

## Practicality test of HOTS-based worksheet on evolution topic for high school students

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### ABSTRACT

Initial studies on the use of high school student's worksheets based on higher order thinking skills (HOTS) in learning biology showed that HOTS content in the worksheet used by teachers is still low. Based on this, HOTS-based worksheet on evolution material has been developed. The type of research is a development research by using ADDIE model. The practicality test of HOTS-based worksheet was carried out at SMA Negeri 4 Wajo, South Sulawesi in March 2022, with 2 biology teachers and 30 students of grade 12<sup>th</sup>. The data collected through some instruments such as the observation sheet for the implementation of the worksheet and the questionnaire for students and teacher's response. The criteria for HOTS-based worksheet are declared practical if the minimum value of the percentage of product implementation obtained is 71.00%, and the average percentage of respondents through questionnaires is  $\geq 70.00\%$ . Generally, product implementation through the observation sheet was 84.46% (very well implemented category); teacher responses to the practicality of the worksheet was 85.83% (very positive response category); and student responses was 85.94% (very positive response category). Refer to the research results, it can be concluded that the worksheet has met the practical criteria.

**Keywords:** higher-order thinking skill, worksheet, practical

### INTRODUCTION

Various efforts have been made by the government to improve the quality of education such as improving the 2006 curriculum into the 2013 curriculum which requires students to be more active in teaching and learning activities. In addition, teachers are also required to have innovative teaching materials that are in accordance with the curriculum. HOTS are one of the skill that are expected to be achieved in the implementation of the 2013 curriculum (Sofyatinigrum et al., 2018). Students with high-level thinking skills will be a generation that is ready to face challenges in the 21st century era and the future, because of their ability to overcome problems encountered from various aspects of life.

Higher-order thinking is considered important for students because it can help them understand and solve problems in a more

effective and efficient way. Higher-order thinking can also help students develop critical and analytical thinking abilities, which are useful skills in a variety of situations, including at school, at work and in everyday life. Higher-order thinking can also help students understand more complex concepts and apply them in different situations. For example, students who have higher-order thinking skills can be better to connecting the concepts they have been learned in school to real-world situations, thus improving their understanding of the material learned. Higher-order thinking makes students see problems from various perspectives and the output is to find the right solution to overcome the problem (Hartono, et al. 2022; Indah, 2020); Pohan & Hasibuan, 2019).

The existence of changes curriculum, requires adjustments from the teacher as an educator by switching from the concept of Low

Order Thinking Skills (LOTS) to the concept of High Order Thinking Skills (HOTS) in the learning process. LOTS focuses on learning concepts at the level of knowing (C1), understanding (C2), and applying (C3). Different with HOTS, it is at more advanced level because there is a process of analyzing (C4), evaluating (C5), and creating (C6) by students, so that they are able to solve a problem (Hartono et al., 2022; Dinni, 2018), explore the experiences and fulfill them in a reflective way that is done consciously to achieve goals (Rofiah et al., 2013). There are several ways that can be done to improve students' higher-order thinking skills, namely providing challenges that are appropriate to the level of difficulty. To improve higher-order thinking skills, students need to be given appropriate challenges with appropriate levels of difficulty. This can help them to continue to develop and improve their thinking ability.

HOTS-oriented learning included in the implementation of the 2013 curriculum is one of the efforts of the Ministry of Education and Culture in improving the quality of learning, the quality of graduates, and catching up due to the Program for International Student Assessment (PISA) ranking which is still low compared to other countries (Setiawati et al., 2018). Indonesia's PISA results are ranked 74 out of 79 countries (Center for Policy Research, 2021). In line with the research of Adnan et al., (2021) that there are still many students who have difficulty in solving HOTS-oriented questions.

Science literacy skills that have not been properly empowered are one of the causes of low students' HOTS. Quoting from the results of research by Adnan et al. (2021) and Sugiarti et al. (2021) that the ability of junior high school students to organize, analyze, and interpret scientific data and information is still low. In addition, Mulbar et al., (2021); Rahmawati et al., (2022) also stated that students can not formulate solutions and solve problems using various methods.

