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Improving Elementary Students Science Problem Solving Ability with HOTS-based LKPD

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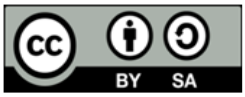

ABSTRAK

Salah satu tuntutan keterampilan abad 21 adalah kemampuan berpikir kritis dan pemecahan masalah. Namun kegiatan pembelajaran IPA di sekolah dasar masih belum optimal ditunjukkan dengan proses pembelajaran yang kurang berorientasi pada siswa dan belum merangsang siswa untuk berpikir tingkat tinggi (HOTS). Kajian ini bertujuan melaksanakan pengembangan LKPD berbasis HOTS. Jenis kajian ini ialah penelitian pengembangan mempergunakan pemodelan ADDIE dengan lima tahapan yakni analize, design, development, implementation, serta evaluation. Subjek penelitian ini berupa produk LKPD berbasis HOTS, objek kajian ini ialah validitas, kepraktisan, dan efektivitas produk LKPD berbasis HOTS. Subjek uji coba melibatkan 25 orang siswa kelas V dengan kemampuan pemecahan masalah yang dijadikan sebagai objek uji coba. Metode pengumpulan data mempergunakan kuesioner. Hasil penelitian menyatakan LKPD berbasis HOTS yang sudah dilakukan pengembangan mendapat skor validitas ahli materi senilai 92,38% serta skor validitas ahli media pembelajaran senilai 94,50%. Skor kepraktisan respons guru senilai 97,49%, skor respons siswa uji perorangan senilai 96,36%, skor respons siswa uji kelompok kecil senilai 95,75% sehingga dinyatakan valid dan praktis berkualifikasi sangat baik. Uji efektivitas mempergunakan metode uji-t memperoleh nilai Sig 0,000 < 0,05. Sehingga LKPD berbasis HOTS efektif untuk meningkatkan kemampuan pemecahan masalah IPA.

ABSTRACT

One of the demands of 21st century skills is the ability to think critically and problem solve. However, the implementation of science learning in elementary schools is still not optimal, indicated by the learning activites that is less student-oriented and has not stimulated students to think at a high level (HOTS). This study aims to develop HOTS-based LKPD. This type of research is development research using ADDIE modeling with five stages as follows analyze, design, development, implementation, and evaluation. The subject of this research is HOTS-based LKPD products, the object of this research is the validity, practicality, and effectiveness of HOTS-based LKPD products. The test subjects involved 25 fifth grade students with problem solving skills who were used as test objects. The data collection method used a questionnaire. This study encompasses both qualitative and quantitative analysis techniques. The results stated that the HOTS-based LKPD that had been developed received a material expert validity score of 92.38% and a learning media expert validity score of 94.50%. The teacher response practicality score was 97.49%, the individual test student response score was 96.36%, the small group test student response score was 95.75% so that it was declared valid and practical with E quality. The effectiveness test using the t-test method obtained a Sig value of 0.000 < 0.05. So that HOTS-based LKPD is effective in improving science problem solving skills.

1. INTRODUCTION

The role of education is very large in preparing and developing reliable human capital that can compete in a healthy manner but also has a sense of togetherness among fellow human beings that has increased (Alpian et al., 2019; Halawa & Mulyanti, 2023). Education serves as the primary tool in navigating the present age of globalization, characterized by advancements in science and technology

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(IPTEK) so that students must be able to learn to use the right technology in everyday life (Lestari, 2018; Rahayu et al., 2022). There are at least seven types of skills needed to help life in the 21st century, namely (1) curiosity and imagination; (2) ability to analyze and access information; (3) ability to communicate effectively both in writing and orally; (4) entrepreneurial spirit and initiative; (5) adaptability and agility; (6) leadership and collaboration; (7) critical thinking and problem solving skills (Hermansyah, 2019; Mardhiyah et al., 2021). Science learning in elementary school is an integrated concept because it has not been separated separately such as chemistry, physics and biology subjects (Fetty Primadini et al., 2019; Tri Pudji Astuti, 2019). Science is a science that involves how to work, how to think, and how to solve problems, not just a pile of knowledge about objects and living things, so that in examining and exploring information about existing natural phenomena is carried out through a scientific process (Amalia & Hardini, 2020; Swiyadnya et al., 2021). Science learning activities characterized by critical thinking and creativity, applied technology and work in collaboration with high standards of personal responsibilities and communication, contributes to meeting the needs of 21st century skills in all disciplinary.

