



Application of HOTS (High Order Thinking Skill) in Science Learning During the Pandemic

Nuryunita Dewantari^{1*}, Suwito Singgih¹, Riva Ismawati¹

¹Departement of Science Education, Tidar University, Magelang, Indonesia.

Received: July 26, 2023

Revised: September 1, 2023

Accepted: November 25, 2023

Published: November 30, 2023

Corresponding Author:

Nuryunita Dewantari

nuryunitadewantari@untidar.ac.id

DOI: [10.29303/jppipa.v9i11.1927](https://doi.org/10.29303/jppipa.v9i11.1927)

© 2023 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: The purpose of this research to know application of HOTS based science learning during the pandemic. The research method used is a literature study method, in which data is collected without going directly to the field and meeting directly with the respondents. The results of this study indicate that the application of HOTS in learning is able to solve problems and find solutions to problems, so as to bring up new discoveries that can be useful. In addition, the application of HOTS in learning is also able to improve student learning outcomes. Based on the results of research that have been studied can be concluded that the application of HOTS learning during the pandemic is able to improve student learning outcomes and make learning more meaningful.

Keywords: HOTS; Pandemic; Science learning

Introduction

The COVID-19 pandemic has changed the world of education at a rapid pace. One of them is the learning design that has changed, from offline learning or face to face directly in the classroom to online learning (in the network). Online learning can be carried out anywhere and anytime, without the need for a room. The thing that really needs is an internet network. Learning is a process of interaction between educators and students in a learning environment. In the implementation of learning, educators have an important role in creating a good learning atmosphere, so preparation is needed before carrying out learning. As for what needs to be prepared by educators before carrying out learning, one of which is learning tools. Learning tools is that prepared by the teacher to carry out learning activities and has a role as a guide for educators in carrying out learning in the classroom (N. M. Sari et al., 2020).

Learning tools consist of the learning planning stage, learning implementation stage, and learning evaluation stage. In preparing learning plans, educators

also need to determine what learning models and approaches will be used, so as to provide student interest in participating in learning. Student interest in learning will help improve student learning in aspects of knowledge (cognitive), attitude (affective), and behavior (psychomotor). Students are trained to be able to remember, understand, apply, analyze, evaluate, and create using high order thinking skills (HOTS). This is in line with the demands of the 2013 curriculum, namely the quality of learning that can make students able to be creative, independent, cooperative, solidarity, leadership, empathetic, tolerance, and life skills in order to shape character and improve the nation's civilization and dignity. HOTS (High Order Thinking Skill) is a thinking process that is not just memorizing and relaying known information (Basis et al., 2020). Higher order thinking skills as a form of ability to connect, manipulate, and transform knowledge and HOTS learning models that can be applied in learning during the COVID-19 pandemic.

Learning that is applied during the COVID-19 pandemic is distance learning or online. Distance

How to Cite:

Dewantari, N., Singgih, S., & Ismawati, R. (2023). Application of HOTS (High Order Thinking Skill) in Science Learning During the Pandemic. *Jurnal Penelitian Pendidikan IPA*, 9(11), 976-980. <https://doi.org/10.29303/jppipa.v9i11.1927>

learning has various impacts on the world of education, both for teachers and students. One of the negative impacts of distance learning is the lack of interaction between teachers and students caused by various factors, one of which is the system, for example due to the influence of signals or networks (Hadisi et al., 2015). The change in the learning process from face-to-face to distance learning has caused many schools to use certain applications as a tool to carry out learning, one of the most frequently used applications by teachers is Google Classroom and WAG (*Whatsapp Group*). The change in the learning process should not be a reason for teachers not to facilitate HOTS to students in online learning. Teachers must continue to make learning implementation plans that are able to facilitate and train students' HOTS, so that they are in accordance with learning objectives and achieve the demands of the 2013 curriculum.

HOTS is known as higher order thinking skills in terms of cognitive domain in Bloom's Taxonomy. The Bloom's Taxonomy that includes HOTS category is C4 (analyze), C5 (evaluate), and C6 (create). HOTS can be applied in learning, one of which is by providing HOTS-based questions which are of course in accordance with the learning materials studied by students. In science learning, the application of HOTS questions is very necessary, because these questions are able to test students' science process skills, so that in this case they can not only know students' higher-order thinking skills, but also simultaneously know the level of students' science process skills. This is in line with Hutabarat (2019) which states that in its application HOTS is closely related to science learning, because the process to achieve HOTS is in line with the character of the science

learning process. Where, science is a science that studies events that occur in nature which includes organized knowledge, ideas, and concepts about the natural surroundings, obtained from experience through a series of scientific processes including investigation, compilation, and presentation of ideas. In principle, science is a way of finding out and procedures for doing or doing, so that it comes to the process of concluding (Samtowa, 2011).