Skills in solving a problem are skills that need to be trained early on. Presenting problems in the learning process can foster a critical

attitude (Haifaturrahmah et al., 2018; Salahuddin & Nurlailatun, 2021). Critical thinking patterns such as the ability to analyze (C4) and assess (C5) included in HOTS elements can help students to find appropriate and logical solutions to solve the problems faced (Palennari, 2018). Through HOTS nuanced learning, students' thinking skills can be empowered.

Implementing HOTS in learning is not easy. Teachers must master learning materials, use methods, models, and teaching materials that support the creation of HOTS nuanced learning. HOTS can be trained through a learning process that makes students active and dominates (Irmawati et al., 2019). One of the teaching materials that can support the creation of this learning process is the student worksheet.

The use of HOTS-based worksheet in learning can support the mindset of students to be more critical (Mahmudah & Bahtiar, 2022; Noviati et al., 2022), active in the learning process (Teti & Ghullam, 2018), and increasing problem solving skills. Referring to this, HOTS-based worksheet needs to be developed to support the creation of HOTS learning, especially in biology learning.

The use of open questions in worksheet can help students to think critically and develop new ideas. The use of open-ended questions is expected to improve students' ability to explore, analyze, and evaluate the information that has been obtained. Teaching higher-order thinking techniques in the worksheet, such as analysis, synthesis, evaluation and application to the students can help them to apply higher-order thinking skills in daily situations.

There have been many studies related to development of HOTS-based worksheet on biology subject, such as respiratory system (Ramadhana, et al. 2022), cell biology (Soraya & Efrida, 2022), bacteria (Rejeki, et al. 2022), and immune system (Afni, et al. 2022). However, it is still rare for researchers to develop similar teaching materials by using evolution as the topic. The topic is contained in the basic competencies 3.8 and 4.8 in the 2013 curriculum during the pandemic. Judging from the verb in the basic

competency, namely explaining, it is included in the LOTS level so that the task given for this material are still rarely directed to HOTS task.

The development of learning products in the form of HOTS-based worksheet, especially on evolution material for class XII SMA is based on: (1) the results of preliminary research on 214 tasks on worksheets used by 10 high school biology teachers, showed that the tasks in worksheets that were at the HOTS level (C4, C5, and C6) were only 3.27%, with details of 5 C4 level tasks, 2 C5 level tasks, and no C6 level tasks; (2) the discrepancy between the number of HOTS learning objectives and HOTS tasks contained in worksheets used by teachers. The number of learning objectives is 2 (2.56%) while the tasks are 7 (3.27%); (3) A total of 39 learning objectives in the teacher's lesson plans are still dominated by verbs at the LOTS level, consist of C1 as many as 22 (56.41%) C2 as many as 9 (23.08%), and C3 as many as 7 (17.95%), while HOTS there is only 1 learning objective at level C6 (2.56%) and no learning objectives at level C4 and C5 (0%); (4) The government through the Ministry of Education and Culture expects HOTS nuanced learning both from learning tools such as syllabus, lesson plans, worksheet, and learning assessments. Product development in this study aims to improve the existing products, namely worksheet by adding HOTS indicators in the assignment.

One of the requirements for a good development product is that it is practical. Practicality can be seen from the ease of use of these products in learning. The research instruments used were prepared in accordance with the components determined based on the use of teaching materials. Sukardi (2011) revealed that these components include ease of use, efficiency of learning time, and the benefits of teaching materials. The requirements for a product to be declared practical are ease of use and equipped with clear instructions (Arikunto, 2013), and an attractive display (Agustyaningrum & Yesi, 2017).