Based on data taken from the Program for International Student Assessment (PISA) 2018 Indonesia's ranking on mathematics literacy and science literacy is very low, the score for mathematics is around 379 and the score for science is 396. The Trends in International Mathematics and Science Study (TIMSS) survey also shows that cognitive abilities in math and science are very low. The facts above show that students in Indonesia are not ready to compete globally in the field of literacy, so it is very important to improve higher order thinking skills in science subjects (Amaliya & Fathurohman, 2022; Hadi & Novaliyosi, 2019). One of the problems in learning science is the low ability of students in problem solving, which is caused by students considering science learning difficult to understand. This is characterized by students' difficulty in solving problems and determining answers quickly. Problem solving is part of a very important need because in the learning activites students can gain experiences in using their knowledge and skills to apply to solving problems encountered in everyday life and non-routine problems (Civil et al., 2020; Nurfatanah et al., 2018). Assessment habits in Indonesia are more oriented towards measuring low-level thinking skills or lower order thinking skills (LOTS) students have not been optimally trained to develop higher order thinking skills (HOTS) (Badjeber & Purwaningrum, 2018; Ichsan, 2022).

HOTS is a thought that challenges students to interpret, evaluate, or manipulate information. Higher order thinking is the skill of processing information to be more developed because it emphasizes the manipulation of information so that there are new things that students find. HOTS indicators include the levels of analyzing (C4), evaluating (C5) and creating (C6). One of the thinking skills that students must have is higher order thinking skills (Dermawan et al., 2021; Dinni, 2018; Pebriani et al., 2022). However, the facts in the field found several problems including: (1) Certain students encounter challenges comprehending scientific concepts, leading to lower academic performance in science, (2) learning is not optimal because it does not provide opportunities for students to actively discover learning concepts so that it has not stimulated students to be able to think at a high level (HOTS), (3) students are less structured in working because the questions given are only based on questions in the learning book, (4) the current approach to science education neglects the cultivation of students' problem-solving abilities, as teachers do not utilize learning support materials such as LKPD to facilitate the learning process. To solve these problems, it is necessary to develop learning tools that can be a solution to student learning problems, namely HOTS-based LKPD (Learner Worksheet).

Moreover, this development aims to produce LKPDs that can encourage students to be more active in participating in science learning and thinking at a high level in solving problems so that the learning process runs optimally by applying a student-centered learning approach. LKPD is teaching material that contains instructions for students to solve a problem so that student activity and creativity increase and learning material can be conveyed optimally (Pawestri & Zulfiati, 2020; Praspita & Rosy, 2020; Utami & Dafit, 2021). Some research that has been carried out previously reveals that HOTS-based LKPD can train students' ability to think at a higher level (Nadifatinisa & Sari, 2021; Purwasi & Fitriyana, 2020). During the implementation of HOTS-based LKPD in the learning process, students experience enhanced comprehension of the material due to the user-friendly nature of the student worksheets. The content aligns with the student book, ensuring clarity and capturing students' interest. Consequently, students exhibit increased enthusiasm as learning becomes more engaging, interactive, and innovative (Muzayyanah et al., 2021; Nadifatinisa & Sari, 2021). The use of HOTS-based LKPD causes students to easily learn the material and be more enthusiastic in paying attention and understanding the teaching materials presented (Aditama et al., 2019; Utami & Dafit, 2021). From the findings of several studies, it can be concluded that the implementation of HOTS-based LKPD in education has shown positive effects in enhancing student learning outcomes. However, none of these studies have specifically focused on the improvement of problem-solving skills in science learning through the use of HOTS-based LKPD.

Therefore, the present research aims to fill this gap by developing valid, practical, and effective HOTS-based LKPD products that target the enhancement of fifth-grade students' problem-solving skills in science.

2. METHOD

The present study is classified as a Research and Development (RnD) research, focusing on the development of educational materials. The ADDIE development model, consisting of five stages, namely analysis, design, development, implementation, and evaluation, is employed as the framework for this research (Tegeh & Kirna, 2013). This model was selected due to its structured and well-defined stages in addressing educational challenges, making it an appropriate choice for the development design. The steps of the ADDIE development model can be visually shown in Figure 1.