Method

This article is a form of qualitative research with the method used is a literature study, which is a research method in collecting data without going into the field and meeting respondents directly. The data were obtained from previous researchers who were in line with the research being. In this study used sources that originated from 19 scientific journal and 6 books.

Result and Discussion

Definition of HOTS (Higher Oder Thinking Skill)

Higher Order Thinking Skill (HOTS) or higher order thinking skills is a complex thinking process in describing material, making conclusions, building representations, analyzing, and building relationships involving the most basic mental activities (Mustaghfirin, 2019).

HOTS-based learning is different from LOTS-based learning. This is in line with Sani (2019) which states that there is a difference between learning activities in HOTS and LOTS-based learning. The differences can be seen in table 1 below:

Table 1. Differences in Learning Activities of HOTS and LOTS

LOTS	HOTS
Positive in thinking	Active in thinking
Solve the problem	Formulate the problem
Studying simple problems	Studying complex problems
Convergent thinking	Divergent thinking and developing ideas
Learn from the teacher as the main source of information	Searching for information from various sources to think critically and solve problems creatively
Practice solving problems and memorizing	Think analytically, evaluative, and draw conclusions
Prioritize factual knowledge	

HOTS is a thought that challenges students to interpret information (Suhandoyo et al., 2016). This is in line with what was stated by Johnson in Helmawati (2019) which defines that higher-order thinking is a skill in processing information to be more developed. HOTS has several indicators which include analyzing (C4), evaluating (5), and creating (C6) (Widana, 2017). In the era of the 21st century, higher order thinking skills are needed to be taught to students, in order to be able to compete (Lu et al., 2021). Students who have high-order

thinking skills have good evaluation skills and are able to create something (Samritin, 2014). This means, students who have high thinking skills will be able to solve problems and find solutions to these problems. In this 21st century, this ability is needed, where the problems and competition that occur are increasingly complex, so that from thinking like that will emerge new discoveries that can save mankind.

Application of HOTS in Science Learning in the Pandemic Period

HOTS is one of the abilities that is a concern in the 2013 curriculum. The current assessment standard is more focused on learning outcomes that prioritize HOTS (Masitoh et al., 2020). However, in reality the learning that occurs in the field is still not all HOTS-oriented. Based on the results of research conducted by Nurwahidah (2018) in Semarang which states that the HOTS ability of some students is still relatively low. There are still many students who have not been able to carry out the process of reasoning and problem solving. The low level of HOTS ability is caused by students who are not used to working on HOTS questions and the media and teaching materials used by teachers cannot trigger students to think at higher levels. One of them is that the LKPD used in learning does not pay attention to the HOTS aspect to develop students' abilities (Kadarisma et al., 2020).

In a study conducted by Dian et al. (2022) showed that E-LKPD-based Problem Based Learning (PBL) can improve the ability of HOTS in science learning. This is indicated by an increase in students' higher-order thinking skills after using the PBL-based E-LKPD in the medium category. This is in accordance with the results of research conducted by Widodoarti et al. (2021) that PBL can train students to be able to solve problems. In addition, research conducted by Syaifulloh et al. (2017) shows that Problem Based Learning (PBL) has a significant influence on problem solving abilities, especially related to HOTS. This is also in line with the research results of Rozi et al. (2019) which states that the application of HOTS-based learning is able to provide meaningful and enjoyable learning experiences for students.

Based on the results of research conducted by Jannah (2021) shows that the application of HOTS questions in science learning needs to be varied so that all higher-order thinking skills can be trained through these questions. Another study related to the application of HOTS in science learning is a study conducted by Nevi (2018) which concludes that the implementation of HOTS science learning using simple tools can invite students to find their own concepts in learning, train students to be sensitive in participating in solving problems that occur in the classroom. Environment, doing learning by finding concepts or applying the concepts learned directly, so that learning becomes fun and meaningful. In addition to the two previous studies, the application of HOTS in learning was carried out by Winarno et al. (2015) which resulted in an integrated science module based on HOTS on the energy theme that was developed, which could improve student learning outcomes seen from the comparison of the

average scores of students before and after using HOTS-based integrated science module on the energy theme.

