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Student Worksheets Based on HOTS-Oriented Case Studies to Improve Critical Thinking Skills of Fourth-Grade Elementary School Students

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ABSTRAK

Rendahnya kemampuan berpikir kritis menjadi permasalahan utama penelitian ini. Penelitian ini bertujuan untuk menciptakan LKPD berbasis studi kasus berorientasi HOTS pada materi perubahan wujud benda di kelas IV SD. Penelitian ini berjenis penelitian pengembangan (R&D) dengan menggunakan model pengembangan ADDIE. Data utama bersumber dari subjek siswa kelas IV SD berjumlah 25 siswa. Data dianalisis secara deskriptif dan kuantitatif. Data dianalisis melalui uji validitas dan uji kepraktisan dengan rentang rata-rata dan analisis efektivitas dengan uji-t. Uji validitas dilakukan penilaian oleh ahli, uji kepraktisan dilakukan penilaian oleh guru dan siswa selaku praktisi dan uji efektivitas. Berdasarkan rata-rata hasil penilaian ahli isi dan media memperoleh hasil sebesar 93,33% dan 94,80% dengan kualifikasi sangat baik. Kemudian hasil rata-rata uji kepraktisan oleh guru memperoleh hasil sebesar 92,73% dengan kualifikasi sangat baik dan dari siswa sebesar 94,28% dengan kualifikasi sangat baik. Berdasarkan uji coba pada siswa, perolehan nilai signifikansi dinyatakan efektif untuk meningkatkan kemampuan berpikir kritis siswa kelas IV di SD. Jadi, LKPD berbasis studi kasus berorientasi HOTS pada materi perubahan wujud benda di kelas IV SD yang dikembangkan layak sebagai bahan ajar karena terbukti valid, praktis, dan efektif digunakan untuk meningkatkan kemampuan berpikir kritis siswa kelas IV SD.

ABSTRACT

Low critical thinking skills are the main problem of this research. This research aims to develop LKPD based on HOTS-oriented case studies on material changing the shape of objects in class IV elementary school. This research is of the research and development (R&D) type using the ADDIE development model. The main data comes from the subjects of class IV students at SD No. 2 Gulingan, Mengwi District, totaling 25 students. Data was analyzed descriptively and quantitatively. Data were analyzed through validity and practicality tests with average ranges and effectiveness analysis with t-tests. Experts assess the validity test, the practicality test is assessed by teachers and students as practitioners, and the effectiveness test is a field test on students to see its effectiveness on critical thinking abilities. Based on the average assessment results of content and media experts, the results were 93.33% and 94.80% with very good qualifications. Then, the average result of the practicality test by teachers was 92.73% with very good qualifications, and from students, it was 94.28% with very good qualifications. Based on trials on students, the obtained significance value (2-tailed) < 0.05, namely 0.00 < 0.05, so the LKPD developed was declared effective in improving the critical thinking skills of fourth-grade students in elementary school. So, the HOTS-oriented case study-based LKPD material on changes in the form of objects in class IV elementary school, which was developed, is suitable as teaching material because it has been proven to be valid, practical, and effectively used to improve the critical thinking skills of class IV elementary school students.

1. INTRODUCTION

Awareness of education is something good for the future. This is proven by the community, which continues to care about educational developments and changes. With education, a person will gain various knowledge and develop their competencies. Education is a process that humanizes and matures humans and improves human behavior. Education is an effective means to achieve the goals of the Indonesian state,

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to educate the nation's life. Education is a comprehensive activity involving various components closely related to each other (N. Abdullah et al., 2022; Sutrisno, 2016). Education aims to develop a person's potential and make someone smarter to become better than before (M. Abdullah, 2022). Education is closely involved with implementing learning in schools, including students, educators, and learning resources. Education teaches students how to think when dealing with a problem. Students are directed to be able to think critically, think at a high level, and be independent in learning activities. Based on its depth, thinking can be categorized into High Order Thinking Skills (HOTS) and Low Order Thinking Skills (LOTS) (Mujib & Mardiyah, 2017; Utami & Dafit, 2021). Low Order Thinking Skills (LOTS) are the thinking abilities of students who obtain information by copying, imitating, remembering, or memorizing and following directions from other people (Nurjanah et al., 2021). Meanwhile, high-order thinking skills (HOTS) are a process carried out by students to analyze information and ideas in a certain way to give them a new understanding of the implications (Fanani, 2018).