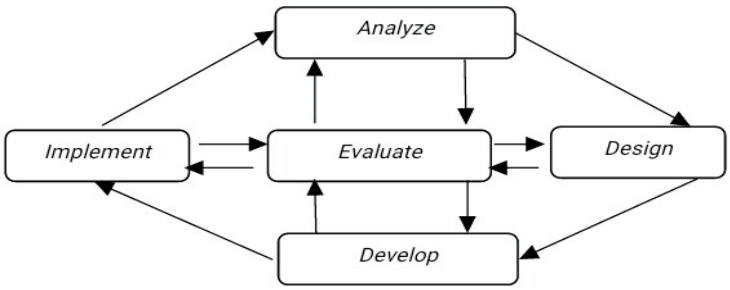

Figure 1. ADDIE Development Model Visually

The first stage is the analysis (analyze). In this phase, an assessment of needs, analysis of student characteristics, and curriculum analysis were conducted using methods such as observation and interviews. The second stage is design, in this stage the initial product preparation is carried out, showing and consulting the product with the supervisor so that suggestions and input are given to the product, as well as the preparation of instruments consisting of material validity instruments, media validity instruments, teacher/teacher practical instruments, student response instruments, and LKPD effectiveness instruments on problem solving abilities. The third phase involves implementing the validated HOTS-based LKPD for science learning in fifth grade. The objective of this stage is to monitor and assess the user's response to the provided LKPD during the learning process, ensuring its effectiveness and suitability. The activities carried out at the implementation stage were pretest and posttest trials which aimed to determine the effectiveness of the HOTS-based LKPD that had been developed on students' natural science problem solving abilities at SD Negeri 1 Banjar Anyar. Then proceed with the evaluation stage, in the evaluation stage formative evaluation activities are carried out at each stage and summative evaluations are carried out at the end of the study. At this evaluation stage, reflection on the development activities carried out was also carried out and conclusions were drawn regardin the effectiveness of the HOTS-based LKPD that was developed.

Product trials were conducted to determine the feasibility of the HOTS-based LKPD products developed. The feasibility or validity of the HOTS-based LKPD is carried out by conducting expert reviews by experts to find out the validity of the LKPD. Two experts, namely media experts and material experts, conducted evaluations to assess the suitability of the HOTS-based LKPD. Limited trials were conducted, involving practitioners and students, to gather feedback on the practicality of the developed product from both teachers and students. Student responses were obtained through individual tests and small group tests. The test subjects in the expert trial stage involved 2 material experts, 2 media experts, and 2 practitioner experts (teachers). Individual test subjects involved 3 students, small group test subjects involved 9 students, and subjects in the effectiveness test phase involved 25 students.

Data collection methods in this study using test and non-test methods. The test method in this study used an objective test, while the non-test method in this research used a questionnaire to gain data on the results of validity, practitioners/teachers and students of the product being developed. In this study, data collection was conducted using a rating scale and a questionnaire to assess the feedback of both teachers and students regarding the HOTS-based LKPD. Table 1, Table 2, Table 3, and Table 4 present the product assessment grid for material experts, media experts, teacher/practitioner experts, and student responses, respectively.

Table 1. Grid of Learning Material Expert Instruments

No	Indicator	Sub- Indicator	Item Number
1.	Content Quality	Clarity of learning material and arranged systematically.	1
		The truth of the concept of Science Material	2
		Compatibility with Basic Competencies, indicators and learning objectives.	3
		Suitability of LKPD based on HOTS indicators.	4
		Compatibility of images with Science material.	5
		OTS-based LKPD are crafted to be concise, comprehensive, and easily to understand.	6
		Compatibility of evaluation with Science Material.	7
2.	Accuracy of Materials and Questions	Accuracy of concepts and definitions.	8
		The accuracy of the images contained in the HOTS-based LKPD.	9
		The accuracy of the questions on the HOTS-based LKPD is based on natural science material.	10
3.	Up-to-date materials and practicum questions	Presentation of images is easy to understand and in accordance with science material.	11
		The use of questions covers the application of everyday life.	12
		The materials provide relevant learning experiences.	13
		Total	**13**