The application of HOTS learning during the pandemic is able to improve student learning outcomes (Mikly et al., 2021). This is in line with the results of research conducted by Larasati (2020) which states that there is an effect of discovery learning models based on higher order thinking skills on HOTS learning outcomes. Other research that is in line is research conducted by Saraswati et al. (Saraswati et al., 2020) that learning uses various thinking abilities of students individually and in groups as well as the real environment to overcome problems, so that it is meaningful, relevant, and contextual. Research conducted by Handayani (2022) proves that the Problem Based Learning (PBL) model can improve the creative thinking skills of fifth grade students in science learning in pandemic conditions with the PTMT system. PBL is a learning strategy that encourages students to develop critical thinking skills and be able to solve problems and communication skills. This shows in theory that PBL has an effect on HOTS abilities, so that in improving student learning outcomes in learning, an appropriate strategy is needed, one of which is PBL as a learning strategy that is able to increase students' HOTS (Syaifulloh et al., 2017).

Conclusion

Based on the results of the research and discussion, it can be concluded that the application of High Order Thinking Skills (HOTS) learning during the pandemic was able to improve student learning outcomes and make learning more meaningful.

Author Contribution

Nuryunita Dewantari: writing-original draft preparation, result, discussion, methodology, conclusion, review, and editing; Suwito Singgih and Riva Ismawati: analysis, review and editing.

Funding

The author is the sole provider of funding for this research.

Conflicts of Interest

The authors declare no conflict of interest.

References

- Basis, U. A., Manongko, A., Tiwow, G., & M. (2020). Learning Development Model of Higher Order Thinking Skill (HOTS) for Students at Senior High School Kristen 1 Tomohon. *Literacy-Journal of Economic Education*, 1(2), 20-36. <https://doi.org/10.53682/jpeunima.v1i2>
- Hadisi, L., & Muna, W. (2015). Management of Information Technology in Creating Learning

