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Practical Test of HOTS Oriented *e*-LKPD Materials of Respiratory System for Class XI of Senior High School

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Abstract

This study aimed to test the practicality of the HOTS-oriented e-LKPD on respiratory system material for class XI SMA students The Electronic Student Worksheet (e-LKPD) is HOTS oriented on respiratory system material to produce an *e*-LKPD that meets applicable criteria. This type of research is *Research and Development (*R *& D*) with the *ADDIE* development model, which consists of 5 stages: Analysis, Design, *Development*, Implementation, and Evaluation. The stages of implementing the e-LKPD were carried out at SMA Negeri 21 Makassar, with the research subjects being two biology teachers and 29 class XI students. The sample was chosen randomly and is intended to provide an unbiased representation of the general population. The results showed that the percentage of e-LKPD product implementation was 78.41%. Furthermore, the implementation results were used to obtain the e-LKPD practicality test through the teacher's response of 9 6, 66 %, and students 8 3, 1 6%. Therefore, the HOTS-oriented e-LKPD on respiratory system material has convenient criteria.

Keywords: Practical test, e-LKPD, HOTS, Respiratory system materials

INTRODUCTION

The tendency of weakening reading literacy culture which can affect the level of critical thinking skills of students who are weak and do not absorb information. According to Sudijiono (2008), the results of the *Trends in International Mathematics and Science Study* (TIMSS) show that Indonesian students rank very low in the ability to understand complex information, theory, analysis and problem solving. Student also underprivileged using tools, procedures, solving problems and conducting investigations. According to Nugrahanto et al. (2019), the results of the *Program for International Student Assessment* (PISA) study in 2018 placed Indonesia in 70th place out of 78 countries. Scientific literacy is one of the life skills at a time when scientific knowledge is the basis of everyday life. This is based on consideration of the importance of thinking and acting skills which involve mastering scientific thinking to recognize and respond to various social problems in life (Adnan et al., 2019).

The poor quality of education is a result of several issues. Among of them, despite best efforts, the government has not been successful in raising educational standards, and progress has been somewhat modest in comparison to public expectations in a setting that

is changing and evolving quickly. According to Zamroni (2011), improving the quality of schools can be referred to as a combination of *knowledge skills*, *art*, and *entrepreneurship*. A combination is needed to balance various pressures, demands, desires, ideas, methods, and practices. Combining these things leads to the learning process to achieve high-quality learning. This state is in line with the results of research by Eldy and Fauziah (2013), creativity is a critical component needed in measuring the level of high-order thinking skills of students.

In general, thinking abilities and skills are formed in an educational environment. Therefore, schools play an essential role in training and developing these abilities, one of which is higher-order thinking skills. Higher-order thinking skills are needed in the era of the industrial revolution 4.0, which includes the skills to analyze, solve problems and make quick and correct decisions in order to be able to compete and be left behind by the rapidly accelerating development of science and technology. As for the opinion of Heong et al. (2011), higher-order thinking skills are defined as the general use of the mind to find new challenges.

According to Kristiyono (2018), learning with higher-order thinking skills or HOTS can make participants think systematically, analyze a problem in various ways, educate them to be confident, and improve their critical and creative thinking. This finding is in line with the opinion of Utaminingsih and Rahayu (2021) that higher-order thinking activities accustom students to using their reasoning because they do not involve memorizing and conveying general information. Instead, higher-order thinking skills are the ability to connect, manipulate, and change the knowledge they already have with things or problems not taught in learning.

Humans are scientifically interested in biology, but not everyone can understand biology easily. The learning process at school takes time to acquire knowledge about biology. Another factor that makes it difficult for students to understand biology material is the use of monotonous teaching materials in the form of books so that they do not involve students actively in the learning process (Adnan et al., 2021). According to Arthur et al. (2018), one of the stages in developing HOTS learning is by choosing a way of asking questions that supports the growth of students' minds by using a synchronous method to measure their cognitive abilities.

The results of Astawan et al. research (2021) show differences in *Critical Thinking Skills* between the groups that are given the application of HOTS learning and the conventional group. However, the critical thinking skills of students who are given the application of HOTS learning are better than the application of conventional learning so that they can improve students' higher-order thinking skills.

There is an increase in the quality of education with various strategies to improve the learning process. Fulfillment of needs is achieved through developing science and technology to streamline the learning process. Adnan's research (2015) revealed that technology and information-based learning provides an excellent opportunity for students to build knowledge based on experience. The use of electronic teaching materials can assist teachers in realizing ICT-based learning.

One of the facilities that can support the learning process for teachers and students is LKPD. Student Worksheets (LKPD) are one of the teaching materials that can help students carry out the learning activities stages. LKPD conceived the steps or procedures for learning activities adapted to the educational strategies used by teachers, information about materials and equipment, and tasks that must be done by students so that an effective and efficient learning process is achieved (Adnan & Bahri, 2011).