In this 21st century, students must possess high-level thinking skills to improve their quality of life. HOTS contains student activities for problem-solving, creative thinking, critical thinking, argumentation, and decision-making skills (Dinni, 2018) Sari, Yuanita, et al., 2019). Critical thinking and creative thinking are called HOTS because, at this stage, students can see a complex problem more deeply from various sides and analyze a problem carefully to find an efficient solution to the problem (Susilowati & Sumanji, 2020). Thus, HOTS and critical thinking are closely related to supporting students' abilities in solving problems they are facing (Anggraeni, 2020; Mardhiyah et al., 2021). HOTS and critical thinking have the same character but different references; HOTS has a reference at the cognitive level consisting of 3 indicators, namely analysis, synthesis, and creation. Critical thinking also has three indicators, namely analysis, evaluation, and making valid arguments (Susilowati & Sumaji, 2021). In the independent curriculum, students are expected to be able to develop their knowledge. Teachers can facilitate students by presenting activities that enable students to think critically and at a high level. Students are expected to be given supporting teaching materials, such as interesting Student Worksheets that contain questions or activities that enable students to think at a high level. Students are expected to have critical thinking skills when working on questions in the Student Worksheet. The indicators of critical thinking skills include formulating problems, analyzing arguments, asking and answering questions, observing and assessing observation reports, evaluating, deciding and implementing, and interacting with others (Firdausi & Yermiandhoko, 2021; Ichsan et al., 2019). In addition, students are expected to be presented with Student Worksheets with an attractive design or appearance that can be studied anytime, anywhere. Through Student Worksheets, teachers can get the opportunity to encourage students to be actively involved in the material being discussed (Rahayu & Budiyono, 2018). In addition, students can better internalize the lessons they receive with an attractive design and the design of Student Worksheet activities based on HOTS-oriented case studies. Science subjects aim to make students understand science concepts and their relevance to their daily lives.

However, based on the results of observations at SD No. 2 Gulingan on October 13, 2022, teachers are still using Science Student Worksheets, which still need more material and many questions that still need to be answered to make students think critically. The Student Worksheets teachers use also have an attractive design, so students quickly get bored with learning. If the teacher cannot attend school, the teacher usually only uses the Student Worksheet to give assignments to students. However, the instructions in the Student Worksheet still need to be made easier for students to understand. In addition, based on interviews conducted with fourth-grade teachers, it was also revealed that science learning with the material on changes in the state of matter has problems, namely that students need more activities that can support them in understanding learning about changes in the state of matter consisting of melting, freezing, In addition, teachers also need help developing HOTS-based questions for science learning, revealing that the Student Worksheets used by students only contain questions that are still LOTS-based. The design needs to make students interested in working on them. This makes students less able to work on HOTS-based questions, so students' critical thinking skills are low. The use of Student Worksheets in schools still has several areas for improvement. These weaknesses include the questions in the Student Worksheets, which must be more varied and often appear in subsequent learning (Ermi, 2017; Prastowo, 2012). Apart from that, student worksheets will only make learning enjoyable if combined with other learning media or models (Ermi, 2017; Prastowo, 2012). There are concerns that teachers only rely on the Student Worksheet media and use it for personal interests. For example, students are asked to work on the Student Worksheet, and then the teacher leaves the students and returns to discuss the Student Worksheet. Student Worksheets issued by publishers tend to be less suitable for the concepts being taught; print media only emphasizes cognitive lessons, rarely emphasizing emotions and attitudes. Student Worksheets often used in schools also have instructions that still need to be clarified if understood by students themselves.

