How Students’s Higher Order Thinking Skills Through E-Learning During the Covid-19 Pandemic? What does it have to do with University?

Ririn Setyowati¹, Sarwanto², Muzzazinah³
¹Department of Primary School Teacher Education, Faculty of Teacher Training and Education, Sebelas Maret University, Indonesia.,
²,³The Faculty of Teacher Training and Education Sebelas Maret University Indonesia
Jl Ir. Sutarmi No 36A, Kentingan, Surakarta, Indonesia
e-mail: setyowatiririin.2024@student.uns.ac.id

Abstract: This study describes the higher-order thinking skills of students at the elementary school level using e-learning during the Covid-19 pandemic. The research subjects were 183 students at the elementary school level in Ngawi Regency, East Java. The data collection technique uses the HOTS development test which includes seven subjects, namely natural sciences (IPA), Pancasila and civic education (PPKn), Indonesia language, mathematics, social sciences (IPS), cultural arts and crafts (SBdP), and physical education, exercise, and health (PJOK). The results showed that students obtained the highest score of 96.7 and the lowest of 30.0. The percentage of subjects with the greatest difficulty through the use of e-learning was physical education, sports and health with a score of 54%, while subjects with the least difficulty were natural sciences with a score of 10%.

Keywords: E-learning; Higher order thinking skills; Primary student

1. Introduction

Higher-order thinking skills is one of the essential skills of the 21st century [5]. The era of the industrial revolution 4.0 which is being promoted in Indonesia requires students starting from the basic level to have this ability. Higher-order thinking skills are key in preparing future generations to get used to thinking critically and creatively to solve problems independently [1]. This is important for students to have high-level thinking to be able to compete in the era of globalization and not to stutter the changes and problems they will experience in the future [2].

The ability of students to think at high levels is one of the factors that shows the quality of education organized by a country. For this reason, the Program for International Student Assessment (PISA) conducts a survey every three years to provide an overview for member countries to evaluate the quality of education. PISA uses HOTS-based questions to determine students' abilities in science, reading, and mathematics.

Based on PISA data in 2015, Indonesia was ranked 64 out of 72 countries, while in PISA in 2018, Indonesia was ranked 74th out of 79 countries [8][9]. This shows that there has been a decline in students' higher-order thinking skills that have not been optimized from year to year. Especially at this time, the condition of education in Indonesia has difficulty adjusting to online learning (e-learning) to be able to improve lags, especially in higher-order thinking skills.

The Ministry of Education and Culture in Indonesia stated that education in Indonesia is carried out in a network as long as the Covid-19 pandemic still threatens. The call for online learning has been implemented since March 2020 until an undetermined time [7].
The policy on the use of e-learning that has been implemented has changed various factors in the world of education in Indonesia. Especially in the implementation of learning that is far from effective. This condition can affect students’ skills as a learning output, especially HOTS which requires more teacher guidance even during face-to-face learning.

Starting from the concern about students 'higher-order thinking skills during e-learning, it is necessary to have an independent survey to find out how far the students' HOTS is developing. E-learning that is implemented is certainly very different from direct learning, so it will greatly affect students' HOTS. E-learning that is implemented is still fixated on learning by submitting materials and assignments by the teacher without more intense interaction to build student abilities.

The survey results can be taken into consideration in the teacher's actions to maximize learning even though it is online, to still be able to develop student HOTS. This can also influence the policies to be taken by higher education to be able to equip prospective educators to be able to adjust themselves in providing learning to students in different conditions and situations in the future.

2. Research Question

Researchers also conducted several studies on the results of previous studies conducted by other researchers. The Ministry of Education and Culture in Indonesia stated that education in Indonesia is carried out in a network as long as the Covid-19 pandemic still threatens. The call for online learning has been implemented since March 2020 until an undetermined time [7].

The policy on the use of e-learning that has been implemented has changed various factors in the world of education in Indonesia. Especially in the implementation of learning that is far from effective. This condition can affect students’ skills as a learning output, especially HOTS which requires more teacher guidance even during face-to-face learning.