The practicality test for developing teaching materials in e-LKPD is measured by stating the aspects of this Practicality. The aspects used include content feasibility, appearance, language, and benefits. The practicality test is carried out based on the eligibility of the e-LKPD product, namely by analyzing the number of students who can answer the assignments in it. Based on the results of this analysis, students will fill out a practicality questionnaire according to their experience answering assignments in the product. These findings align with the opinion of Akbar (2016) that teaching materials can be practical if students use teaching materials without any problems. The use of technology in the learning process will be an additional factor in increasing the effectiveness of the learning process (Adnan et al., 2016).

This research was conducted to test the Practicality of the HOTS-oriented e-LKPD on respiratory system material for class XI SMA students. The fundamental thing in testing practicality is that the material is easily understood and used efficiently in several aspects of the assessment indicators, including general textbook requirements, special tactical

requirements, and aspects of the feasibility of product content. Therefore, if a product is applied to students without going through a practicality test, it will be easier for students to use it, and learning objectives will be challenging. However, if a practicality test is carried out first, the product's Practicality will be guaranteed, and students will quickly achieve learning objectives. Based on these problems, a HOTS-oriented e-LKPD was developed so that students and teachers can overcome some of these problems, mainly since the learning currently being carried out is online learning due to the COVID-19 pandemic.

METHOD

The research conducted was development research with the ADDIE design, which included five stages. Research and development procedures using the ADDIE development model included five stages: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2009). The stages of the process in the ADDIE model are related to each other. Therefore, using the ADDIE model needs to be done gradually and thoroughly to ensure an effective learning product is created.

The analysis stage was carried out by observing the biology learning process at school. The analysis results obtained several teachers and student needs to overcome these problems. In addition, the formulation of learning objectives and product content in the form of an initial product design, namely e-LKPD, was also carried out. Finally, the design stage is carried out by designing and creating a research instrument in the form of an e-LKPD validation sheet.

The development stage is carried out by realizing the e-LKPD product design that has been prepared at the design stage. After development, the implementation stage is the e-LKPD process for research subjects: two biology teachers and 29 students. Finally, the collection technique was carried out by analyzing the implementation and Practicality of the e-LKPD, obtained through a teacher and student response questionnaire.

e-LKPD product was measured based on the number of students who answered the assignment correctly. The analysis results will be used to state whether or not the e-LKPD product has been implemented. The criteria for categorizing the percentage of implementation are contained in Table 1.

Table 1. Eligibility Criteria

Performance Percentage	Category
$\chi \geq 80\%$	Very good
$60\% \leq \chi < 80\%$	Well
$40\% \leq \chi < 60\%$	Enough
$20\% \leq \chi < 40\%$	Not enough
$\chi \leq 20\%$	Very less

(Widoyoko, 2009).

The formula used in analyzing Practicality, according to Sudjana & Rivai (2007), namely:

$$PPR = \frac{\sum \text{Skor Responden}}{\sum \text{Responden} \times \sum \text{Item} \times \sum \text{Skala Tertinggi}}$$

PPR is the percentage of respondents' ratings in one aspect. The respondent's score is the total score of all respondents in one aspect. The respondents are the number of respondents, and Σ item is the number of items assessed in one aspect. If the percentage of respondents' ratings on each aspect has been obtained, then further analysis is carried out to obtain the average statement indicator percentage score by using the formula:

$$SIP = \frac{\sum \text{Skor Aspek Penilaian}}{\sum \text{Aspek}}$$

SIP is the average percentage score of statement indicators. The assessment aspect score is the total score given by all respondents, and Σ aspect is the number of aspects. Based on this information, the assessment categories are obtained in the following practical criteria in Table 2.

Table 2. Practicality Criteria

Score	Information
$85\% \leq SIP$	Very Practical
$70\% \leq SIP < 85\%$	Practical
$50\% \leq SIP < 70\%$	Less Practical
$SIP = 50\%$	Impractical

(Ridwan, 2010).

RESULTS AND DISCUSSION

a. Results of Product Implementation of e-LKPD

Based on the implementation results, it was obtained that the average e-LKPD product implementation was 78.41% (Table 3). Therefore, the e-LKPD products were

implemented well, with a percentage of implementation of 60% ≤χ <80%. Therefore, the developed e-LKPD meets the good category based on the analysis of product implementation data. It is in line with Malicoban & Castro (2022) that a good e-LKPD can guide teachers' and students' activities in the learning process.