The solution to this problem is that providing learning materials in class must be done correctly and with the right media. Using the appropriate learning model will result in meaningful learning (Kholifah et al., 2023). One of the learning models that makes learning meaningful is case studies. Case studies provide an understanding of something that attracts attention, a social process that occurs, a concrete event, or the experience of a person who is the background of a case (Prihatsanti et al., 2018). Case studies also have the advantage of encouraging problem-solving, investigation, and persuasion carried out by students in learning so that students can then form a report or make a conclusion (Fiqih, 2023). In addition, case studies in their stages have activities that support students in honing their critical thinking skills. In problem-solving activities in the cases presented, students also hone their high-level thinking skills. To avoid the weaknesses of the Student Worksheet, the Didi Student Worksheet needs to be combined with a HOTS-oriented case study model. Based on the advantages of the HOTS-oriented case study model, it can create meaningful learning so that students can internalize the learning that has been done. In making it, the Didi Student Worksheet is designed attractively to increase student motivation in learning using the Didi Student Worksheet. In developing good HOTS-based items for students, teacher quality is a very important part of this case. Teachers must understand cognitive processes in low-level thinking skills (LOTS) and High-Order Thinking Skills (HOTS). In addition, teachers must be able to design HOTS-based activities (Nurjanah et al., 2021). HOTS can be presented as questions or activities carried out by students in learning.

One of the media teachers can use to support HOTS-based learning, and students' critical thinking is by presenting teaching materials. Teaching materials used by teachers and students in the learning process, complete with discussion of materials or exercises that students will solve, are called Student Worksheets, which currently have the name Student Worksheets (Utami & Dafit, 2021; Wardoyo et al., 2020). Student Worksheets are teaching materials in the form of sheets containing materials, summaries, and instructions for carrying out tasks that refer to Basic Competencies that function to make students actively involved in learning to apply the knowledge they have acquired so that teachers can find out the success of students in mastering or absorbing the knowledge that has been taught. Several previous research findings state that Student Worksheets should contain questions that hone high-level thinking skills (HOTS) so students can think critically and creatively (Aditama et al., 2019). The development of HOTS-based Student Worksheets in mathematics learning on the volume of spatial figures in grade five of SDN Sentul 1 is declared valid (Aditama et al., 2019). Developing HOTS-based thematic student worksheets for grade four elementary school students has obtained valid and practical results (Muzayyanah et al., 2020). This research aims to create a HOTS-oriented case study-based Student Worksheet on the material of changes in the form of objects in the fourth grade of elementary school. This research allows students to work on HOTS-based questions and improve their critical thinking skills.

2. METHOD

This research is a type of development research or research and development using the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation). The ADDIE model is a model that can provide an opportunity to evaluate product development activities at each stage (Tegeh et al., 2014). The selection of the ADDIE model is based on the fact that the use of this model is arranged in a programmed manner with a systematic sequence of activities to solve learning problems related to learning resources that are appropriate to the needs and characteristics of students (Tegeh & Kirna, 2013). In addition, this model is easy to understand and implement to develop products such as textbooks, learning modules, learning videos, multimedia, and so on. In the ADDIE model, there are five development steps, namely as follows. First is the analysis stage (Analyze). The analysis stage is the initial stage in development research, defining something students will learn by conducting an analysis (Sari & Harjono, 2021). The analysis stage is a process of defining something that will be learned by students, namely by analyzing student characteristics (needs assessment), identifying content (needs), and analyzing learning outcomes and learning objectives (task analysis). The second stage, namely the design stage, is carried out after completing the needs of students at the analysis stage by designing in the form of a design. This stage is also known as making a design (blueprint), which will later be assessed before the development stage is carried out. At the design stage, what is done is making a design for the Student Worksheet, which includes the design of the Student Worksheet, materials, and the preparation of questions related to HOTS on the material on changes in the state of objects.