Table 2. Learning Media Expert Grid

No	Indicator	Sub-Indicator	Item Number
1.	LKPD display	The clarity and completeness of LKPD content	1
		Type and size accuracy.	2
		Image clarity.	3
		The attractiveness of LKPD design.	4
2.	The attractiveness of LKPD.	Image layout suitability.	5
		The color combinations of the LKPD used are appropriate and look attractive.	6
		Grammar usage.	7
		Sentences do not have a double meaning.	8
		Image attractiveness.	9
3.	Easiness of LKPD	Easy to use.	10
		Encourage students to find their own concepts/procedures.	11
		Clarity of instructions or directions of LKPD.	12
		Total	**12**

Table 3. Teacher/Practitioner Instrument Grid

No	Indicator	Sub- Indicator	Item Number
1.	Content Quality	LKPD suitability with student characteristics.	1
		Clarity of work systematics on LKPD.	2
		Clarity of each LKPD item.	3
2.	Visual	Image clarity on LKPD.	4
		Attractiveness of colors, backgrounds, and images	5
		The accuracy of LKPD color contrast.	6
3.	Typography	Selection of text type in LKPD.	7
		Precision of text size in LKPD	8
4.	Assessment	The suitability of the questions referred to in the LKPD with regard to the information provided	9
5.	Material	Suitability of LKPD with learning objectives.	10
		Suitability of learning materials with Basic Competencies and learning objectives.	11
		Accuracy of materials and concepts.	12

No	Indicator	Sub- Indicator	Item Number
		Appropriateness of perceptions/illustrations with the material.	13
		The accuracy of examples of cases/events included in the LKPD.	14
		The precision and coherence of the content distribution	15
		Facilitate students' comprehension of the content	16
		Encourage students to find their own procedures/concepts.	17
		LKPD improve students' problem solving abilities.	18
6.	Language	Language suitability with Indonesian rules.	19
		The use of the sentences is simple to comprehend	20
		Appropriateness of language level with students' cognitive	21
7.	Integration	LKPDs have attractiveness.	22
		Compatibility of pictures and illustrations on LKPD.	23
		Clarity of each LKPD item.	24
		Total	**24**

Table 4. Individual Test and Small Group Test Grids

No	Indicator	Sub- Indicator	Item Number
1.	Display of LKPD	Image clarity.	1
		LKPD Design.	2
		The size and style of the letters are clear..	3
		Appropriateness of layout and drawings.	4
		The color combinations of the LKPD used are appropriate and look attractive.	5
		Image attractiveness.	6
2.	The attractiveness of LKPD	Explanation of material in LKPD can be understood easily.	7
		LKPD questions and sentence structures are easy to understand.	8
		The questions in the LKPD are easy to understand.	9
3.	Easiness of LKPD	Ease of use of LKPD.	10
		The language employed is readily comprehensible.	11
		Total	**11**

The research methodology employed in this study encompasses both qualitative and quantitative analysis techniques. Quantitative analysis used includes descriptive statistical analysis and inferential statistical methods. Descriptive analysis methods are used to classify data, work on, describe, and present research data. The inferential analysis method serves to determine the comparison of pre-test values and post-test values. The inferential statistical analysis used in this study consisted of a normality test of data distribution using the Shapiro-Wilk formula, homogeneity of variance test and hypothesis testing with a correlated t-test technique (Paired Sample t-test) to analyze the effectiveness of LKPD on science problem solving abilities.

3. RESULT AND DISCUSSION

Result

The design of the HOTS-based LKPD was designed with Microsoft Word which was later developed with Canva application/software. The HOTS-based LKPD developed is A4 in size which contains material on the process of heat transfer in everyday life. The developed LKPD contains problem analysis, practical exercises and questions to train students to find student problems that are in accordance with HOTS indicators. This HOTS-based LKPD consists of three meetings in accordance with the learning in Theme 6 Subtma 3 class V which is printed and given to students directly at school and students can immediately answer through the printed LKPD. HOTS-based LKPD product development using the ADDIE model. The ADDIE model consists of five phases: analysis, design, development, implementation, and evaluation. During the analysis phase, a thorough needs assessment is conducted, along with an examination of student characteristics and curriculum analysis. This includes analyzing core competencies and competency achievement indicators, which serve as a basis for LKPD preparation. Then at the design stage the initial product preparation was carried out by making flowcharts and storyboards as a reference in product development, and continued with the preparation of instruments consisting of

learning material validity instruments, learning media validity instruments, teacher response practical instruments and student responses, as well as instruments effectiveness of HOTS-based LKPD. In the third stage, namely the development stage, HOTS-based LKPD product development was carried out in accordance with the flowcharts and storyboards that had been made previously. The results of the development are in the form of HOTS-based LKPDs to improve the ability to solve science problems, while the results of the development are shown in Figure 2.

