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DEVELOPMENT OF HOTS-BASED E-WORKSHEET TO IMPROVE CRITICAL THINKING AND PROBLEM SOLVING ABILITY OF FIFTH GRADE OF PRIMARY SCHOOL STUDENTS

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ABSTRACT

This research aims to produce a feasible and practical HOTS-based E-Worksheet (LKPD) and to determine its effectiveness in improving the critical thinking and problem solving skills of fifth grade primary school students. This research refers to development stages by Dick & Carey, namely (1) identifying learning objectives, (2) conducting learning analysis, (3) identifying student characteristics, (4) formulating specific objectives, (5) developing test items, (6) developing learning strategies, (7) developing and selecting instructional materials, (8) designing and implementing formative evaluations, and (9) revising learning. The individual experiment in this research involved three students and a teacher, while the small group experiment involved nine students and a teacher. The field experiment covered control and experimental classes. Data were collected through product feasibility scales, teacher and student response scales, observations, pretest questions, posttests, and interviews. The results of the research show that HOTS-based e-worksheet is feasible, practical and effective for improving students' critical thinking and problem solving skills.

Keywords: **critical thinking skills; HOTS-based e-worksheet; problem solving skills**

INTRODUCTION

The global spread of Covid-19 has affected many walks of life, including education sector. Despite the passing outbreak of the global pandemic, the Fourth Industrial Revolution marked by the rapid technological advancement has made it much easier to obtain information. Therefore, it is necessary to create an appropriate application to help students sharpen their critical thinking skills when analyzing, evaluating, and using information. Based on the results of the needs analysis that has been carried out, the need for electronic-based worksheets that contain HOTS has not been identified. Electronic-based worksheets available in the field have not been able to stimulate students' critical thinking skills. Facione articulated that a person's critical thinking skill is indicated by the ability to analyze, organize, evaluate and solve problems.[1] Critical thinking and problem solving-skills are interrelated life skills for students to master in-

[1] Peter A Facione, "Critical Thinking: What It Is and Why It Counts," *Insight Assessment* 1, no. 1 (2011): 1–23.

order to form meaning from each of their learning activities. The current technological advancement today has called for blended learning that combines in person classroom learning and e-learning. Therefore, teachers must prepare instructional materials for both learning models. The e-learning requires students to put more effort to understand the instructional materials independently because the teacher is not present in person and students have to study independently at their own place. It is thus necessary to create instructional materials to bridge these two learning models. An essential step for this goal is to create an innovatively interesting learning materials more which contains comprehensive explanations. Schmidt in Wardani said that student worksheets are perfect instrument to stimulate student's learning achievement if the worksheets are arranged according to their learning and thinking stages.[2] This way, the worksheet can help students find facts about scientific thinking and motivate them to find solutions to problems independently.

One of the supporting learning tools in e-learning is digital worksheet or widely known as e-worksheet. e-worksheets contain student-oriented learning and evaluation as learning subjects. Ideally, this learning tool can develop students' critical thinking skills, creativity and interest in order to achieve the predetermined competencies, namely communicating, collaborating, creative thinking, critical thinking and problem-solving skills. In line with this, Trianto articulated that student worksheets can guide students to investigate or solve problems and develop their cognitive abilities and other aspects.[3] Thus, the development of HOTS (Higher Order Thinking Skill) based e-worksheets greatly contributes to online learning activities and can foster students' critical thinking and problem-solving skills. In this context, Nufus[4] and Ende (2019) explained that the e-worksheet contains a collection of slides containing learning material and questions for students to solve their problems. The e-worksheet also constitutes attractive pictures to strengthen students' understanding of the presented material. The e-worksheet can serve as digital learning material for training students' cognitive development. HOTS is known

[2] Indra Kusuma Wardani and Galuh Tisna Widiana, "Pengembangan LKS Berbasis Saintifik Untuk Melatih Keterampilan Berpikir Kritis Siswa SD," *Sekolah Dasar: Kajian Teori Dan Praktik Pendidikan* 27, no. 1 (2018): 79–90.