The third stage is a development activity with a core activity to translate design specifications into physical form or realize the blueprint. In this stage, the activities carried out are the preparation of the Student Worksheet, which has been determined to be a product ready to be tested. At this stage, the product will be assessed for feasibility by media, design, and content experts. The fourth stage is implementation, which determines the response of media users. At the implementation stage, the activities carried out are

practicality tests by testing them on class teachers at SD No. 2 Gulingan. In addition, other activities at this stage are conducting pre-tests and post-tests to test effectiveness. The effectiveness test uses the One-Group Pretest-Posttest Design with t-test analysis. The fifth stage is evaluation, namely evaluating based on expert validation tests, practicality test results, and effectiveness test results to perfect the final product results. The activities carried out consist of improving the Student Worksheet's development. If there are improvements or input from experts, at the evaluation stage, the Student Worksheet is also revised to perfect the Student Worksheet that has been developed. Based on the development model, this study requires data to determine the feasibility of the product. Data was sourced from experts, practitioners, and students. Experts/specialists provide data sources for product validation and assessment instruments. Meanwhile, three teachers, homeroom teachers of grades three, four, and five of elementary schools, provided assessments through teacher response questionnaires related to the practicality of the developed Student Worksheets. The main data was sourced from fourth-grade students of SD No. 2 Gulingan, Mengwi District, Badung Regency, totaling 25 people as research subjects to determine the effectiveness of the Student Worksheets developed on students' critical thinking skills.

In this development research, data analysis is conducted to understand the success of the student worksheets that have been developed. The data analysis methods used are qualitative descriptive analysis techniques and quantitative descriptive analysis techniques. The qualitative descriptive analysis method analyzes or processes data by compiling data in a structured manner in the form of words or sentences and categories regarding objects to obtain a general conclusion (Agung, 2014). This qualitative descriptive analysis technique processes data from trials or reviews by content experts, media experts, and practicality by teachers and students. This quantitative descriptive analysis aims to test the feasibility and suitability of learning with the material from the media being developed. The quantitative descriptive analysis method is a way of processing data that is carried out by systematically compiling it in the form of numbers and percentages regarding the object being studied to obtain a general conclusion (Agung, 2014). Data analyzed through inferential statistics is used to determine the effectiveness of the product developed. The effectiveness of the developed product can be seen from the students' abilities before and after using the product, which is then analyzed using the t-test to determine the difference between the pre-test and post-test results. Before conducting a hypothesis test (correlated t-test), a prerequisite test is carried out, namely the normality and homogeneity tests.

3. RESULT AND DISCUSSION

Result

The developed Student Worksheet product can be produced by implementing the development procedure according to the stages in the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation, described in detail. First, the analysis stage is the initial stage of development research.

The analysis stage defines what students will learn by conducting a needs analysis, analyzing student characteristics (needs assessment), identifying content or contents (needs), and analyzing learning outcomes and objectives. The analysis stage obtains the needs analysis results, namely that in science learning, teachers still need to be able to design media that help them teach the material on changes in the state of objects. In addition, teachers only rely on Student Worksheets provided by the school to support learning. The teacher also revealed several areas for improvement in the Student Worksheets provided by the school, both in terms of design and content. The teacher also revealed that the Student Worksheets must be linked to other learning models to support students' learning. The analysis of student characteristics revealed that they were interested in learning using the Student Worksheets because they could be touched and used directly and contained interesting pictures. Students also revealed interest in learning in groups because they could exchange ideas. In addition, students also revealed that they had been presented with problems experienced in real life. Students also feel challenged when assigned to solve problems with their group members. The results of the analysis of learning achievements and learning objectives by analyzing the learning achievements of the Merdeka curriculum Permendikbud No. 008/H/KR/2022 in grade four, especially in CHAPTER II The Form of Matter and Its Changes, namely explaining mass and volume, the form of objects and changes in the form of matter. Then, the main material is derived into three learning objectives. Firstly, by completing the Student Worksheet, students can correctly distinguish the forms of objects. Through group discussions, students can analyze objects' properties correctly. By completing the Student Worksheet and group discussions, students can correctly identify changes in the form of objects.

