ 0,7	Medium
g ≤ 0,3	Low

Source: (Dewi & Yahya, 2022)

Table 4. N-Gain Effectiveness Interpretation Categories

Percentage	Category
<40	Ineffective
40-50	Less effective
56-75	Effective enough
>76	Effective

Source: (Nawir et al., 2019)

3. Result and Discussion

Results

This research produces HOTS-Based Learner Worksheet (LKPD) products on Material Changes in the Form of Objects for grade IV elementary school students. The stages that the author has carried out include:

Define **Stage**

This stage is the first step for researchers in designing the developed HOTS-based Learner Worksheets (LKPD). This worksheet was developed to improve students' higher-order thinking. All information was collected to prepare HOTS-based LKPDs, ranging from the curriculum used to the learning resources used by teachers in teaching material changes in the form of objects in class IV. Researchers collected information by interviewing the fourth-grade homeroom teacher at one of the public elementary schools in Padang Lawas Regency and observing the learning resources used.

The curriculum used by the school is the Merdeka Curriculum, and the learning resource used by the teacher in teaching the material on changes in the form of objects is the IPAS book for Primary School Grade IV. In this book, the material on changes in the form of objects is located in the third chapter and is learning for students in the fourth grade, semester 2. This information became the initial reference for researchers in designing HOTS-based LKPDs. After that, researchers began determining learning objectives and assessment instruments using HOTS thinking skills rubrics to measure students' high-level thinking. The instrument for the cognitive aspect of students' higher-order thinking skills was prepared based on three indicators: 1) Analysing, 2) Evaluating, 3) Creating (Table 5).

Table 5. Indicators of higher order thinking skills

No.	Indicators	Cognitive aspects
1.	Analyse	Decompose information into relevant parts and explain how the parts relate to each other. Questions that measure analysis when learners are able to give an opinion based on analysis of a section of text or stimulus
2.	Evaluate	Evaluating involves the process of making judgements based on set criteria. Questions that invite students to be able to conclude a problem and make decisions with good judgement.
3.	Create	Combining elements and reassembling them to create a new structure. The related problem invites learners to create their own good framework according to their own ideas and the stimulus they receive.

Design Stage

The design stage is the stage of preparing the LKPD (Figure 2 – Figure 9). LKPD is prepared using the canva application. Besides being easily accessible, the canva application also provides various features of images, designs, animations, etc., making it easier for researchers to design LKPD. Learner worksheets are designed to be as interesting as possible according to children's cognitive development stage, so that students are interested in working on them. The use of images or animations adapted to the material, the font on the LKPD is written in a varied and colourful manner, and the use of language on the LKPD is easy for students to understand. After the curriculum and student learning resources are known, at this stage HOTS-based LKPDs begin to be designed with LKPD contents which include: (1) practice questions that are adjusted to the HOTS cognitive thinking indicators; (2) material

on changes in the form of objects contained in the IPAS book for Grade 4 Elementary School, and (3) steps of experimental activities related to changes in the form of objects. At this stage, the preparation of the Learner Worksheet (LKPD) is adjusted to the stage of the higher-order thinking process, which is why this Learner Worksheet (LKPD) is called HOTS-based.