[3] Trianto Trianto, *Model Pembelajaran Terpadu* (Jakarta: Bumi Aksara, 2011).

[4] Hayatun Nufus, I Khadun, and Muhammad Nazar, "Pengembangan Lembar Kerja Peserta Didik (LKPD) Interaktif Berbasis Software Ispring Pada Materi Larutan Penyangga" (Prosiding Seminar Nasional MIPA IV, Banda Aceh: Prosiding Seminar Nasional MIPA IV, 2018), 46–53.

as high-level thinking skills, which covers reasoning. Towards this goal, students are expected to use the learning information to apply it in their daily lives (Annuuru, et al, 2017). The e-worksheet questions in this study were designed by referring to dimension of Anderson & Krathwohl's cognitive process covering the domains of analyzing (C4), evaluating (C5), and creating (C6). Each question uses a stimulus or stimuli, which is contextual, and derived from global issues and problems in students' surrounding environment.

HOTS can be achieved when individuals retrieve information, store it in memory, and reorganize it with pre-existing memories to achieve goals and find solutions even in confusing situations.[5] Later, this high-level thinking skill can be used in each scientific discipline to enhance cognitive perspective in order to create a habit so as to generate effective and creative problem solving skill. According to Sutanto & Retnawati (2016: 190), HOTS is pivotal to develop learning process and to provide students with analytical and decision-making skill. HOTS will help them create new ideas, make guesses or predictions, and solve problems. In line with the rapid changes of modern life and the digital and global challenges, this provision of high-level thinking skills greatly contributes to students' future lives and learning activities. Likewise, according to Syafitri & Tressyalina (2020), e-worksheet is one of a comprehensive learning instrument containing simple and practical materials for one meeting of learning activities, which allows a more effective learning process.

In this line, Hummel reinforced that critical thinking is crucial to learn in elementary schools.[6] Students can be trained to think critically using various methods. As a skill, critical thinking cannot be memorized. Anderson & Krathwohl further explained that critical thinking is the ability to actively think about activities because it includes a question and answer procedure, which is classified as a high-level thinking ability given the inclusion of the cognitive development levels of analysis, evaluation and creation.[7] On the other hand, Ennis[8] was of the opinion that critical thinking skills are reflective,

[5] Arthur Lewis and David Smith, "Defining Higher Order Thinking," *Theory Into Practice* 32, no. 3 (June 1, 1993): 131–37, https://doi.org/10.1080/00405849309543588.

[6] Laura Hummell, "21st Century Skills: Critical Thinking Skills," *Children's Technology and Engineering* 20, no. 4 (2016): 5–6.

[7] Lorin W Anderson and David R Krathwohl, "Kerangka Landasan Untuk Pembelajaran, Pengajaran, Dan Asesmen," *Yogyakarta: Pustaka Pelajar* 300, no. 300 (2010): 0.

[8] Robert H Ennis, "The Nature of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities," *University of Illinois* 2, no. 4 (2011): 1–8.

reasonable thinking that focuses on deciding what to believe and do, while Brookfield[9] explained that the benefit of critical thinking is getting the desired results. Actions are taken based on evidence, which can be explained to others who need further answers as the basis of critical thinking. Mahanal reinforced this opinion by stating that critical thinking can help students overcome social problems that occur in student's surrounding environment.[10] In addition, Haghparast also articulated that critical thinking trains students to analyze, evaluate and construct information to make appropriate decisions and actions.[11]