Figure 2. HOTS-Based Worksheet Development Results

Base on Figure 2, the LKPDs developed were 3 LKPDs for 3 meetings. Furthermore, in the implementation phase, the pretest-posttest was carried out before the HOTS-based LKPD was applied in the learning process and the posttest was given after the HOTS-based LKPD was implemented. The implementation of the HOTS-based LKPD was applied to all VA class students in three meetings. Finally, at the evaluation stage through formative evaluation. Formative evaluation is carried out with the aim of identifying and correcting deficiencies that are still present in the product being developed.The validity of HOTS-based LKPD development was carried out by learning material experts and learning media experts. The recapitulation of the results of the assessment of learning material experts and learning media experts is shown in Table 5.

Table 5. Validity of HOTS-Based LKPD

No	Expert	Result	Qualifications
1.	Learning Materials Expert	92.38%	Excellent
2.	Learning Media Expert	94.50%	Excellent

Practicality carried out on teachers/practitioners, individual tests, and small group tests. The results of the practicality test of HOTS-based LKPD products are presented in Table 6.

Table 6. Practicality of HOTS-Based LKPD

No	Expert	Result	Qualifications
1.	Teacher / Practitioner Practicality Test	97.49%	Excellent
2.	Individual Trial	96.36%	Excellent
3.	Small Group Trial	95.75%	Excellent

The effectiveness of HOTS-based LKPD development is shown by the results of the pretest and posttest. Obtained an average pretest value of 52.8 and the results of an average posttest value of 91.2. The research data described are the results of the pretest and posttest given through multiple choice questions to determine the effectiveness of the HOTS-based LKPD before and after being given treatment is shown in Table 7.

Table 7. Summary of Pretest and Posttest Scores

No	Learning Outcomes	Average Value
1.	*Pretest*	52.8
2.	*Posttest*	91.2

Based on the analysis of pretest and posttest results, a prerequisite test was conducted using the IBM SPSS Statistics 22 application to assess normality and homogeneity. The significant value (Shapiro-Wilk) for the pretest data was 0.336, and for the posttest data it was 0.025. The results indicated that the Sig. values were greater than 0.05 for both datasets, suggesting that the data followed a normal distribution. The homogeneity test showed a significant value (Based on Mean) of 0.151, indicating that the data variances were homogeneous. Therefore, the prerequisite test requirements were met, and further hypothesis testing can be conducted.

The hypothesis in this study was tested using the Paired Sample T-Test or Correlated Sample t-test. The analysis was conducted with the assistance of the IBM SPSS Statistics 22 program, and the obtained significance value was 0.000. The results indicated that the Sig. value was less than 0.05, leading to the rejection of H0 and acceptance of Ha. This means that there is a significant difference in the ability to solve science problems before and after join in learning using HOTS-based LKPD media.

Discussion

This development research produced HOTS-based LKPD development products to improve the ability to solve science problems for class V which focuses on science content on theme 6 *(Panas dan Perpindahan)* sub-theme 2 *(Perpindahan Kalor di Sekitar Kita)* to support the learning of fifth grade elementary school students. This research aims to developing learning teaching materials that can help students in understanding learning materials and can think creatively and critically in solving problems. This HOTS-based LKPD is equipped with interesting pictures and in line with the characteristic of primary school children and the questions contained in this LKPD are easy to understand and students can find the concept of *Perpindahan Kalor di Sekitar Kita*. In addition, this HOTS-based LKPD consists of 3 meetings, each meeting has a different topic of discussion. In general, the characteristics of students in high grades are in line with the learning process that uses a variety of HOTS questions. The characteristics of fifth grade primary school age children are happy to work in groups , happy to play, happy to move, and happy to try something new to them. The fifth grade students are also in the learning process already able to learn by themselves without repeated explanations by the teacher in preparing the students' own needs in the learning process. For example, doing assignments and paying more attention to the teacher when explaining the lesson in front of the class.