Second, the design stage is carried out to prepare the developed Student Worksheet. The activities carried out in this stage are the designed Student Worksheet consisting of a cover, table of contents, Student Worksheet identity, learning outcomes, learning objectives, instructions for using the Student Worksheet,

cases regarding the form of objects, material on the form of objects, essential questions, cases of the properties of objects, material on the properties of objects, supporting activities for the properties of objects, cases of changes in the form of objects, material on changes in the form of objects, supporting activities for changes in form, summaries and practice questions and bibliographies. The Student Worksheet is printed on A4 paper using a right, left, top, and bottom margin format with a size of 2.54 cm. The Student Worksheet cover is designed with the Canva application, while the contents of the Student Worksheet are created with the help of the Microsoft Word 2019 application. Furthermore, the design is consulted with the supervising lecturer to obtain input on the initial product design that is made. Some input given by the supervising lecturer is to pay attention to the cases presented in the Student Worksheet and prepare HOTS questions in the practice questions. Based on the input provided, improvements are made before the Student Worksheet design is realized into a complete product ready to be tested on experts, practitioners, and students. Third, the development stage includes several activities, namely presenting the Student Worksheet's initial appearance, presenting the Student Worksheet trial results from content experts, materials, and practitioners, and presenting the results of the product revision according to input from content experts, media, and practitioners. The cover or cover serves to present initial information about the title, description of the contents, and learning activities carried out. The cover consists of a front cover and a back cover. The appearance of the cover can be seen in Figure 1.

Figure 1. Front and Back Cover View of Student Worksheet

The initial part of the Student Worksheet consists of a table of contents, Student Worksheet identity, learning outcomes, learning objectives, and instructions for using the Student Worksheet. The initial part of the Student Worksheet can be seen in Figures 2. The contents of the Student Worksheet consist of cases regarding the form of objects, material on the form of objects, essential questions, cases on the properties of objects, material on the properties of objects, supporting activities for the properties of objects, cases on changes in the form of objects, material on changes in the form of objects, supporting activities for changes in form, summary and practice questions and Bibliography. The contents of the Student Worksheet can be seen in Figure 2.

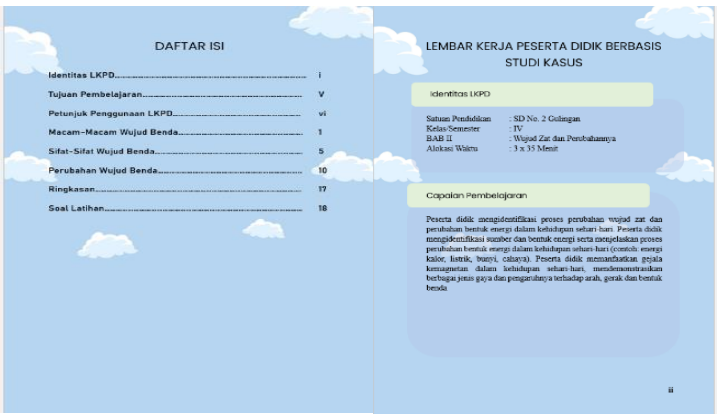

Figure 2. Display of the contents of the Student Worksheet

After the product is developed, it is ready to be tested for feasibility. The results of the feasibility test are as follows. The feasibility test is carried out by providing products and questionnaires to assess the developed product. Based on the assessment results by experts, the percentage of the learning content expert trial results is obtained, and then the percentage is converted to a feasibility table. Based on the feasibility table, the percentage obtained from content expert 1, namely 95.00%, is in the range of 90-100% with very good qualifications. The percentage obtained from content expert 2, namely 91.67%, is in the range of 90-100% with very good qualifications.

Furthermore, the values from the two experts will be averaged, and a result of 93.33% will be obtained in the range of 90-100% with very good qualifications. After obtaining the percentage of the learning media expert trial results, the percentage is converted to a feasibility table. Based on the feasibility table, the percentage obtained from media expert 1, namely 93.80%, is in the range of 90-100% with very good qualifications. Meanwhile, the percentage obtained from Content Expert 2 is 95.80%, in the 90-100% range, with very good qualifications. Furthermore, the values from both experts will be averaged, and a result of 94.80% will be obtained in the range of 90-100% with very good qualifications.