Thus far, student worksheets used by teachers usually contain long reading text and learning activities that put less emphasis on improving high-level thinking skills. As seen from Bloom's taxonomy, the evaluation questions only contain C1 (remembering) to C2 (understanding) levels. There is no indication to reach a level above the test because in its development, reasoning, argumentation, contextuality and creativity were still less obvious. Generally, most students were still unfamiliar with questions that require high levels of reasoning. They would prefer multiple choice questions or non essay questions. When working on story problems, most students can understand the questions, but tended to focus their attention on other things instead of working to finish answering the questions. This practice led them to choose the wrong solution because such questions principally require them to focus and understand the core problem. In terms of assessments of scientific learning content, especially in essay questions, students generally showed a low level of critical thinking and problem solving skills. This condition was attributed to the fact that teachers had not prepared e-worksheets for use in distance learning in order to support students' critical thinking and problem-solving processes. Online learning essentially requires digital materials, although as aforementioned, printed student worksheets still dominated. Most teachers still found it difficult to adapt to online learning. Hence, e-worksheets will certainly make it easier to

[9] Stephen D Brookfield, *Teaching for Critical Thinking: Tools and Techniques to Help Students Question Their Assumptions* (John Wiley & Sons, 2011).

[10] Susriyati Mahanal et al., "RICOSRE: A Learning Model to Develop Critical Thinking Skills for Students with Different Academic Abilities," *International Journal of Instruction* 12, no. 2 (April 2019): 417–34.

[11] Mahboobeh Haghparast, Fariza Hanum Nasaruddin, and Noorhidawati Abdullah, "Cultivating Critical Thinking Through E-Learning Environment and Tools: A Review," *Procedia - Social and Behavioral Sciences*, 2nd International Conference on Innovation, Management and Technology Research, 129 (May 15, 2014): 527–35, https://doi.org/10.1016/j.sbspro.2014.03.710.

enhance e-learning during the pandemic.[12]

The currently developed e-worksheet will contain activity instructions, illustrative images, challenge questions, columns, conclusions and supporting information from which students will easily discover concepts, think at a higher level, think critically and solve problems. In its development, it will use a book creator application, which contains interesting pictures and interactive videos explaining the material with links for exercises to directly help students with the live worksheet application. According to Makdis (2020), the book creator application contains text, images and sound and was published in digital form which can later be read on a computer or other electronic device such as an Android, smartphone or tablet. Furthermore, Puspitasari explained that Book Creator is suitable for improving students' cognitive abilities in speaking, writing, listening and reading.[13] This HOTS-based e-worksheet learning material was developed for the topic of human digestive system for the subject of Natural Sciences for the Fifth grade of elementary school students. Its basic competencies explain the digestive organs and their functions in animals and humans as well as ways to maintain the health of human digestive organs. The materials were developed based on the core competencies and basic competencies of the 2013 curriculum. It contains student activity sheets that are connected to real contexts and are equipped with a table of contents, study instructions, basic competencies, indicators, learning objectives, learning introduction and material references. Furthermore, each activity sheet on this HOTS-based e-worksheet contains activity instructions, practice questions, conclusions, tables and images supporting the material, illustration images, conclusion columns, and supporting information. In addition, this HOTS-based e-worksheets also serves as continuous stages starting from learning plans and worksheet products with activities and questions that encourage students to practice critical thinking and have problem-solving skills.

[12] Siti Suryaningsih and Riska Nurlita, "Pentingnya Lembar Kerja Peserta Didik Elektronik (E-LKPD) Inovatif Dalam Proses Pembelajaran Abad 21," *Jurnal Pendidikan Indonesia* 2, no. 07 (July 25, 2021): 1256–68, https://doi.org/10.59141/japendi.v2i07.233.

[13] Verdiana Puspitasari, Rufi'i, and Djoko Adi Walujo, "Pengembangan Perangkat Pembelajaran Dengan Model Diferensiasi Menggunakan Book Creator Untuk Pembelajaran Bipa Di Kelas Yang Memiliki Kemampuan Beragam," *JURNAL EDUCATION AND DEVELOPMENT* 8, no. 4 (November 2, 2020): 310–310.