## METHOD

This type of research is research and development, referring to the ADDIE development model, which consists of five stages, namely analyze, design, development, implementation, and evaluation. One of the stages carried out in this research is implementation. Implementation was carried out by testing the practicality of the worksheet at SMAN 4 Wajo, by distributing the worksheet to 2 biology teachers and 30 students of class XII Science, as mean as they were the user of product. Collecting data through observation sheets for product implementation, and questionnaire for teacher and student's response about the product.

The product implementation observation sheet contains 19 descriptions of learning activities and their implementation time. Observers assessed the applicability of the worksheet during the learning process referring to a scale of 1-5. Score 1 (not implemented), score 2 (less implemented), score 3 (fairly well implemented), score 4 (well implemented), and score 5 (very well implemented). The practicality data that has been obtained through the observation sheet is then calculated using the formula Riduwan (2006):

$$P(\%) = \frac{\sum F}{N \times I \times R} \times 100\%$$

Description:

- P (%) = percentage of implementation
- $\sum F$  = total number of observer's answers
- N = the highest score in the observation sheet
- I = number of statements
- R = number of observers

The percentage value of the implementation is then categorized according to the existing criteria. worksheet is declared feasible if the minimum value of the percentage of implementation is in the Good category. worksheet implementability categories can be seen in Table 1.

Table 1. Categories of product applicability.

| Percentage of implementation (%) | Category  |
|----------------------------------|-----------|
| 81 – 100                         | Very good |
| 61 – 80                          | Good      |
| 41 – 60                          | Simply    |
| 21 – 40                          | Less      |
| 0 – 20                           | Very less |

(Source: Riduwan, 2018)

The practicality test of worksheet was also assessed from the results of the respondent's assessment, that were teachers and students through a response questionnaire. The teacher and student response questionnaires each contain 13 statements. The assessment aspects include content, display, language, and the benefits of the worksheet that has been developed. The questionnaire uses a rating scale of 1-5 which is adjusted to the response of the respondent to the statements in the questionnaire. Score 1 if "disagree", score 2 if "less disagree", score 3 if "enough", score 4 if "agree", and score 5 if "strongly agree". Teacher and student response data obtained, then calculated using the formula (Riduwan, 2010):

$$\%R = \frac{R}{5} \times 100$$

Description :

%R : the average percentage of marks awarded respondent

R : the average score given by respondents

Furthermore, determining the practicality category based on the responses given by the respondents through the questionnaire. The categorization is shown in Table 2.

Table 2. Practicality assessment categories.

| Interval                | Response category | Category      |
|-------------------------|-------------------|---------------|
| $85\% \leq R$           | Very positive     | Practical     |
| $70\% \leq R \leq 84\%$ | Positive          |               |
| $50\% \leq R \leq 69\%$ | Less positive     | Not practical |
| $R \leq 49\%$           | Not positive      |               |

(Source: Modified from Riduwan, 2010)

The developed product is declared feasible if the average percentage value is at least 70%.

## RESULTS AND DISCUSSION

### Description of HOTS-based worksheet

The developed HOTS-based worksheet refers to one of the HOTS categories, namely the cognitive process dimension (transfer of knowledge). The worksheet uses evolution material as the topic of discussion, in the 2013 curriculum evolution included in basic competency 3.8 and 4.8. Based on that basic competency, 10 indicators, 16 learning objectives, and 8 sub-topics are obtained, namely the theory of the origin of life, the theory of evolution, the development of evolutionary theory, factors that cause evolution, evidence of evolution, evolutionary mechanisms, speciation, and Hardy Weinberg's Law. The tasks in this worksheet are arranged from the LOTS level (C1-C3) to HOTS (C4-C6). There are a total of 40 tasks for 2 learning processes, 25 of which belong to the HOTS level. Table 3 is a breakdown of the number of HOTS tasks.