Figure 2. Cover of HOTS-based LKPD

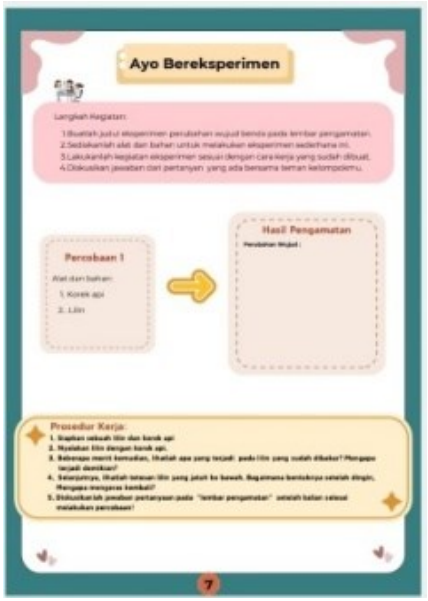

Figure 3. Instructions for Use HOTS-based LKPD

Figure 4. Material on changes in the form of objects

Figure 5. Analysis questions objects

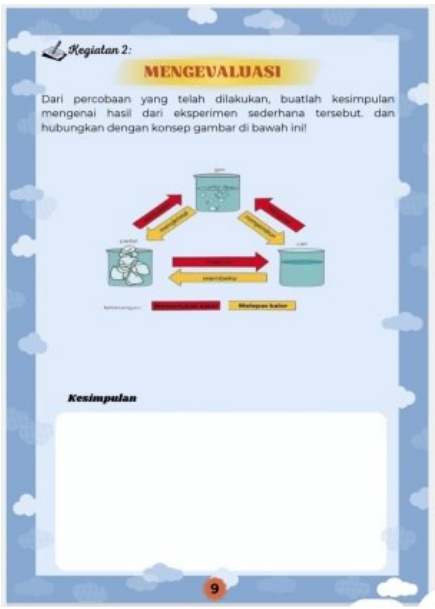

Figure 7. Evaluating stage

Figure 6. Experiment stages objects

Figure 8. Creation Stage

Figure 9. Learning Reflection

Development Stage

The third stage is Development, where the learner worksheet (LKPD) that has been designed is then validated by two expert validators to determine the feasibility of the learner worksheet (LKPD) that has been made. The feasibility of the Learner Worksheet consists of media and material feasibility. Aspects assessed by media experts are aspects of presentation and accessibility, while aspects assessed by material experts are aspects of learning and content material.

Media Feasibility

As shown in the table 6, media expert validation has confirmed the feasibility of HOTS-based learner worksheet (LKPD) media.

Table 6: Media Expert Validation Results

No.	Aspects	Indicators	Score
1.	Presentation	Cover design of LKPD is well designed	4
		The LKPD page is well designed	3
		The colour selection on the HOTS-based LKPD is good and looks harmonious.	3
		The text presented in the LKPD is well designed, making it easier to understand the text.	3
		The use of fonts (variety of types, sizes, and shapes of letters) is consistent and attractive	3
		The order of presentation of HOTS-based LKPDs is clear and organised	4
		The layout of the LKPD is well designed and attractive	4
		Presentation of LKPD is equipped with attractive images and illustrations	4
2.	Accessibility	The images presented are in accordance with the material	4
		The layout of the material is sequential and interesting	3
		The ability of LKPD to facilitate students in learning	4
		Ease of accessing the LKPD	4
		Total Score	**43**
		Percentage	**89,5%**

Media validation resulted in a total score of 43 and a percentage score of 89.5%. This puts the classification in the valid category with an interval of 90%- 100%. Media revisions have included using images that match the material and changing some writing fonts to make them more attractive and appropriate.

Material Feasibility

The feasibility of LKPD material is based on creativity, which is known from the validation of material experts. The results of validation by material experts can be seen in Table 7.

Table 7. Material Expert Validation Results

No.	Aspects	Assessment Indicator	Score
1.	Learning	Suitability of material with learning objectives	4
		Material presented systematically	4
		The material presented increases students' knowledge about changes in the form of objects	4
		Explanation of LKPD material encourages students' curiosity	4

		Activities on the LKPD emphasise learner involvement	3
		The connection between the material and the questions on the LKPD helps to improve students' higher order thinking skills	3
2.	Content	The material is as formulated	4
		Suitability of the material to the cognitive development / ability level of children	3
		Clarity of material description of changes in the form of objects	3
		The material presented is clear and specific	4
		The material on the LKPD is a contextual application in real life	4
3.	Linguistics	Using good and correct language	4
		Use appropriate punctuation	3
		Appropriate language structure and easy to understand	4
		Total Score	51
		percentage	91%

The total material validation score of 51 with a percentage of 91% is classified as highly valid with an interval classification of 81%-100%. The assessment results from subject matter experts on the HOTS-based LKPD concluded that the HOTS-based LKPD is suitable for use with minor revisions. The revisions made to the material include adjusting the language used in the LKPD to match the students' level of understanding and writing the material in the LKPD more clearly and in greater detail so that students can understand it well (Table 8).