In the fourth stage, the revised product and its feasibility test are implemented in the school, which is the place of research involving teachers and students to determine the practicality and effectiveness of the product developed. The results of the practicality of the product test are carried out to evaluate the product and test it on users. The practicality test of the Student Worksheet was carried out by giving a questionnaire to 3 class teachers who studied the material on changes in the state of objects, namely the homeroom teacher for grade three, grade four, and grade five and six students from grade four. Based on the results of the practicality test, the practicality test by the teacher was obtained, namely 90.60%, 93.80% and 93.80%. Then, the results were averaged to get the teacher's practicality test results, which was 92.73% in the 90-100% range with very good qualifications. Meanwhile, the practicality test by students in the sequence was 90.60%, 93.80%, 96.90%, 96.90%, 96.90%, and 90.60%. Then, the results were averaged to get students' overall practicality test results, 94.28% in the 90-100% range with very good qualifications.

The effectiveness test stage of the Student Worksheet developed was carried out using the One-Group Pretest-Posttest design. The effectiveness test was conducted with 25 fourth-grade students at SD No. 2 Gulingan in Mengwi District, Badung Regency. Based on the results of the pre-test and post-test that had been carried out, a prerequisite test was carried out first before conducting a hypothesis test. The prerequisite tests carried out were the normality test of data distribution and the homogeneity test of variance, then continued with the hypothesis test. The normality test of data distribution was carried out with the help of the SPSS version 25 application. The results of the Kolmogorov-Smirnov normality test can be seen in Table 1.

Table 1. Results of the Kolmogorov-Smirnov Normality Test

	Kolmogorov-Smirnov		
	Statistic	**df**	**Sig.**
Critical Thinking Pre-test	0,143	25	0.199
Critical Thinking Post-test	0,166	25	0.072

Based on the test table, the Kolmogorov-Smirnov significance value in the pre-test was 0.199, and the Kolmogorov-Smirnov significance value in the post-test was 0.072. Then, the value was compared with a significance level of 0.05 so that the pre-test significance value was 0.199> 0.05 and the post-test post-test significance value was 0.072> 0.05; thus, the pre-test and post-test post-test data could be normally distributed so that it could be continued with the homogeneity of variance test. After the data was normally distributed, the data underwent a homogeneity of variance test, which was carried out with the help of the SPSS version 25 application. From the homogeneity test, the Lavene Significance result was 1.00. The significance value obtained was then compared with a significance level of 0.05 to obtain a significance value of 1.00> 0.05. Thus, the data was homogeneous and could be continued with the hypothesis test. The hypothesis test was carried out with a correlated or dependent t-test (paired sample t-test) with the help of SPSS version 25.

Based on the hypothesis test, the result of the Significance (2-tailed) was 0.00, then compared with the significance level of 0.05 so that the significance value of 0.00 <0.05 was obtained so that H0 was rejected and H1 was accepted. Thus, there is a significant influence between before and after using the HOTS case study-based Student Worksheet on critical thinking skills in the material content of changes in the state of objects in the fourth grade of elementary school. The last stage of this research is evaluation. This stage is carried out by reviewing the results of the Student Worksheet test. In addition, at this stage, the final

revision or improvement is carried out on the product developed based on input and suggestions obtained during the trial process, resulting in a better Student Worksheet.

Discussion

Based on the research results, developing Student Worksheets based on HOTS-oriented case studies is declared valid, practical, and effective for learning. This is because the product has gone through the stages of feasibility, practicality, and effectiveness testing, so it has met various requirements for use in learning. Based on the results of the tests that have been carried out, the developed product was also improved/revised according to the input and suggestions obtained during the product trial so that a Student Worksheet based on HOTS-oriented case studies was produced that was feasible, practical, and effective for use to improve student's critical thinking skills. In addition, the Student Worksheets that were developed were declared feasible, practical, and effective also because they had gone through a series of development stages using the ADDIE development procedure consisting of five stages, namely the analysis stage, design stage, development stage, implementation stage, and evaluation stage. This development procedure was chosen because the ADDIE development model is one of the development models that is suitable for developing teaching materials.