Table 3. Results of Implementation Analysis

Topics	Sub Material	Average Percentage
Structure and Function of the Respiratory System Organs	Structure and Function of the Respiratory System Organs	74.71%
	Breathing Mechanism	71.55%
Respiratory Frequency, Lung Volume and Capacity	Respiratory Frequency In Humans	84.48%
	Lung Volume and Capacity	77.01%
Respiratory Disorders and Technology	Dangers of Cigarettes for Health Respiratory	79.31%
	Abnormalities and Technology in Humans	80.17%
Average		78.41%

b. The teacher's response to the Practicality of the e-LKPD in terms of content feasibility.

Teacher response to the Practicality of the e-LKPD in content feasibility shows an average of 96.66% classified in the convenient category (85% ≤ SIP) (Table 4). Therefore, the feasibility aspect of the content in the e-LKPD is by the three indicators used. First, learning is supported and facilitated by students with the HOTS orientation e-LKPD, which follows the learning objectives. This result in line with the opinion of Arsyad (2012) that teaching materials must meet criteria relevant to learning objectives.

Table 4. Teacher Responses to the Practicality of e-LKPD in terms of Content Feasibility

Indicator	Practicality Score		Percentage
	Teacher 1	Teacher 2	
Learning is supported by *e* -LKPD.	5	5	100%
Facilitate students in learning.	5	4	90%
e-LKPD following learning objectives.	5	5	100%
Average			96.66%

c. The teacher's response to the Practicality of the e-LKPD in terms of appearance

The average percentage of teacher responses to the Practicality of the e-LKPD in appearance is 100% (Table 5). These results show that the appearance of the HOTS-

oriented e-LKPD is convenient and can increase students' interest in learning. This result is to the opinion of Kurniawati et al. (2017) that teaching materials designed with an attractive appearance can stimulate students' interest in learning and use them as learning resources. LKPD appearence comprises significant characteristics since it is the major point to excite or trigger the interest of learners first compared to the LKPD content (Rohaeti et al., 2009).

Table 5. Teacher Responses to the Practicality of e-LKPD Viewed from Views

Indicator	Practicality Score		Percentage
	Teacher 1	Teacher 2	
The appearance of illustrations or pictures on the e-LKPD is clear and easy to understand.	5	5	100%
Suitability of writing in Indonesian language rules.	5	5	100%
Average			100%

d. The teacher's response to the Practicality of the e-LKPD in terms of language

Teachers' response to the Practicality of the e-LKPD in terms of language obtained an average percentage of 100% (Table 6), which is in the convenient category (85% ≤ SIP). Language aspect indicators in the e-LKPD include language presentation following the EYD, are simple, do not have double meanings, and are appropriate. For students to comprehend the content adequately, e-LKPD as an instructional material should be prepared using clear and intelligible phrases (Prastowo, 2013).

Table 6. Teacher Responses to the Practicality of e-LKPD in terms of language

Indicator	Practicality Score		Percentage
	Teacher 1	Teacher 2	
Indonesian presentation, according to EYD.	5	5	100%
The presentation of language is simple, easy to understand, and has no double meaning.	5	5	100%
Average			100%

e. The results of the analysis of teacher responses to the Practicality of e-LKPD are viewed from the benefits.

The teacher's response to the Practicality of the e-LKPD in terms of benefits shows an average of 90% categorized as convenient (Table 7). The fulfillment of indicators of benefits that can make students actively like and help them in the learning process. It is in

line with Magdalena et al. (2021) in their investigate state that E-LKPD is anticipated to create understudies feel upbeat and the concepts that they need to instill in understudies are maximized

Table 7. Teacher's response to the Practicality of e-LKPD in terms of benefits

Indicator	Practicality Score		Percentage
	Teacher 1	Teacher 2	
Students are more active in learning.	5	4	90%
Liked by students in the learning process.	5	4	90%
Help students to understand the learning material better.	5	4	90%
Average			90%

f. The results of the analysis of students' responses to the Practicality of the HOTS-oriented e-LKPD

Based on the HOTS-oriented e-LKPD implementation results at SMA Negeri 21 Makassar, the average percentage of student responses was 83.16%. Developed e-LKPD is practical in use by students. Students' positive responses indicate an interest in the learning material used (Bella et al., 2021).

Table 8. Results of Analysis of Student Responses to the Practicality of e-LKPD

Assessment Aspects	Average Score	Percentage
Content Eligibility	4.07	81.40%
Appearance	4.25	85.06 %
Language	4.16	83.20%
Benefit	4.15	83.00%
Average	4.15	83.16%

CONCLUSION

e-LKPD HOTS-oriented on respiratory system material in class XI SMA, which was developed, refers to the ADDIE model. The results of the implementation of the use of the e-LKPD that have been obtained are then carried out by practicality tests through the responses of teachers and students, showing that the HOTS-oriented e-LKPD on respiratory system material is in the convenient category. Based on these conclusions, the authors hope that the HOTS-oriented e-LKPD that has been developed can be used by teachers as teaching materials in the biology learning process because it has gone through a validity test and is declared valid.

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