



JPPIPA 6(2) (2020)

Jurnal Penelitian Pendidikan IPA

*Journal of Research in Science Education*<http://jppipa.unram.ac.id/index.php/jppipa/index>

# Analysis of Science Teachers' Understanding of High Order Thinking Skills (HOTS) and Their Implementation in Learning

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## Article Info

Received : March 16<sup>th</sup>, 2020Revised : June 24<sup>th</sup>, 2020Accepted: July 7<sup>th</sup>, 2020

**Abstract:** This study aims to analyze and describe data on the understanding of YAPNUSDA elementary school teachers of High Order Thinking Skills (HOTS) and their implementation in learning. This study is a descriptive study that describes HOTS's understanding of the teacher and its implementation in learning. The data collection tool used was a questionnaire. The results of this study indicate that in general the data obtained is that the teachers in the study location schools do not yet understand about HOTS. They can't even explain the definition of HOTS. The lack of understanding of HOTS certainly has an impact on the implementation of HOTS in the tools for assessing learning performance, including the exam questions jointly prepared by the editorial team. The most frequently cited reason that also hinders teachers is that they do not yet understand HOTS and the technique of formulating instruments with verbs that measure HOTS.

**Keywords:** Implementation; High Order Thinking Skills (HOTS); Learning

**Citation:** Anggraeni, D.M., & Sole, F.B. (2020). Analysis of Science Teachers' Understanding of High Order Thinking Skills (HOTS) and Their Implementation in Learning. *Jurnal Penelitian Pendidikan IPA (JPPIPA)*. 6(2). 210-214. doi. <https://doi.org/10.29303/jppipa.v6i2.411>

## Introduction

The 21st century is known to everyone as the age of knowledge and requires the existence of new skills and intelligence known as the intelligence of the 21st century (Makhrus, et al., 2019). In this century, there were tremendous changes in various areas often referred to as Industrial Revolution 4.0 (Ridho, et al., 2020). Learning in this century is expected to adapt to a number of development requirements of science, technology, and art (Darling-Hammond, et al., (2020). Therefore, the educational world needs to change the paradigm in the learning process. The paradigm shift in 21st-century learning is that it must be able to generate a number of skills, such as students' ability to think critically, connect knowledge to the real world, master information technology, communicate and work together (Shelia, 2014). This ability is often known as

4C, which is communication, collaboration, critical thinking and problem solving, creativity, and innovation. This is consistent with the results of research conducted by more than 250 researchers from 60 world institutions included in the Assessment Teaching of 21st Century Skills (ATC21S), which group 21st century skills into 4 categories, including the ability to think (Faisal, 2019).

The mind is divided into two parts, namely the ability to think at a low level (Low Order Thinking Skills or LOTS) and the ability to think at a higher level (High Order Thinking Skills or HOTS) (Anggraeni, et al., 2019). The high-level thinking skills of students are one of the barometers of the intellectual level of the nation (Faisal, et al., 2019). As agents of change, students must be able to show their identity in a way that is intellectual, moral, and elegant (Faisal, et al.,

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2019). Therefore, in the 21st century, the learning process carried out in schools and tertiary institutions must be thoroughly considered to produce competent graduates.

High order thinking skills that are the demands of 21st-century learning are actually embodied in Bloom's taxonomy (Ichsan, et al., 2019). Bloom's taxonomy in the cognitive domain consists of three levels classified as high-level thinking, namely analysis, synthesis, and evaluation in the original version and analysis, evaluation, and creation in the modified version (Putra & Abdullah, 2019). If the teacher has used Bloom's taxonomy at a high level of thinking in developing the learning process and tools for assessing learning outcomes, then in fact he has prepared his students to survive and compete in the 21st century.

Teachers should train students in higher-order thinking (HOT), with the aim of students' ability to reason to answer more complex questions, and or solve a case of a more complex problem. It aims to improve students' thinking ability to answer more complicated questions and/or solve a more complicated problem case (Kemendikbud, 2013). The implication is that learning designed by teachers should train students to think critically and solve problems and measure their performance using HOTS tools.

High Order Thinking Skills (HOTS) are defined as the broader use of the mind to find new challenges. This high-level thinking requires someone to apply new information or foreknowledge and manipulate information to achieve possible answers in new situations (Heong et al., 2011).

According to Wardana (2010), The ability to think at a higher level is a thought process that involves mental activity to explore complex, reflective and creative experiences that are consciously carried out to achieve goals, namely the acquisition of knowledge that will level of thinking includes, analyzing, evaluating and creating. High-level thinking is thinking at a higher level than just memorizing or saying facts.

Bloom (1956) in Paidi et al., (2017) describes the level of cognitive processes from the simplest to the complex level, known as the level of cognitive skills. Level categorization is divided into 6 levels, namely knowledge, understanding, application, analysis, synthesis, and evaluation. The level was then revised by Bloom's students (Anderson and Krathwohl, 2001) to Remembering (C1), Understanding (C2), Applying (C3), Analyzing (C4), Evaluating (C5) and Creating (C6).