This HOTS-based LKPD is designed to be used by teachers and students in science class. HOTS is defined as an ability that involves creative power and critical thinking to solving a problems. A person with high-level of thinking skills should be capable of analyzing, connecting, parsing and interpreting problems to find a solution or a new idea. HOTS is at the level of analyzing, evaluating to creating (Hajaroh, 2022; Saraswati & Agustika, 2020). So that students can think creatively and critically in an effort to determine problem solving and decision making with maximum confidence (Gowasa et al., 2019; Prajono et al., 2022). Development research uses the ADDIE model with five stages, namely the analysis, design, development, implementation and evaluation so that the development carried out is more structured and in accordance with the learning design. This statement is in agreement with the opinions of previous study who argues that development using the ADDIE model is carried out systematic manner and remains on the scientific basis of a learning model and allows for evaluation at each stage, so as to minimize errors (Tegeh & Kirna, 2013).

The results of this study are HOTS-based LKPD to improve science problem solving skills that are valid, practical, and effective to use. The validity results show as follows: (1) assessment of learning material experts by obtaining a score of 92.38% with excellent qualifications, (2) assessment of learning media experts by obtaining a score of 94.50% with excellent qualifications, (3) teacher response assessment results of 97.49% with excellent qualifications, (4) individual trial assessment results of 96, 36% with excellent qualifications, (5) the results of the small group test assessment of 95.75% with excellent qualifications and (6) the results of significance (2-tailed) obtained results of 0.000 <0.005 so that there are significant results of increasing the science problem solving ability of fifth grade students of SD Negeri 1 Banjar Anyar after being given HOTS-based LKPD. The validity of this HOTS-based LKPD is determined based on the assessment results from learning material experts and learning media experts. These results are known by using a rating scales. The results of the assessment of learning material experts, HOTS-based LKPD developed obtained 92.38% with excellent qualifications. Aspects of

assessment in the expert test of learning materials include aspects of content quality, aspects of accuracy of material and questions, and aspects of material updates and practicum questions. In the aspect of content quality includes clarity of material, basic competencies, indicators, presentation of objectives and the correctness of the concept. Furthermore, aspects of the accuracy of the material and questions include the accuracy of concepts, images and questions. While the aspects of updating the material and practicum questions cover the presentation of pictures, the questions cover the application of everyday life, providing relevant learning experiences. The preparation of LKPD needs to be considered in accordance with the content of LKPD with the material and learning objectives to be achieved so that later LKPD can be used optimally. The material used in the LKPD is in accordance with what is contained in the curriculum and in accordance with the learning objectives to be achieved by the students (Nareswari et al., 2021; Suwastini et al., 2022). This is in accordance with the previous study which stated that in the development of LKPD, it is important to consider the suitability of learning goals, basic competencies, and the indicators to be achieved in learning as well as the material in the LKPD so that it is conveyed clearly and coherently (G. Y. M. A. Putra et al., 2021; I. M. C. W. Putra et al., 2022). In addition, by discovering concepts themselves and solving contextual problems through their learning experiences, the knowledge is easier to stick in students' memories (Lailiah et al., 2021; Pratiwi & Margunayasa, 2022). Based on this, it can be concluded that the suitability between basic competencies, indicators, objectives and learning content is needed to facilitate the learning process so that there is an increase in the quality of learning.

According to the evaluation conducted by the learning media expert, HOTS-based LKPD achieved a score of 94.50%, indicating an excellent qualifications. The research aspects in the learning media test include aspects of the appearance of LKPD, aspects of the attractiveness of LKPD, aspects of the ease of LKPD. In the aspect of LKPD display, it covers the accuracy, clarity, completeness and design of LKPD. The aspect of the attractiveness of LKPD includes suitability, combination of images and colors and the use of grammar in LKPD. The ease aspect of LKPD includes ease of use and clarity of LKPD instructions or directions. The LKPD display is presented with various colors and interesting pictures and designs according to the characteristics of students so that the LKPD becomes more interesting so that students are more interested in using the LKPD (Pane et al., 2022; Sugiyanto et al., 2018). In addition, the appearance of the LKPD is made as attractive as possible with the appropriate background color, writing, and graphics that will give students a comfortable impression when reading and working on LKPD (Aprilda et al., 2021; Idayanti & Sujana, 2022). The attractiveness of the LKPD display can affect students' enthusiasm in using and working on LKPD.