Characteristics of HOTS-oriented Case Study-based Student Worksheets. Student worksheets have various benefits in their use in learning. One of the benefits of Student Worksheets is that they can help teachers to make students actively involved in learning, namely changing learning that was initially centered on the teacher to be centered on students (Indrawan & Yudiana, 2022; Nasution & Oktaviani, 2020). In addition, student worksheets can also help teachers direct students to find their concepts through independent or group activities, so the development of student worksheets needs to be implemented. In developing Student Worksheets, the material reviewed must suit the learning objectives. Learning materials are all materials in the form of information, tools, or texts arranged systematically to achieve competency standards so that teachers can use them in the learning process (Dermawati et al., 2019; Fransiska et al., 2021). Therefore, in the development of Student Worksheets, the packaging of learning materials needs to be done properly. The characteristics of the Student Worksheets that have been developed have also been adjusted to the needs analysis that has been conducted through interviews with homeroom teachers, who stated that it is necessary to design interesting learning media that can train students' critical thinking skills. In addition, the characteristics of the Student Worksheets have also been adjusted to analyze the characteristics of students who use the Student Worksheets that have been developed. Based on the results of interviews with students, interesting learning is learning that can present students' daily problems in learning, and they can discuss them with their group members. This group discussion activity can be an alternative to help solve students' problems. It can increase student activity in the learning process and make learning more meaningful and meaningful in students' lives (H. Masrik, 2019).

The results of the feasibility test of the developed Student Worksheets were assessed based on content experts, media experts, and practitioners who had conducted product trials. The various aspects assessed ranged from the contents of the Student Worksheets covering the curriculum aspect, the content aspect, the visualization aspect, the language aspect, and the evaluation aspect. Meanwhile, the aspects assessed regarding the appearance of the Student Worksheets were the cover and content design aspects. Then, from the aspects assessed in terms of the practicality of the Student Worksheets, they included aspects of ease of use and the product's benefits. The developed Student Worksheets were categorized as suitable for learning from all the aspects assessed. Learning media is valid if there is a relationship between the learning media and the curriculum and considering the objectives of developing the product (Arisandy et al., 2021; Fransiska et al., 2021; Lestari & Sari, 2021). The high media validity results were obtained because the media and material aspects presented in the media were based on the characteristics and needs of elementary school students. The development of Student Worksheets based on case studies was carried out so that students have learning media that can make it easier for them to learn. Media can psychologically make it easier for students to learn because it can make abstract things concrete or real. The feasibility of the Student Worksheets developed was reviewed based on aspects of the cover design, including the attractiveness of the cover, use of letters, suitability of illustrations to the material, and color of letters to the background. Content design includes clarity of titles and subtitles, size and color of writing, use of spacing, variation of letters, proportion of images, and size of letters. With the attractiveness of the packaging of the Student Worksheets developed, students can be interested in learning about something new and learn independently, so learning becomes effective. In addition, the Student Worksheets developed also have activities that can make students think more critically because of the questions.

Based on the results of the practicality test, the practicality test was obtained by teachers with very good qualifications. At the same time, students do the practicality test with very good qualifications. The practicality referred to in the development of this product is the ease of the product being applied in

learning, the ease of carrying the product, the ease of understanding the instructions in the product, the product can motivate students, the product can help students learn independently, the product can facilitate the delivery of material, and the product can hone students' analytical skills. Learning media is said to be practical if teachers and students who are users of learning media state that the learning media is interesting to use, easy to use, and useful for increasing knowledge and learning experience (Afnan et al., 2022; Fransiska et al., 2021; Mahmudah & Bahtiar, 2022). Developing this Student Worksheet can help teachers and students carry out the learning process effectively. They can be used as a guide for student activities in the learning process so that students can learn independently (Rahmadani & Yurnetti, 2023; Utami & Dafit, 2021). The Student Worksheets produced can also be accessed via the Android application. Through the Android application, students can learn while playing and maximize their abilities using technology (Ayuningrum & Afif, 2016; Guterres et al., 2018). This Student Worksheet is a form of collaboration with technology, where students can access it on their mobile phones so that they can access it at any time to explore the features available on the product. With this product, it is as if students are visiting a place. However, some things can be learned about the area being studied virtually through interactive learning media products based on Android. So, the ease of use and benefits provided by the Student Worksheet that is developed make the Student Worksheet a proven practical learning medium.