Starting from the concern about students 'higher-order thinking skills during e-learning, it is necessary to have an independent survey to find out how far the students' HOTS is developing. E-learning that is implemented is certainly very different from direct learning, so it will greatly affect students' HOTS. E-learning that is implemented is still fixated on learning by submitting materials and assignments by the teacher without more intense interaction to build student abilities.

The survey results can be taken into consideration in the teacher's actions to maximize learning even though it is online, to still be able to develop student HOTS. This can also influence the policies to be taken by higher education to be able to equip prospective educators to be able to adjust themselves in providing learning to students in different conditions and situations in the future.

3. Methodology

This study is a qualitative study to determine students' higher-order thinking skills at the elementary school level during e-learning. This study used a single survey model with cross-sectional data that focused on research on a single variable at a time. The research instrument is a HOTS test consisting of 30 questions covering seven subjects, namely natural sciences (IPA), Pancasila and civic education (PPKn), Indonesia language, mathematics, social sciences (IPS), cultural arts and crafts (SBdP), and physical education, exercise and health (PJOK). The Cronbach alpha score of 30 questions was 0.82. Participants in this study consisted of 183 elementary school students in Ngawi Regency, East Java, Indonesia.
4. Results and Discussions

Based on the HOTS test results of 183 students who took e-learning during the Covid-19 pandemic, the highest score obtained by students was 96.7 and the lowest score was 30.0. The frequency distribution data of students' HOTS scores can be seen in Figure 1.

![HOTS Value Frequency Distribution](image)

**Fig. 1: Data frequency distribution of students' HOTS scores**

Based on the data obtained, students with HOTS scores below 69.9 consist of 94 students, while students who score above 69.9 are 84 students. More than half of the students who took the test scored below the average. This shows that the e-learning implemented in Ngawi District has not been able to optimize HOTS for half of the total number of students.

Assessment instruments or HOTS questions are questions that require skill high-level thinking, including the ability to analyze, evaluate, and create [12]. Therefore, if students are unable to solve these questions, in other words, students’ HOTS have not been developed during learning. This should be the teacher's obligation to evaluate the e-learning that has been done. The teacher is one of the most prominent elements in being able to prepare active learning for students even in conditions of online learning, so learning is not only limited to providing materials and assignments.

Based on an analysis of 30 HOTS questions consisting of 5 questions about natural sciences, 5 questions about Pancasila and civic education, 4 questions about Indonesia language, 5 questions about mathematics, 6 questions about social sciences, 2 about cultural arts and crafts, and 3 about physical education, exercise, and health. (PJOK) shows a significant difference in true/false scores in each subject. These differences are shown in Table 1 and depicted in Figure 2.

| Subjects                        | True Scores | False Scores | Total Scores |
|--------------------------------|-------------|--------------|--------------|
| Natural sciences               | 823         | 92           | 915          |
| Pancasila and civic education  | 748         | 167          | 915          |
| Indonesia language            | 502         | 230          | 732          |
| Mathematics                    | 428         | 487          | 915          |
Based on the comparison table above, when viewed from the total score of each subject, natural sciences is the subject with the highest number of true scores, namely 823, which shows that HOTS natural sciences questions can be answered correctly by almost all students. Material from natural science can be found in the student environment, giving students the possibility to more easily understand even with e-learning, because material objects are available everywhere.

Meanwhile, physical education, exercise, and health had the lowest true score at 254, which indicates that out of the 183 students who each worked on 3 HOTS questions in total, not half of the students answered correctly. This is because physical education, exercise, and health subjects require motor skills to be physically active to better understand learning [13]. This possibility is why physical education, exercise, and health are not suitable for e-learning.