RESEARCH METHODS

This development research refers to Dick & Carey's development stages, namely (1) identifying instructional objectives, (2) conducting instructional analysis, (3) identifying entry behaviors, (4) writing performance objectives, (5) developing criterion referenced test, (6) developing instructional strategies, (7) developing and selecting instructional materials, (8) designing and implementing formative evaluations, and (9) revising learning. The sources of information in this research involved 2 validators (lecturers), namely 3 classes of fifth grade teachers, and fifth graders of SD Negeri Caturtunggal 6 and SD Negeri Nogopuro. In the individual testing stage of the material prototype, 3 fifth graders from SD Negeri Caturtunggal 6 were involved. In the small group experiment stage, 9 fifth graders from SD Negeri Caturtunggal 6. Next, the field experiment stage involved 1 control class, namely class fifth graders of Class A while one experimental class was from the fifth graders of Class B of SD Negeri Nogopuro.

Data were collected through product feasibility scales, teacher and student response scales, observations, pretest questions, posttests, and interviews. Afterwards, the feasibility of the product was assessed based on the materials, instrument and media experts. Meanwhile, practicality was seen form the analysis of teacher and student response forms. The data on feasibility and practicality were then grouped based on value conversion. The product effectiveness was analyzed by measuring the level of difficulty, differentiation, validity test, and reliability test. Meanwhile, an effectiveness test was carried out by carrying out normality and homogeneity tests, while an effectiveness test was carried out by independent sample t test and paired t test.

The research hypotheses were in the form of an action hypothesis as listed below:

Ho : There is no significant difference between critical thinking and problem solving skills in students who use HOTS-based e-worksheets and those who do not use HOTS-based e-worksheets.

Ha : There is a significant difference between critical thinking and problem solving skills in students who use and do not use HOTS-based e-worksheets.

RESULT AND DISCUSSION

This research developed an e-worksheet (LKPD) based on Higher Order Thinking Skills (HOTS) for the subject of Natural Science on "Human Digestive System" to

improve the critical thinking and problem solving skills of fifth grade elementary school students. The selected topics were 3 topics on healthy food, and 1 subtheme on how the body processes food. The HOTS-based e-worksheet in this study is different from the general one because it is in digital form and contains exercises in high-level thinking skills. The development stages referred to Dick & Carey's (1985)[14] stages, namely:

1. Identifying Instructional Goals

   At this stage, the researcher looked for data information from students when they experience difficulties. Through interviews with teachers and students, researchers also reviewed the 2013 curriculum. The process of learning activities in the classroom has not been varied and the teaching materials used have not been able to facilitate students' critical thinking skills. The teaching materials used are not electronic or digital-based, and currently students' critical thinking skills are still relatively low. In the development of the 21st century, students must have the ability to think critically to filter any information received by students and solve problems in everyday life. From the information obtained, researchers took the initiative to create HOTS-based e-worksheets that can stimulate high-level thinking skills in order to improve critical thinking and problem solving skills.

2. Presenting data, conducting instructional analysis, and having discussions

   To achieve critical thinking and problem solving skills, students must be trained continuously. One step is to provide worksheets containing activities or questions with high level skills. In this human digestive system material, students were required to practice conceptualizing, applying, analyzing, synthesizing and asking questions related to real world contexts.

3. Identifying Entry Behaviours

   The identification resulted the following: 1) Most of students have understood the problem description in the form of a story, 2) Some students have written down the steps to solve the problem without merely writing a short answer, 3) Students have indicated their interest in digital books other than the printed books currently used for learning, 4) Students were interested in digital books with interesting activities and colorful pictures, videos and digital worksheets.

[14] W Dick and L Carrey, "The Systematic Design Instruction. Secon Edition. Glenview," *Illinois: Scott., Foreman and Company*, 1985.

4. Writing Performance Objectives

   In this step, researchers created indicators of critical thinking and problem solving skills for pretest and posttest in framework material related to human digestion.