The Effectiveness of HOTS-Oriented Case Study-Based Student Worksheets shows a significant influence before and after using HOTS-oriented case study-based Student Worksheets on critical thinking skills in the material content of changes in the state of objects in grade four elementary school. HOTS can be applied to students through practice questions during the learning process to stimulate students' high-level thinking skills (Arsa Putra & Agustiana, 2021; Sulistiowati & Susilowibowo, 2021). Student Worksheets are teaching materials that can help students learn activities in class. Teaching materials are important because they can guide teachers and students in learning (Maysiska Ruci et al., 2023). The advantages of the HOTS-based Student Worksheet that was developed include presenting problems to stimulate students to record company finances. The problems are presented in the form of case studies. Suppose the questions are presented as narrative transactions in the circulating Student Worksheet in this developed Student Worksheet. In that case, the questions are presented as transaction document evidence. In addition to presenting a contextual case form, transaction evidence is used as a stage of analytical and critical thinking regarding financial recording. Presenting different problems, namely on the criteria for the type of company and the type of inventory recording method used by the company in the case study in the Student Worksheet, and presenting problems with complete answers from the recording process to reporting (Sulistiowati & Susilowibowo, 2021).

This finding is reinforced by previous research stating that HOTS-integrated Physics Student Worksheets can improve students' critical thinking skills with a feasible category (Fransiska et al., 2021). HOTS-based Student Worksheets can improve students' critical thinking skills in learning with the inquiry model (Rahmadani & Yurnetti, 2023). HOTS-based Student E-Worksheets in learning have been declared valid and feasible because they can improve critical thinking skills (Mahmudah & Bahtiar, 2022). There is an increase in students' critical thinking skills with the case study learning method (Ahmad et al., 2021). From this previous research, HOTS-oriented case study-based Student Worksheets can influence and improve students' critical thinking skills. Using case study-based Student Worksheets in the teaching and learning process can increase students' understanding and make students more active (Sujarwo, 2021). In line with this, several objectives exist for using Student Worksheets in learning. The objectives of Student Worksheets are to activate students in the teaching and learning process, help students develop concepts, train students to find and develop teaching and learning processes, help teachers in compiling learning, as a guide for teachers and students in implementing the learning process, help students obtain notes on the material learned through learning activities, help students to add information about the concepts learned (Dermawati et al., 2019).

The advantage of this research is that it integrates a case study method that has not existed before in the development of HOTS-based Student Worksheets. Through this case study, the teaching and learning process can increase students' understanding and make students more active (Sujarwo, 2021). Case studies lead students to this method by explaining a particular problem, incident, or situation; students are tasked with finding alternative solutions. This method can also develop critical thinking and find new solutions to a topic being solved (Anggraeni, 2020). The case study approach is usually more flexible because its design is intended to explore a problem (Zulfikar, 2018). By implementing case studies in learning, students can train their high-level thinking skills and learn to use the problems they face every day. The implications of this research can motivate colleagues who have the same problems in the Teaching and Learning Process. Although getting very good qualifications, the developed Student Worksheets were also revised according to the suggestions so that the products developed became even better.

4. CONCLUSION

This development research aims to develop HOTS-oriented case study-based Student Worksheets on the material of changes in the state of objects in grade four of elementary school. The results of this study indicate that HOTS-oriented case study-based Student Worksheets on the material of changes in the state of objects in grade IV of elementary school are declared feasible as learning resources and effective in improving critical thinking skills. It is recommended that teachers always design and complete learning with Student Worksheets according to the needs of students. In addition, the content of the material of changes in the state of objects suggests that the results of this study be used as an alternative learning media to make students more active and interested in learning something new and can make it easier for teachers to explain the material of changes in the state of objects. It is recommended that school principals always motivate teachers regarding the creation of Student Worksheets according to the needs of students. In addition, this HOTS-oriented case study-based Student Worksheet product can be used as an additional insight, and it is hoped that the Student Worksheets that are developed can be a supporting book for learning about changes in the state of objects. It is suggested to other researchers that this research can be used as a consideration or reference for conducting more interesting and innovative development research.

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