Table 3. Details of the number of HOTS tasks in the worksheet.

| HOTS level    | Number of task |
|---------------|----------------|
| C4 (analyze)  | 10             |
| C5 (evaluate) | 12             |
| C6 (create)   | 3              |
| Average (%)   | 62.5           |

The assignment is presented by providing a stimulus in the form of brief information, discourse, tables, graphs, or images. Students in C4 level tasks are instructed to find essential information from the stimulus. At the C5 level (evaluate), they are directed to provide an assessment (true or false) of the information presented accompanied by arguments that support the results of the assessment. The C6 level assignment directs students to think creatively such as making tables based on the brief information given, suggesting ideas or solutions to a problem.

### Practicality test result based on observation sheet

Data on the implementation of worksheet products that have been developed, obtained through observation sheets. Observation

activities were carried out by two observers during the learning process using worksheet. The following are the results of the analysis of the data that has been obtained for two meetings.

Table 4. Results of implementation of worksheet.

| Activities | Description  | %     | Category       |
|------------|--|-------|----------------|
| Early      | Conduct apperception activities  | 94    | Very well done |
| Main       | Working on worksheet tasks oriented to cognitive levels C4, C5, and C6 | 82.72 | Very well done |
| End        | Draw conclusions and reinforcement from the teacher                    | 76.66 | Well done      |
| Average    |  | 84.46 | Very well done |

The mean implementation of the worksheet was 4.22 with a percentage of implementation of 84.46%. The value is included in the category of very well implemented and can be declared feasible because the value achieved exceeds the specified minimum value of 70%.

**Practicality test result based on teacher response questionnaire**

A total of two Biology teachers at SMAN 4 Wajo as respondents gave an assessment of worksheet products in terms of content, display, language, and benefits. Table 5 is the teacher's response to the content of the worksheet.

Table 5. Teacher assessment of worksheet's content.

| No      | Description                                     | R |   | $\bar{x} \pm SEM$ | Average (%) | Category      |
|---------|---|---|---|-------------------|-------------|---------------|
|         |   | 1 | 2 |                   |             |               |
| 1       | Tasks are in line with learning objectives      | 5 | 5 | 5.00±0.00         | 88          | Very positive |
| 2       | Assignment reflects HOTS                        | 4 | 3 | 3.50±1.00         |             |               |
| 3       | Worksheet supports biology learning             | 5 | 4 | 4.50±1.00         |             |               |
| 4       | worksheet makes it easier for students to learn | 5 | 5 | 4.50±1.00         |             |               |
| Average |   |   |   | 4.37±0.31         |             |               |

Notes: R = responden; SEM = standart error of the mean

In general, teachers showed a very positive response to the content of the worksheet. Furthermore, the display aspect can be seen in Table 6.

Table 6. Teacher assessment of the display of worksheet.

| No      | Description   | R |   | $\bar{x} \pm SEM$ | Average (%) | Category      |
|---------|---|---|---|-------------------|-------------|---------------|
|         |   | 1 | 2 |                   |             |               |
| 1       | The font size in the worksheet is proportional                                  | 4 | 5 | 4.50±1.00         | 87.5        | Very positive |
| 2       | Clear image quality   | 4 | 5 | 4.50±1.00         |             |               |
| 3       | Placement of figures and tables as needed                                       | 4 | 5 | 4.50±1.00         |             |               |
| 4       | The color composition used does not interfere with the content of the worksheet | 4 | 4 | 4.00±0.00         |             |               |
| Average |   |   |   | 4.38±0.12         |             |               |

The average value of the response given by the teacher to the worksheet display is 4.38 with a percentage of 87.5%. This value shows that the teacher gave a very positive response so that it was declared feasible. Furthermore, the teacher's response to the writing and use of language in the worksheet is listed in the Table 7.

Table 7. Teacher assessment of language presentation in the worksheet.

| No      | Description  | R |   | $\bar{x} \pm SEM$ | Average (%) | Category      |
|---------|--|---|---|-------------------|-------------|---------------|
|         |  | 1 | 2 |                   |             |               |
| 1       | worksheet language in accordance with EYD                | 4 | 4 | 4.00±0.00         | 85          | Very positive |
| 2       | Language is easy to understand and has no double meaning | 4 | 5 | 4.50±1.00         |             |               |
| Average |  |   |   | 4.25±0.25         |             |               |

Based on Table 7, the results of the teacher's response to the worksheet based on the language aspect show an average of 4.25 with an average percentage of response value of 85%, indicating that the teacher gave a very positive response, so it was declared feasible. Furthermore, the teacher's assessment of the benefits of worksheet is listed in Table 8.