- Information Models (E-Learning. *Journal Al-Ta'dib*, 8(1), 117-140. <https://doi.org/10.31332/atdb.v8i1.396>
- Handayani, M. (2022). Peningkatan Creative Thinking Skills Melalui Model Problem Based Learning Pembelajaran Ipa Sd Selama Pandemi. *Jurnal Cakrawala Pendas*, 8(2), 428-437. <https://doi.org/10.31949/jcp.v8i2.2192>
- Helmawati. (2019). *Learning and Assessment Based HOTS*. Remaja Rosdakarya.
- Hutabarat, R. (2019). Improvement of High Order Thinking Skill (HOTS) In Learning The Nature and Change Of Objects Through The Community Science Technology Approach For Class IV Public Elementary Schools 167959 Tebing Tinggi City Academic Year 2017/2018. *Elementary Scholl Journal*, 9(2), 159-168. <https://doi.org/10.24114/esjpsd.v9i2.14326>.
- Jannah, R. (2021). Penerapan soal HOTS (Higher Order Thinking Skill) Dalam Pembelajaran IPA. *IQTISODINA: Jurnal Ekonomi Syariah & Hukum Islam*, 4(1), 54-63. Retrieved from <http://ejournal.kopertais4.or.id/madura/index.php/IQTISODINA/article/download/4961/3287>
- Kadarisma, G., Sari, I. P., & Senjayawati, E. (2020). Pengembangan Lembar Kerja Siswa Berbasis Inkuri Untuk Meningkatkan HOTS Siswa SMA pada Materi Trigonometri. *Teorema: Teori Dan Riset Matematika*, 5(2), 239. <https://doi.org/10.25157/teorema.v5i2.3725>
- Larasati, D. A. (2020). Pengaruh Model Discovery Learning Berbasis Higher Order Thinking Skill Terhadap Kemampuan Berpikir Kritis. *VOX EDUKASI: Jurnal Ilmiah Ilmu Pendidikan*, 11(1), 39-47. <https://doi.org/10.31932/ve.v11i1.684>
- Lu, K., Yang, H. H., Shi, Y., & Wang, X. (2021). Examining the key influencing factors on college students' higher-order thinking skills in the smart classroom environment. *International Journal of Educational Technology in Higher Education*, 18(1), 1. <https://doi.org/10.1186/s41239-020-00238-7>
- Masitoh, L. F., & Aedi, W. G. (2020). Pengembangan Instrumen Asesmen Higher Order Thinking Skills (HOTS) Matematika di SMP Kelas VII. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(2), 886-897. <https://doi.org/10.31004/cendekia.v4i2.328>
- Mikly, H., Kawulur, A. F., Manongko, A., & Wantah, E. (2021). Model Pembelajaran Higher Order Thinking Skill (HOTS) Di Masa Pandemi Covid 19. *Syntax Idea*, 3(8), 1847. <https://doi.org/10.36418/syntax-idea.v6i8.1409>
- Mustaghfirin, A. (2019). *Preparation of Assessment Instruments Based on HOTS: Paper Handouts*. Ministry of Education and Culture Directorate General of Primary and Secondary Education Directorate of Vocational High School Development.
- Nevi, R. (2018). Learning Implementation of HOTS (Higher Order Thinking Skills) Science Using Simple Tools. *Journal of Mathematics and Science Education Research*, 2(2). <https://doi.org/10.26740/jppms.v2n2.p48-53>.
- Nurwahidah, I. (2018). Development of Raesoning Questions Timss Model to Measure High Order Thinking (HOT. *Thabiea: Journal of Natural Science Teaching*, 1(1), 20. <https://doi.org/10.21043/thabiea.v1i1.3874>.
- Rozi, F., & Hanum, C. B. (2019). Pembelajaran IPA SD Berbasis HOTS (Higher Order Thinking Skills) Menjawab Tuntutan Pembelajaran di Abad 21. *Seminar Nasional Pendidikan Dasar Universitas Negeri Medan*, 246-311. Retrieved from <https://jurnal.unimed.ac.id/2012/index.php/snp/ua/article/view/16127>
- Samritin. (2014). *Development Ability Assesment Instruments for Junior High School Students in Mathematics Subjects*. Yogyakarta State University.
- Samtowa, U. (2011). *Science Learning in Elementary School*. PT Indeks.
- Saraswati, & Rohayati. (2020). Indonesian Language Learning Oriented HOTS Observation Report Text Material Through Discovery Learning Model, Class VII Odd Semester Students at Integrated Islamic Junior High School Assalam Learning Model HOTS in Covid-19 Pandemic. *Journal of Artikula*, 3(1), 12-19. <https://doi.org/10.30653/006.202031.37>.
- Sari, D. N. I., Budiarmo, A. S., & Wahyuni, S. (2022). Pengembangan E-LKPD Berbasis Problem Based Learning (PBL) untuk Meningkatkan Kemampuan Higher Order Tingking Skill (HOTS) pada Pembelajaran IPA. *Jurnal Basicedu*, 6(3), 3699-3712. <https://doi.org/10.31004/basicedu.v6i3.2691>
- Sari, N. M., Sabri, T., & Kresnadi, H. (2020). Analysis of Thematic Learning Devices with a Scientific Approach in the Covid-19 Period in Grade IV Elementary School. *Journal of Education and Equatorial Learning*, 9(11), 1- 8. <https://doi.org/10.26418/jppk.v9i11.43256>.
- Suhandoyo, G., & Wijayanti, P. (2016). Profile of Students' Creative Thinking Ability in Solving Higher Order Thinking Problems in View from Adversity Quotient (AQ. *Journal of Scientific and Mathematics Education*, 3(5), 158. <https://doi.org/10.26740/mathedunesa.v5n3.p>.
- Syaifulloh, B., & Supriadi. (2017). The Role of Problem-Based Learning (PBL) to Improvement Effort Higher Order Thinking Skills (HOTS) of Student in

- Mathematics Learning. *Proceedings of the Mathematics and Mathematics Education Seminar*. Retrieved from <http://seminar.uny.ac.id/semnasmatematika/sites/seminar.uny.ac.id.semnasmatematika/files/full/M-104.pdf>
- Widana, I. W. (2017). *Penyusunan Soal Higher Order Thinking Skill (HOTS)*. Jakarta: Depdikbud.
- Widoarti, N., & Suparman, S. (2021). Analisis Kebutuhan LKPD Penunjang Model PBL untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Siswa. *Jurnal Inovasi Pendidikan Matematika (JIPM)*, 3(1), 30-36. <https://doi.org/10.37729/jipm.v3i1.1039>
- Winarno, W., Sunarno, W., & Sarwanto, S. (2015). Developing of Module Integrated Science Based on High Order Thinking Skill (HOTS) on Energy Theme. *Inkuiri: Journal of Science Education*, 4(1), 82-91. <https://doi.org/10.20961/inkuiri.v4i1.9562>.