5. Developing Criterion Referenced Test

   In this stage, the researcher developed the assessment instruments to be further used in the next step. The instrument was first validated by an instrument expert and then tested on 3 students as an individual test before a different level test, level of difficulty, validity and reliability test were carried out. The shortcomings of the questions were then revised and then tested on a small group consisting of 9 students. The different level test generated types of question based on good and very good criteria. The level of difficulty criteria covered easy and medium criteria, while the validity and reliability test indicated that all the questions were valid and had very high reliability.

6. Developing Instructional Strategy

   At this stage, the researcher developed a learning implementation plan by developing a strategy. The steps taken include creating learning objectives in a HOTS-based student worksheet. Based on activities requiring students to detail the human digestive organs and their functions, students could analyze the digestive organs and their functions in humans, analyze how to maintain the human digestive organs to maintain their function, and analyze disorders of the human digestive system. The e-worksheets materials were organized in a sequential order according to the indicators of the learning objectives. In a subsequent stage, the researcher selected students as respondents from the school serving as the research subjects by considering the equally existing conditions and facilities. The learning materials were selected in accordance with the research objective of improving critical thinking and problem solving skills by paying attention to need analysis from the scale filled in by students.

7. Developing and Selecting Instructional materials *(Develop and Select Instructional Materials)*

   At this stage, researchers created instructional materials in the form of HOTS-based e-worksheets to further develop critical thinking and problem solving skills. The HOTS-based e-worksheet was developed via a book creator application. Students were provided with 6 activity sheets or worksheets to be filled in via the live

worksheet application. The material was related to the human digestive organs, the sequence of the human digestive system, the function of the human digestive organs, mechanical and chemical digestion, factors that cause digestive disorders, and how to maintain the digestive organs. Previously, the material and instruments were validated by experts and analyzed based on assessment score conversion. From the results of the material and media expert assessment, this product was declared very feasible and the instrument expert also declared its feasibility. This HOTS-based student worksheet consists of a cover and table of contents, learning instructions, basic competencies, indicators, learning objectives, learning introduction, material references, activities or worksheets in the HOTS-based e-worksheet, bibliography and closing. Apart from pictures to attract students' interest, it also contains videos made by the developers to explain the material. The HOTS-based e-worksheet was further tested on individuals and small groups with very practical results.

8. Designing and implementing formative evaluations

The final cycle of the formative evaluation was a field test involving 28 students from fifth grade of A class as the control class and 27 students from fifth grade of class VB as the experimental class. This field test revealed that the product was in the very practical category, meaning that HOTS-based e-worksheets were practical for use in learning. The pre test and post test between the control class and the experimental class generated the following results illustrated in the following diagram regarding critical thinking and problem solving skills:

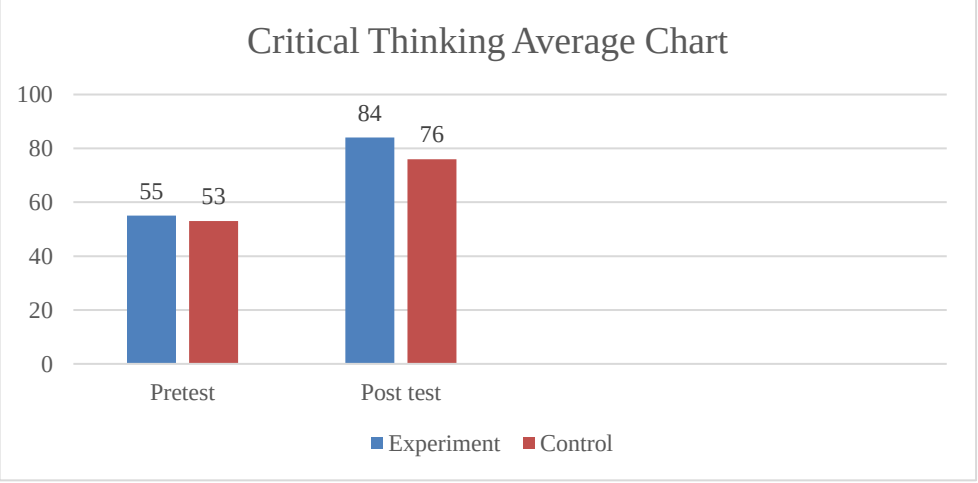

Figure 1
Comparison diagram of critical thinking skills of the control class and the experimental class