**Method**

This study is a descriptive study that illustrates HOTS's understanding of the teacher and its

implementation in learning. Data were collected from 30 teachers from Yapnusda Primary School in Southwest Sumba. The data collected is then analyzed using quantitative descriptive statistical techniques. The instruments used are shown in Table 1.

Table 1. Research Instruments

No	Instruments
1	What do you know about High Order Thinking Skills (HOTS)?
2	Can HOTS be taught at the primary school level?
3	Have you implemented HOTS in the learning activities?
4	Challenges or obstacles in implementing HOTS-based learning?
5	Challenges or obstacles in the development of HOTS-based assessment tools?
6	Taken efforts/solutions to implement HOTS-based learning and assessment?
7	Suggestions and enter related to HOTS

**Result and Discussion**

Based on data from interviews with the team of teachers who prepared UTS questions with YAPNUSDA Elementary School, the following data was obtained:

**a. Data Respondent**

Respondents data were 30 teachers, consisting of 8 teachers from 4 schools designated to prepare scientific instruments for UTS with YAPNUSDA Elementary Schools and also 22 YAPNUSDA teachers from other schools who were not involved in preparing joint exam questions. The composition of the respondents is shown in diagram 1.

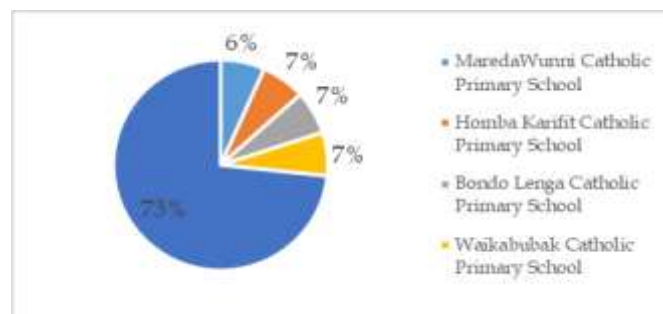


Figure 1. Percentage of Respondents in Each School

**b. Interview data**

Based on the interview data, data is generally obtained that the teachers in the study location schools do not understand HOTS. They can't even explain the definition of HOTS. The lack of understanding of HOTS certainly has an impact on the implementation of HOTS in the tools for assessing learning performance, including the exam questions jointly prepared by the editorial team. The most frequently cited reason, which

also hinders teachers, is that they do not yet understand HOTS, as do techniques for formulating instruments with verbs that measure HOTS. Detailed responses from respondents are described as follows based on interview guidelines.

1) What do you know about High Order Thinking Skills (HOTS)?

Respondents gave a surprising answer in which 70% of the respondents did not understand HOTS. They are able to define HOTS as high-level thinking skills but have no understanding of how it is implemented in learning. 30% of respondents listed HOTS as high thinking skills. These respondents could describe high-level forms of thinking skills, such as creative and innovative thinking

2) Can HOTS be taught at the primary school level?

Respondents' answers to questions about HOTS at primary school level are explained in Figure 2.

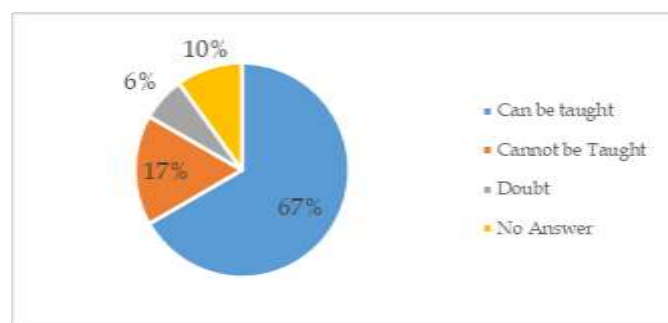


Figure 2. Results of Respondents' Answers about HOTS at Elementary School Level

3) Have you implemented HOTS in the learning activities?

Respondents' answers to questions about applying HOTS to learning are explained in Figure 3

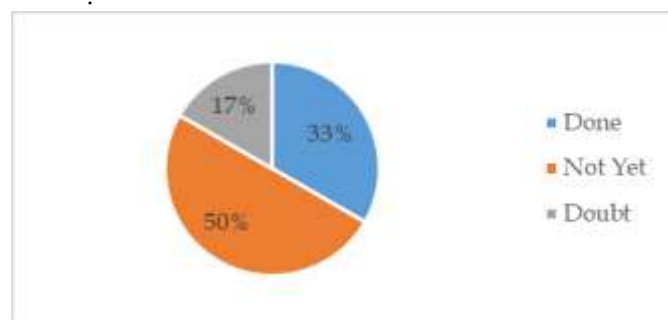


Figure 3. Results of Respondents' Answers on the Application of HOTS in Learning

4) Challenges or obstacles in implementing HOTS-based learning?

Respondents' answers to questions about the obstacles they experience in implementing HOTS-based learning are explained in Figure 4.