Table 8. Recapitulation of Assessment from Validators

No.	Validator Type	Validation Score	Criteria
1.	Material Expert	91%	Very Valid
2.	Media Expert	89,5%	Very Valid
	Average	90,2%	Very Valid

Based on the recapitulation of assessments and suggestions by validators, several improvements were made to the LKPD. The results of the HOTS-Based Learner Worksheet can be seen in the Figure 10 – Figure 17.

Figure 10. LKPD material before revision (material summarised briefly)

Figure 11. LKPD material after revision (material separated into individual sections)

Figure 12. Experimental activities before revision (various writings)

Figure 13. Experimental activities after revision (writings and colours of LKPD design are standardised)

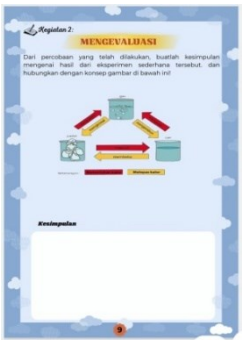

Figure 14. Evaluation before revision (image unclear)

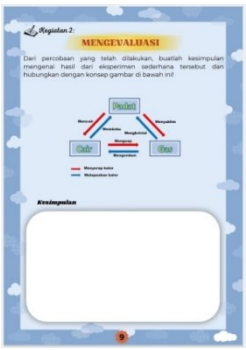

Figure 15. Evaluation after revision (image replaced for clarity)

Figure 16. Reflection section before revision (the box is not enlarged enough)

Figure 17. Reflection section after revision (the reflection box is replaced and enlarged)

Based on the picture above, the LKPD before being revised had many inappropriate writing fonts, an unattractive colour design, and material that was not clearly described. After the revision, there is a clear description of the activities and stages of the process students go through to develop their high-level thinking skills. Students have developed high-level thinking skills after working on this creativity-based LKPD.

Disseminate Stage

The last step is the dissemination stage of the LKPD, which has been developed and is feasible. Then, it is distributed and tested to teachers and students of the fourth-grade elementary school on the material of changes in the form of objects. The practicality of HOTS-based LKPD can be seen based on the value of student and teacher response questionnaires, and the effectiveness of LKPD is seen based on the results of the Pretest and posttest conducted on students.

Practicality of HOTS-based LKPD

Students were enthusiastic about working on the HOTS-based LKPD during the learning process. This is because the LKPD contains simple experiments related to changes in the form of objects and questions that try to attract high-level thinking skills. Students were very excited when preparing the experimental materials, and they were also very productive when filling in the questions on the LKPD.
Practicality is measured using an assessment instrument: a teacher and student response questionnaire. The questionnaires are given to teachers and students to determine the level of practicality in the LKPD trials that have been developed. The results of the data obtained can be seen in the Table 9.

Table 9. Recapitulation of Teacher and Student Response Questionnaires

No.	Appraiser	Validation Score	Criteria
1.	Teacher response	94,2%	Very Practical
2.	Student response	90%	Very Practical
	Average	92%	Very Practical

Based on Table 9, the teacher and student response questionnaire assessment results of the LKPD developed obtained a teacher response percentage of 94.2% and a student response of 90% with the category "efficient." The results of the recapitulation of pretest and posttest scores can be seen in the following table 10.