Both the control class and the experimental class experienced an increase in the average results of the written test of critical thinking skills. The experimental class had increased by 29 points, from the pretest average score of 55 to 84 on the post test average. Meanwhile, the control class had increased by 23 points, as indicated from the pretest average of 53 to 76 in the post test average.

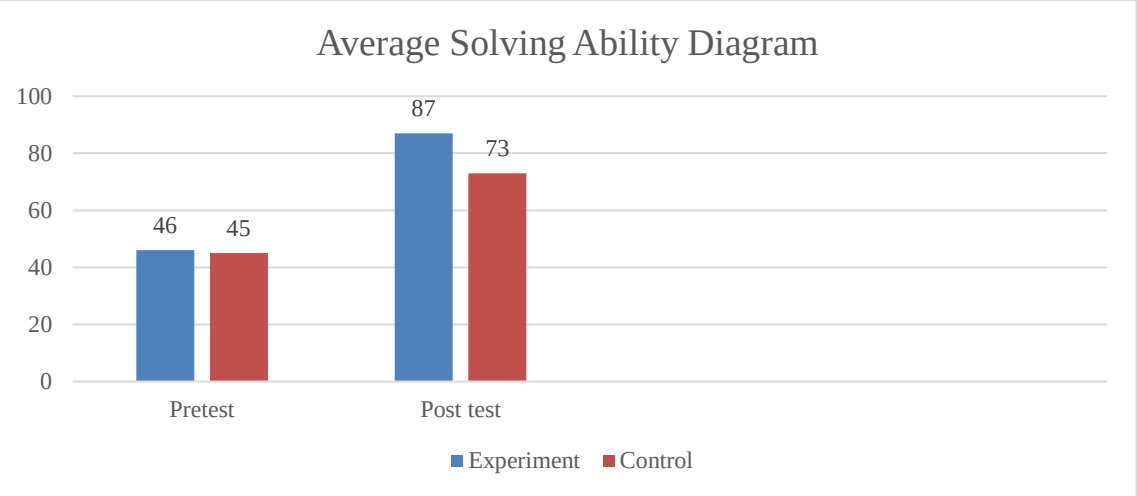

Figure 2
Comparison Diagram of Problem solving skills Control Class and Experimental Class

It is obvious that both classes witnessed an increase. From an average initial problem solving ability of 46 to 87 in final problem solving ability, the experimental class's problem solving ability increased by 41 points. Meanwhile, the control class experienced an increase of 28 points from an initial average problem solving ability of 44 to 62.

The effectiveness test was carried out using the t test, but before testing, prerequisite analysis tests were carried out in the form of normality tests and homogeneity tests. The prerequisite will be fulfilled if the test results are significant for a certain level of significance (α) at $\alpha = 0.05$. If the results of the normality and homogeneity tests are significant, the normality and homogeneity are not fulfilled. In this critical thinking and problem solving ability, the normality test indicated the significance level (p) of the critical thinking ability data that was greater than 0.05. Thus, the pretest and posttest data for the control class and experimental class were normally distributed. The homogeneity test was carried out using the SPSS program via one-way ANOVA to determine whether the data on critical thinking and problem solving skills were homogeneous. The homogeneity test indicated that the pretest data information for the control and experimental groups had a significance level of more than 0.05, thereby indicating that

the data variance in the control and experimental classes was homogeneous or the same.