Table 8. Teacher assessment of the benefits of worksheet.

| No      | Description   | R |   | $\bar{x} \pm SEM$ | Average (%) | Category |
|---------|---|---|---|-------------------|-------------|----------|
|         |   | 1 | 2 |                   |             |          |
| 1       | The use of worksheet can increase students' learning activities     | 4 | 4 | 4.00±0.00         | 83.33       | Positive |
| 2       | The use of worksheet attracts students attention                    | 4 | 5 | 4.50±1.00         |             |          |
| 3       | The use of worksheet helps students more understanding the material | 4 | 4 | 4.00±0.00         |             |          |
| Average |   |   |   | 4.16±0.16         |             |          |

The average value of worksheet in terms of benefits is 4.16 with an average percentage of response value of 83.33%, indicating that the teacher gave a positive response, so it can be concluded that worksheet in terms of benefits is feasible. All respondents agreed that HOTS-based worksheet can increase learning activities, as seen from the average score given of 4 which indicates agreement with the statement in question.

Table 9. Accumulated teacher assessment of worksheet.

| No.     | Indicator | Average (%) | Category      |
|---------|-----------|-------------|---------------|
| 1.      | Content   | 88          | Very positive |
| 2.      | Display   | 87,5        | Very positive |
| 3.      | Language  | 85          | Very positive |
| 4.      | Benefit   | 83,33       | Positive      |
| Average |           | 85,83       | Very positive |

The accumulated results of the analysis of the teacher response questionnaire, obtained an average percentage value of 85.83%, this value indicates that the teacher gave a very positive response to the worksheet developed and categorized as feasible.

**Practicality test result based on student response questionnaire**

Worksheet was tested on 30 students of class XII Science at SMAN 4 Wajo. There were 4 aspects of assessment, namely content, display, language, and benefits. Filling out the questionnaire was done directly in the classroom while still observing health protocols. The following are the results of students' assessment of worksheet based on the content aspect.

Table 10. Assessment from 30 students about worksheet's content.

| No      | Description   | $\bar{x} \pm SEM$ | Average (%) | Category |
|---------|---|-------------------|-------------|----------|
| 1       | Enjoy learning using HOTS-based worksheet               | 4.07±0.12         | 79          | Positive |
| 2       | HOTS-based worksheet is easy to use in learning biology | 3.77±0.14         |             |          |
| 3       | Biology learning interest increases using the worksheet | 3.87±0.12         |             |          |
| 4       | Easy to understand learning materials                   | 4.10±0.10         |             |          |
| Average |   | 3.95±0.08         |             |          |

Based on Table 10, the results of students' responses to worksheet based on the content aspect. The score obtained was 3.95 with a percentage of 79% and was in the positive response category. Furthermore, the students' assessment of the worksheet based on the display aspect is listed in Table 11.

Table 11. Assessment of 30 students on the display of the worksheet.

| No      | Description   | $\bar{x} \pm SEM$ | Average (%) | Category      |
|---------|---|-------------------|-------------|---------------|
| 1       | The display of worksheet attracts attention.                                      | 4.07±0.14         | 89          | Very positive |
| 2       | The use of font type and size makes it easy to read the contents of the worksheet | 4.43±0.12         |             |               |
| 3       | The worksheet display has a color composition that attracts my attention          | 4.53±0.09         |             |               |
| 4       | The quality of the images presented in the worksheet is clear                     | 4.77±0.08         |             |               |
| Average |   | 4,45 ±0,15        |             |               |

The results of students' responses to the worksheet based on the display aspect showed an average of 4.45 with a response percentage of 89%. This value indicates that students give a very positive response to the display of the worksheet. The following is the assessment of students related to the language aspect in the developed worksheet.