Table 10. Recapitulation of pretest and posttest scores

Subject	Average score acquisition	
	***Pre-Test* Score**	***Post-Test* Score**
14 class IV students	59,64	84,64
Average N-gain score	0,64	
N-gain score percentage	64 %	

The number of students who took the Pretest and Posttest was 14. The average value obtained from the Pretest is 60.71, while the Posttest average is 84.64. This shows

an increase in the results of the Pretest and Posttest given to students after using HOTS-based Learner Worksheets (LKPD) in learning. By referring to the Pretest and Posttest values, the N-gain value is 0.63, meeting the value range of $0.3 < g \leq 0.7$ with a moderate category, with fairly effective criteria.

Discussion

The findings in this study indicate that HOTS-based LKPD can improve students' higher-order thinking skills in learning science material on changes in the form of objects in elementary schools. Students can hone their high-level thinking skills by participating in learning, conducting experiments as part of learning activities, and working on student activity sheets by including instructions and processes. This Development produces HOTS-based LKPD on the material of changes in the form of objects for grade IV elementary school students that are valid, practical, and effective. The research (Purwasi, 2020) also explained that HOTS-based LKPDs that have met the valid, practical, and effective aspects can facilitate students in practicing their high-level thinking skills, carry out scientific work activities, and guide students to think at a high level.

HOTS (Higher Order Thinking Skills) thinking indicators are used as a reference to see the achievement of students' higher-order thinking skills. Indicators of higher-order thinking skills were analysed to see the achievement of the skills trained. The LKPD in this study is prepared based on the aspects to be achieved in the indicators so that it can help students to develop and apply their knowledge, understand learning materials in depth, and provide opportunities to elaborate concepts based on the solution to a problem so that it can trigger the Development of students' higher order thinking skills.

This HOTS-based LKPD contains learning activities and relevant images to stimulate students' interest in learning. This is based on the opinion (Sabaniah et al., 2019) that one of the components that supports efforts to improve students' higher-order thinking skills is learning with the use of teaching materials tailored to students' characteristics and needs.

The Design of LKPD in this study is adjusted to the questions and materials related to the stages of the HOTS thinking process that encourage students to develop their high-level thinking skills. The creative thinking process stage consists of three aspects: analysing, evaluating, and creating. High-level thinking skills can be improved if students are accustomed to performing each stage.

At the LKPD development stage validated by two expert validators, the feasibility of HOTS-based LKPD media gets a decent and valid category with a score of 89.5%. Meanwhile, the feasibility of creativity-based LKPD material gets a percentage score of 91% and is included in the very feasible/valid category. This shows that this creativity-based LKPD is suitable as additional teaching materials for teachers in learning science regarding changes in the form of objects in elementary schools.

At the dissemination stage, researchers spread the LKPD to find out how far the understanding of the material that students master after using the creativity-based LKPD developed in this study, after making revisions based on input from the validator. Then, from the results of the trials, the researchers received a good assessment to conclude that the creativity-based LKPD developed had been completed and the final product obtained. Based on the results of the above research, there is success in learning science after using HOTS-based LKPD on the material of changes in the form of objects. From several existing studies, HOTS-based LKPD was successfully developed. HOTS-based LKPD is a tool to help and facilitate teaching and learning activities so that learning is more interactive and practical, and can train students' higher-level thinking skills.

4. Conclusion

This study aims to develop HOTS-based LKPD on the material of Changes in the Form of Objects for grade IV elementary school students and determine the validity, practicality, and effectiveness level. The results showed that the developed LKPD met the criteria as a valid, practical, and effective learning tool. The validity of the LKPD is reflected in the assessment of experts who stated that the content and appearance of the LKPD are consistent with the characteristics of HOTS and the needs of science learning in elementary schools. The practicality of the LKPD is shown through positive responses from teachers and students, who find the LKPD easy to use and interesting in the learning process. The effectiveness of the LKPD is reflected in the increase in students' higher-order thinking skills after using the LKPD. Overall, the purpose of this research was well achieved, namely to produce HOTS-based LKPD products that can optimally support learning. This research contributes positively to developing learning media that promote 21st-century skills, especially critical and creative thinking.

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