The score comparison data above can be presented to see the difficulties experienced by students in each subject. The percentage of difficulty in each subject can be seen in Figure 3.
Based on the data above, it can be concluded that the order of the subjects that have a difficulty level from the largest to the smallest is: (1) physical education, exercise, and health, (2) mathematics, (3) cultural arts and crafts, (4) Indonesian language, (5) social sciences, (6) Pancasila and civil education, and the last (7) natural sciences. The highest difficulty level was in the subjects of physical education, exercise, and health, with a percentage of 54%, while the lowest level of difficulty was in the subjects of natural science with a percentage of 10%. The analysis carried out on the whole subject shows several factors that must be considered to maximize e-learning learning, including:

a. Selection of methods or models to manipulate face-to-face learning so that it can be carried out online. Factors that intersect directly with student learning activities are the selection of learning methods and models by educators [15]. Some subjects that are supposed to be carried out face-to-face have to be carried out online and require more effort to be as similar as possible to normal learning.

b. The intensity of teacher and student interaction in online forums. Active learning is not only done face-to-face, e-learning must still optimize student involvement in learning. The teacher opens opportunities for students both in asking questions, arguing, and making decisions, so that students are not accustomed to passively accepting materials and assignments [11]. For example, teachers can use digital literacy as a learning resource so that students can respond to the form of opinions, actions, acceptance, or rejection [13].

c. Ensuring students understand the material, not just making sure the material is delivered. Still related to the interaction between teachers and students that must continue even though they are online, the teacher must ensure that students do not have difficulty understanding the material by opening discussions so that students do not hesitate to ask questions.

d. HOTS based evaluation. For some teachers, evaluation is still focused on providing material which is followed by giving assignments according to the material provided. Indirectly, students only rewrite what has been conveyed, without any thought processes that occur in students. The task does not have to be the same as the material, but at least there is a process of analysis, evaluation, or creation that is carried out in it.
Based on the phenomenon that has occurred for approximately eight months of online learning, there should also be important points that can be taken as a result of adaptation to this condition. Not only in basic education units but higher education, especially the faculty of education, has a great influence on making changes in the future by investigating competencies that must be renewed to equip prospective educators who are likely to face similar conditions in the future.

E-learning has become a major change in the implementation of education in Indonesia, which can "force" each component of education to adapt to future challenges through the use of technology. University departments around the world have taken advantage of technological capabilities by creating exciting new curricula that further promote conceptual understanding [6]. This shows that universities in Indonesia need to do the same thing to equip students to understand conceptually, not just procedurally, in other words, that prospective teachers in the future must know the concept of teaching in various conditions, not just stages (procedures) learning.

This condition is also a challenge for higher education, because most higher education institutions face the same problem, namely how to transfer knowledge and how to develop and ensure professional and cutting-edge practical skills [16], especially in e-learning. It is expected that graduates who have adapted to e-learning must have the same competencies as previous graduates. Higher education can absorb the essence of the conditions that occur by updating the educational curriculum by inserting scientific disciplines that can equip prospective educators to be ready to face educational conditions as occurs in the present.

5. Future Trends and Conclusions

Based on the results of the research and discussion above, it can be taken as follows:

Based on the phenomenon that has occurred for approximately eight months of online learning, there should also be important points that can be taken as a result of adaptation to this condition. Not only in basic education units but higher education, especially the faculty of education, has a great influence on making changes in the future by investigating competencies that must be renewed to equip prospective educators who are likely to face similar conditions in the future.

E-learning has become a major change in the implementation of education in Indonesia, which can "force" each component of education to adapt to future challenges through the use of technology. University departments around the world have taken advantage of technological capabilities by creating exciting new curricula that further promote conceptual understanding [6]. This shows that universities in Indonesia need to do the same thing to equip students to understand conceptually, not just procedurally, in other words, that prospective teachers in the future must know the concept of teaching in various conditions, not just stages (procedures) learning.