Table 12. Assessment from 30 students about the presentation of language in worksheet.

| No      | Description  | $\bar{x} \pm SEM$ | Average (%) | Category      |
|---------|--|-------------------|-------------|---------------|
| 1       | Language used according to EYD   | 4.40±0.13         | 88          | Very positive |
| 2       | The language used is simple, easy to understand, and not double-meaning. | 4.40±0.10         |             |               |
| Average |  | 4.40±0.00         |             |               |

The average response value obtained is 4.4 with a percentage of 88%, indicating a very positive response from students to the language aspect. The following are the results of the assessment of students on the benefits of worksheet.

Table 13. Assessment of 30 students about benefit of the worksheet.

| No | Description | $\bar{x} \pm SEM$ | Average (%) | Category |
|----|-------------|-------------------|-------------|----------|
|----|-------------|-------------------|-------------|----------|

|         |   |           |      |               |
|---------|---|-----------|------|---------------|
| 1       | Provides a meaningful learning experience | 4.40±0.11 | 87.8 | Very positive |
| 2       | Train higher-order thinking skills        | 4.43±0.10 |      |               |
| 3       | Make it easy to learn biology             | 4.33±0.10 |      |               |
| Average |   | 4.39±0.03 |      |               |

Respondents showed a very positive response to the benefits of the developed worksheet, seen from the average score given which was 4.39 with a percentage of 87.8%.

Table 14. Accumulation of student's assessment of worksheet.

| No.     | Indicator | Average (%) | Category      |
|---------|-----------|-------------|---------------|
| 1.      | Content   | 79          | Positive      |
| 2.      | Display   | 89          | Very positive |
| 3.      | Language  | 88          | Very positive |
| 4.      | Benefit   | 87,8        | Very positive |
| Average |           | 85,94       | Very positive |

Respondents showed a very positive response to the worksheet both from the aspects of content, display, language, and benefit. The average percentage value given by 30 respondents is 85.94% and is categorized as practice.

In general, teachers and students showed a very positive response to the developed HOTS-based worksheet, so it can be stated that the worksheet meets the criteria for use in learning evolution material in class XII SMA. This is because the tasks presented have reflected HOTS, there are instructions for learning activities, the grammar used is simple and easy to understand, making it easier for students and teachers to use the worksheet in the learning process. [Ramadhani \(2016\)](#) stated that a learning tool is declared feasible if students give a positive response to the tool.

Teachers agree that worksheet oriented to HOTS on Evolution material is able to encourage students to be actively involved in the learning process and the gradual assignment of worksheet starting from the LOTS level to HOTS can support students' understanding of

evolution material. [Anderson & Krathwol \(2010\)](#) state that learning in the LOTS cognitive dimension will support to arrive at the HOTS cognitive dimension, so it needs to be done gradually and not directly to the HOTS dimension. The application of worksheet oriented to HOTS in learning can empower critical and creative thinking skills because the tasks presented are at the C4 level which requires the ability to analyze, the C5 level which requires the ability to evaluate, and the C6 level supports creative thinking. The form of tasks presented is more diverse than the worksheet used by schools in general. The forms of questions that are applied as worksheet tasks include: essay, true-false, short answer, numerical response, and matching. [Fanani \(2018\)](#) explains that various forms of questions are useful for describing the abilities of students in more detail so that teachers conduct objective assessments. Assessment results by applying objective principles have a high level of responsibility.