Afterwards, an independent t-test was used to determine the significance of the difference in critical thinking and problem-solving skills of students who used HOTS-based e-worksheet (experimental class) and students who did not use HOTS-based e-worksheets (control class). Independent t-test was conducted using the SPSS program. The independent t-test exceeded 0.05, and thus it is clear that the experimental class that used HOTS-based e-worksheets had significantly different critical thinking and problem solving skills compared to control class students who did not use them. Primary-age students who have critical thinking skills and high curiosity are more likely to be thorough in looking at a problem.[15] Providing HOTS based e-worksheets[16] and change the habit of learning that is not based on memorisation[17] is the habits that can train HOTS. Every teacher should have the ability to teach higher order thinking skills,[18] So that through e-worksheet can facilitate teachers in improving learning achievement and the ability to think critically and deeply to students.[19]

Finally, a paired t-test was carried out to determine whether there was an increase in critical thinking and problem solving skills in the experimental class before and after using the HOTS-based e-worksheet. From the calculations, it is clear that using HOTS-based e-worksheets there is a significant increase in students' critical thinking and problem solving skills after using HOTS-based e-worksheets. The results of this study are in line with the results of previous studies, one of the treatments that can be used to improve students' HOTS abilities is by using interesting learning tools such as e-

[15] Erin Bridges Bird, Heidi L. Ballard, and Margaret Harte, "Data to Decision-Making: How Elementary Students Use Their Community and Citizen Science Project to Reimagine Their School Campus," *Instructional Science* 51, no. 5 (October 1, 2023): 788, https://doi.org/10.1007/s11251-022-09612-6.

[16] Théophile Muhayimana, Lambert Kwizera, and Marie Rose Nyirahabimana, "Using Bloom's Taxonomy to Evaluate the Cognitive Levels of Primary Leaving English Exam Questions in Rwandan Schools," *Curriculum Perspectives* 42, no. 1 (April 1, 2022): 51, https://doi.org/10.1007/s41297-021-00156-2.

[17] Shirley Miedijensky, Irit Sasson, and Itamar Yehuda, "Teachers' Learning Communities for Developing High Order Thinking Skills—A Case Study of a School Pedagogical Change," *Interchange* 52, no. 4 (December 1, 2021): 577, https://doi.org/10.1007/s10780-021-09423-7.

[18] Anat Zohar and Galit Ben-Ari, "Teachers' Knowledge and Professional Development for Metacognitive Instruction in the Context of Higher Order Thinking," *Metacognition and Learning* 17, no. 3 (December 1, 2022): 855, https://doi.org/10.1007/s11409-022-09310-1.

[19] Han-Yu Sung, Gwo-Jen Hwang, and Shan-Feng Chen, "Effects of Embedding a Problem-Posing-Based Learning Guiding Strategy into Interactive e-Books on Students' Learning Performance and Higher Order Thinking Tendency," *Interactive Learning Environments* 27, no. 3 (April 3, 2019): 389, https://doi.org/10.1080/10494820.2018.1474235.

worksheets.[20] The development of teaching materials such as e-worksheets that are arranged systematically is needed to help teachers train students' HOTS skills.[21]

Acesta stated that many scientific learnings are not integrated with multiple intelligences and higher order thinking skills (HOTS).[22] This research also departed from the same notion, which was also reinforced by Fernandez, who stated that students' critical thinking skills are still low.[23] On this basis, the researchers developed a form of HOTS-based e-worksheet to improve students' critical thinking and problem-solving skills. The development of a HOTS-based e-worksheet on the "Human Digestive System" material was declared feasible, effective and practical for improving critical thinking and problem solving skills. Electronic worksheets can attract students' attention.[24] This result is in line with previous researches conducted by Fadilah,[25] Yakin,[26] Puspita and Dewi,[27] Wardani[28], and Lorenza (2021) who developed student worksheets in the form of printed and digital versions, all of which influenced not only critical thinking and problem solving but also cognitive skills.