In terms of practicality, the HOTS-based LKPD in using the product is very good and feasible to be implemented in learning activities. Judging from the assessment results of the teacher's responses of 97.49% with excellent qualifications. The aspects of assessment in the teacher's response contain aspects of content quality, visual, typography, assessment, material, language, and integration. Content quality aspects comprise the suitability of LKPD with student characteristics, clarity of work systematics, clarity of each LKPD item. Visual aspects include image clarity, color attractiveness, images, backround, and color contrast. The typography aspect includes text selection and text size. The assessment aspect is the appropriateness of the questions that presented with the materials. The material aspect includes the suitability of basic competencies, learning objectives, the suitability of illustrations, the accuracy of material and events, the provision of division and sequence of material. The linguistic aspect includes language rules, easy-to-understand sentences, and language level suitability. The aspect of integration includes the attractiveness and suitability of the image.

Practicality can also be seen from student responses, namely individual tests and small group tests getting results amounting to 96.36% and 95.75% with excellent qualifications. Aspects of student response assessment include LKPD display aspects, quality aspects, and convenience aspects. In the LKPD display aspect, it includes clarity of images, LKPD design, fonts used, layout, color combinations. Furthermore, the quality aspect includes material, sentence structure, and questions that are easy to understand. While the convenience aspect includes ease of use and the language used. This could make it more convenient for students to study on their own by following the instructions that are already available in it and make it easier for teachers to guide students in the learning activity. During the learning processes, learning media can support the explanations delivered by the teacher, attract and direct students' interests to follow the lessons, and increase students' interest and motivation in learning and doing the assignments given (Puspita & Dewi, 2021; Widiarta et al., 2019). After conducting product validation and practicality, the next test of the effectiveness of using HOTS-based LKPD to increase science problem solving was conducted by analyzing the results of the pretest and posttest scores of class V students who were used as test subjects. Of the 25 VA students of SD Negeri 1 Banjar Anyar, the value analysis of Paired Sample T-Test / Correlated Sample T-Test was obtained using the help of the IBM SPSS Statistics 22 program, the significance value was 0.000. It shows that the use of HOTS-based LKPD is able

to increase students' science problem solving skills. This is evidenced by the achievement of problem solving ability indicators including understanding the problem, developing a strategy or solution design, and solving the problem according to plan. Indicators of problem solving ability are combined with HOTS indicators, namely C4, C5, C6 and adapted to concrete operational verbs (KKO) of Bloom's revised taxonomy. Through the questions given in the pretest-posttest developed based on problem-solving indicators, it can guide students in learning, encourage students to find their own knowledge, where the teacher introduces a problem that involves students to use concepts and then find ideas by using formal thinking patterns that can train problem-solving skills. In addition, using HOTS questions can also make an individual able to interpreting, analyzing and manipulating acquired data. Proficiency in advanced cognitive abilities can be observed through students' aptitude in tasks involving analysis, evaluation, and creation (Angraini & Sriyati, 2019; Fikri et al., 2022). This is in line with what is explained that activities related to higher order thinking skills encompass problem-solving abilities, innovative thinking, critical analysis, persuasive skills, and decision-making proficiency (Fanny, 2019; Saraswati & Agustika, 2020). As a result, students become more engaged in resolving complex problems and achieving tangible outcomes.

The constraints of this research can be identified in terms of the subject matter coverage, level of difficulty, and learning content incorporated in the E-LKPD, as well as the sample size employed for assessing the effectiveness of the product. In this study, the E-LKPD product's content was specifically focused on science learning, specifically theme 6 *(Panas dan Perpindahan)*, subtheme 2 *(Perpindahan Kalor di Sekitar Kita)*, targeting fifth-grade students in elementary school. The effectiveness test was conducted with a sample size of one class, comprising 25 students from SD Negeri 1 Banjar Anyar. The significance of this study suggests that the utilization of HOTS-based LKPD to enhance problem-solving skills in science among fifth-grade students can serve as instructional materials to optimize the attainment of predefined learning goals. For students, the development of HOTS-based LKPD helps students to be actively participating the problem solving process and fosters an independent attitude in order to gain a more meaningful learning experience and be able to improve science problem solving skills.

4. CONCLUSION

Based on the results and discussion, the conclusion of this research is that HOTS-based LKPD to improve fifth grade science problem solving skills is declared valid, practical and feasible with excellent qualifications, and has a significant effect on improving fifth grade science problem solving skills in elementary schools. The research specifically concentrated on the content of the E-LKPD related to science education, specifically addressing theme 6 (Heat and Transfer) and subtheme 2 (Heat Transfer in Our Surroundings), with a target audience of fifth-grade elementary school students.

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