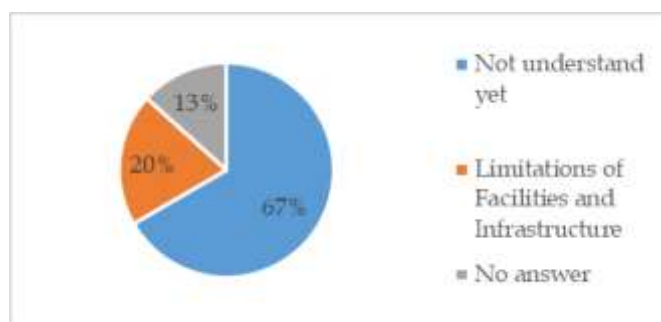


Figure 4. Results of respondents' responses to disabilities experienced in implementing HOTS-based learning

5) Challenges or obstacles in the development of HOTS-based assessment tools?

Respondents' answers to questions about the limitations experienced in developing HOTS-based assessment tools are explained in Figure 5.

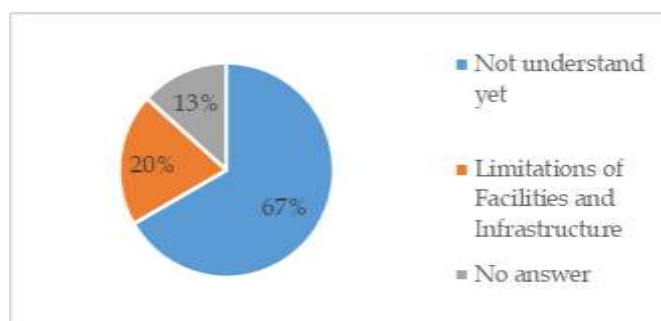


Figure 5. Results of respondents' responses to disabilities experienced in compiling HOTS-based assessment tool

6) Taken efforts/solutions to implement HOTS-based learning and assessment?

Respondents' responses to questions about the solutions adopted to apply HOTS-based learning and assessment are illustrated in Figure 6.

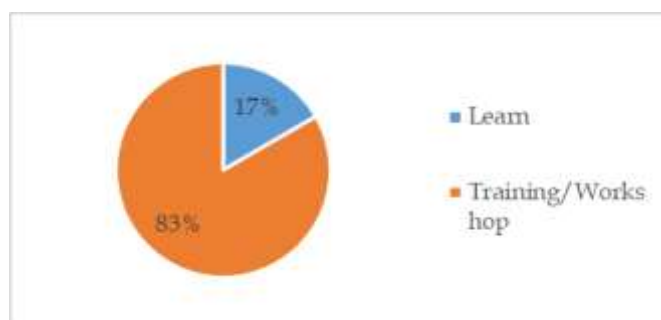


Figure 6. Results of respondents' responses to solutions taken to implement HOTS-based learning and assessment

7) Suggestions and enter related to HOTS

In this column, all respondents provide suggestions for STKIP as one of the tertiary educational institutions in Sumba to provide socialization or workshops on HOTS and its implementation in learning.

Based on the data in the above diagram, it is known that the teacher still does not understand HOTS. This certainly influences its implementation in the learning process. Due to limited understanding, teachers are still limited to presenting knowledge in the learning process only at low or low-level thinking skills such as remembering, understanding, and applying. Another impact is that the developed measuring instrument is also limited to the cognitive level. If the learning process like this is continued by the teacher, students will not be able to understand the higher cognitive levels categorized as higher-level thinking skills. This certainly contradicts the technical learning guidelines established by Kemendikbud (2013) that teachers should train students in the form of high-level thinking skills or abilities.

If students already have low-level thinking skills, it is time for the teacher to introduce and practice high-level thinking skills. This is consistent with Rosnawati (2012), which states that high order thinking skills (HOTS) can occur when someone associates newly received information with information already stored in their memory, then connects and/or rearranges it and develops the information so that information is achieved the goal or solution of a difficult situation to solve. Another obstacle conveyed by the teachers is the teacher's understanding of developing HOTS-based assessment tools that are still low. The research results of Ichsan et al., (2019) showed that a proper evaluation of high-level thinking skills required an appropriate evaluation.

At the primary school in the 2013 curriculum, there was an integral thematic policy where the evaluation's provisions were based on authentic assessment. Therefore, higher-order thinking skills must also be authentically mapped. Therefore, to carry out the HOTS-based learning and evaluation process requires teachers' determination and motivation to continue learning and developing themselves by following training courses or workshops relevant to high order thinking skills.

## Conclusion

On the basis of the data obtained and presented above, it can be concluded that the data was generally obtained that the teachers in the study location schools do not understand about HOTS. They can't even explain the definition of HOTS. The lack of understanding of HOTS certainly has an impact on the implementation of HOTS in the tools for assessing learning performance, including the exam questions jointly prepared by the editorial team. The most frequently cited reason that also hinders teachers is that

they do not yet understand HOTS and the technique of formulating instruments with verbs that measure HOTS.

## Acknowledgments

Thanks to the Ministry of Research, Technology, and Higher Education which has entrusted and provided research grants, especially in the research schedule for beginning teachers of the implementation year 2019. Also a big thanks to the leaders of STKIP Weetebula along with all the fellow teachers who have us supported in carrying out research activities and scientific publications.

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