[20] Tiya Agustina, Wahyu Oktavia, and Elen Inderasari, "The Implementation of Higher-Order Thinking Skills (HOTS) in Text-Based Learning at SDN Banyurip 3 Sambungmacan," *Al-Bidayah : Jurnal Pendidikan Dasar Islam* 12, no. 1 (June 30, 2020): 27, https://doi.org/10.14421/al-bidayah.v12i1.253.

[21] Rina Rahmi, Iin Nurhalizha, and Nasrin Nabila, "Relevance of Bahasa Indonesia Main Materials with HOTS (Higher Order Thinking Skills)," *Al-Bidayah : Jurnal Pendidikan Dasar Islam* 12, no. 1 (June 30, 2020): 93, https://doi.org/10.14421/al-bidayah.v12i1.236.

[22] Arrofa Acesta, M. Syarif Sumantri, and Fahrurrozi, "Development of Natural Science Learning Models Based on Multiple Inteligences to Improve Higher Order Thinking Skills in Elementary Schools," *Journal of Physics: Conference Series* 1477, no. 4 (March 2020): 042036, https://doi.org/10.1088/1742-6596/1477/4/042036.

[23] Eduardo Encabo-Fernández, Domingo Albarracín-Vivo, and Isabel Jerez-Martínez, "Evaluative Research on the Critical Thinking of Primary School Students," *International Journal of Educational Research Open* 4 (January 1, 2023): 100249, https://doi.org/10.1016/j.ijedro.2023.100249.

[24] Nissa'atul Syaidah and Silviana Nur Faizah, "Developing Electronic Student-Based Problem Worksheet for Primary School Student," *Al-Bidayah : Jurnal Pendidikan Dasar Islam* 13, no. 2 (December 27, 2021): 417, https://doi.org/10.14421/al-bidayah.v13i2.699.

[25] Isni Nur Fadilah, "Pengembangan LKS Dengan Model SQ3R (Survey, Question,Read, Recite, And Review) Perubahan Benda Untuk Mengembangkan Keterampilan Metakognitif Dan Penguasaan Konsep Siswa SD" (masters, Universitas Terbuka, 2020), http://repository.ut.ac.id/9657/.

[26] Ainul Yakin, "Pengembangan E-Lkpd Berciri Multimedia Untuk Meningkatkan Kemampuan Pemecahan Masalah Dan Disposisi Matematis" (Malang, Universitas Muhammadiyah Malang, 2021).

[27] Puspitasari, Rufi'i, and Walujo, "Pengembangan Perangkat Pembelajaran Dengan Model Diferensiasi Menggunakan Book Creator Untuk Pembelajaran Bipa Di Kelas Yang Memiliki Kemampuan Beragam."

[28] Wardani and Widiana, "Pengembangan LKS Berbasis Saintifik Untuk Melatih Keterampilan Berpikir Kritis Siswa SD."

CONCLUSION

This research concludes that the HOTS-based e-worksheet on "Human Digestive System" which was developed to improve the critical thinking and problem solving skills of fifth grade elementary school students, was declared by material experts to be very suitable for use, as indicated by the score of 45. Likewise, media experts also stated that this e-worksheet instructional material was very suitable for use with a score of 16. Finally, the instrument expert stated that this e-worksheet was suitable for use with a score of 22. The HOTS-based e-worksheet instructional material on "Human Digestive System" which was developed to improve the critical thinking and problem solving skills of fifth grade elementary school students was declared practical for use in learning according to user responses. The teachers gave it an average score of 93 (classified as a very practical category), while students gave it an average score of 66 (classified in the very practical category). HOTS-based e-worksheet instructional materials have proven effective in improving the critical thinking and problem solving skills of fifth grade elementary school students. This can be proven from the data of the field tests in the control class and experimental class, namely the independent t-test showing the significant differences in students' critical thinking and problem solving skills.

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