In addition, Evolution selected as the topic of worksheet is also one of the advantages in this research. Evolution material has been widely developed into teaching materials, one of which is worksheet. However, it is still rare for research related to the development of Evolution worksheet to focus on the orientation of its tasks towards HOTS. This is because the basic competencies in evolution material are at the LOTS (C2) level, in accordance with Balitbang Decree number 018/H/KR/2020. In this research, the basic competency is derived into several HOTS indicators so that HOTS-oriented tasks are obtained. Furthermore, teachers and students showed a very positive response to the display of the developed worksheet. Students liked the pictures and background color of the worksheet. The color used is orange, which symbolizes creativity, uniqueness, enthusiasm, attractiveness, and confidence ([Monica & Laura, 2011](#)). Color selection is one of the factors that can increase students' desire to use the developed teaching materials ([Purnama, 2010](#)). In addition, the font type and font size applied

are proportional, the image quality is clear, the table size is as needed, and the composition of the text color and background is in harmony so that it makes it easier for students to read the text in the worksheet. An attractive display is one of the indicators that a product is declared feasible ([Alwi et al., 2020](#); [Agustyaningrum & Yesi, 2017](#)).

In terms of language, according to respondents, the language used in the instructions for learning activities and instructions for each task is easy to understand and clear. Language is one of the factors that determine the practicality level of a learning product. The use of appropriate and communicative language in teaching materials supports the creation of interaction between teachers and students, so that learning materials or messages can be conveyed properly to students. Language is not only in the form of verbal communication but can be in a non-verbal form, namely through writing or symbols ([Wicaksono, 2016](#)). Writing words or sentences that are unclear and ambiguous in teaching materials will make it difficult for students to understand the intended information or instructions. Quoting from [Keraf \(2007\)](#) that in compiling teaching materials, teachers must use language that is in accordance with the level of cognitive development of students and EYD rules. Good and clear grammar will make it easier for students to understand the material and achieve their learning goals ([Prastowo, 2011](#)).

Learning activities listed in the worksheet, such as finding information from relevant sources and doing tasks at levels C1 to C6 can be carried out by students. However, the lowest percentage of implementation is in the conclusion drawing activity. In this activity, some students still have difficulty in making conclusions from the material that has been learned. This is because students are not actively involved during discussion sessions for tasks at level C4 (analyzing). The research was conducted during the pandemic so that the duration of learning time was shorter than



normal, causing some students to rush in completing the worksheet tasks and the answers given were less than optimal. The teacher as the research respondent also suggested that the worksheet be broken down into several meetings because the density of the material was not proportional to the duration of time provided. Therefore, it is necessary to make improvements by allocating learning using the worksheet for 3 meetings (effectiveness testing needs). The implications of the resulting HOTS-based worksheet are: (1) teachers can create HOTS learning, especially on evolution material; (2) become one of the references for HOTS-oriented teaching materials for teachers, to make similar teaching materials on other biological materials and adjust them to the design and content of the material; (3) empower students' higher-order thinking skills through HOTS problem exercises; (4) train students to solve non-routine problems contained in worksheet's task.

## CONCLUSION

The HOTS-based worksheet developed was declared practice in terms of product implementation, teacher responses, and student responses. The practicality of worksheet through the product implementation observation sheet obtained an average of 84.46%, including the category of very well implemented. Teachers and students showed a very positive response to the content, display, language, and benefits of the developed worksheet, seen from the average response from teachers (85.83%) and students (85.94%).

The advantages of HOTS-based worksheet are: (1) Evolution material as the learning topic of the worksheet is still rarely developed towards HOTS so that it can be a teacher innovation in teaching the material; (2) the display of the worksheet is attractive; (3) the tasks presented are gradual from LOTS to HOTS and the forms of tasks are diverse; (4) the grammar used is simple and easy to understand. Turning to the shortcomings of this product, among others: (1)

Only using 1 of the 3 existing HOTS categories, namely the cognitive process dimension (transfer of knowledge); (2) The short duration of learning causes there are still some students' answers related to worksheet task that are not as expected. HOTS can be viewed from 3 aspects, namely transfer of knowledge, problem solving, critical and creative thinking. The worksheet developed only focuses on 1 aspect of HOTS, namely transfer of knowledge, so it is recommended to the next product developer to develop worksheet products that cover all three aspects of HOTS.

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