This condition is also a challenge for higher education, because most higher education institutions face the same problem, namely how to transfer knowledge and how to develop and ensure professional and cutting-edge practical skills [16], especially in e-learning. It is expected that graduates who have adapted to e-learning must have the same competencies as previous graduates. Higher education can absorb the essence of the conditions that occur by updating the educational curriculum by inserting scientific disciplines that can equip prospective educators to be ready to face educational conditions as occurs in the present.

The higher-order thinking skills of students in the Ngawi Regency are still not optimal. The results showed that students' HOTS through e-learning had been implemented for more than eight months, only half of the population had the expected abilities. Based on the comparison of scores in each subject, the highest difficulty level was in the subjects of physical education, exercise, and health, with a percentage...
of 54%, while the lowest level of difficulty was in the subjects of natural science with a percentage of 10%.

The challenge of preparing competencies for future generations does not only come from elementary school education units but also higher education. If the basic unit education institutions tried teachers to be able to adapt to e-learning during the Covid-19 pandemic conditions and can provide learning that can optimize students' high-level thinking skills, then higher education has the responsibility to update curriculum policies to insert disciplines that can equip prospective educators to be ready to face the conditions of education as is currently happening.

6. References
[1] Brookhart, S. M. (2010). How to Assess Higher Order Thinking Skills in Your Classroom. United State of America, USA: Association for Supervision and Curriculum Development (ASCD)

[2] Dahlan, D., Permana, L., & Oktariani, M. (2020). Teacher’s Competence and Difficulties in Constructing Hots Instruments In Economics Subject. Jurnal Cakrawala Pendidikan, 39(1), pp 111-119. doi: 10.21831/cp.v39i1.28869

[3] Daum, D. N., & Buschner, C. (2014). Research on Teaching Blended and Online Physical Education. Handbook of Research on K-12 Online And Blended Learning, 201-222.

[4] Garcia, L. C. (2015). Environmental Science Issues for Higher-Order Thinking Skills (HOTS) Development: A Case Study in the Philippines. Biology Education and Research in a Changing Planet, 45–54. doi: 10.1007/978-981-287-524-2_5.

[5] Ichsan, I. Z., Sigit, D. V. M., Miarsyah, Ali, A., Arif, W. P., Prayitno, T. A. (2019). HOTS-AEP: Higher Order Thinking Skills From Elementary To Master Students In Environmental Learning. European Journal of Educational Research, 8(4), 935-942. doi: 10.12973/eu-jer.8.4.935.

[6] Juan, Á. A., Huertas, M. A., Cuypers, H., & Loch, B. (2012). Dossier “Mathematical e-Learning”. RUSC. Universities and Knowledge Society Journal, 9(1), pp 86-197. doi: 10.7238/rusc.v9i1.1431.

[7] Kemendikbud. (2020). Mendikbud Terbitkan SE tentang Pelaksanaan Pendidikan dalam Masa Darurat Covid-19. Retrieved from: https://www.kemdikbud.go.id/main/blog/2020/03/mendikbud-terbitkan-se-tentang-pelaksanaan-pendidikan-dalam-masa-darurat-covid19.

[8] OECD. (2015). PISA 2015 Results in Focus. Retrieved from https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf.

[9] OECD. (2018). PISA 2018 Results Combined Executive Summaries Volume I, II & III. Retrieved from HTTPS://WWW.OECED.ORG/PISA/COMBINED_EXECUTIVE_SUMMARIES_PISA_2018.PDF.

[10] Partnership for 21st Century Skills. (2020). Our mission is to Realize the Power and Promise of 21st Century Learning for Every Student—In Early Learning, in School, and Beyond School—Across The Country and Around The Globe, Retrieved from http://www.p21.org.

[11] Pekince, P., & Avci, N. (2018). Children’s Perspective on the Right of Self-determination. International Electronic Journal of Elementary Education, 10(4), 431-439. doi: 10.26822/iejee.2018438133.
[12] Pratiwi, P. H., Hidayah, N., & Martiana, A. (2017). Pengembangan Modul Mata Kuliah Penilaian Pembelajaran Sosiologi Berorientasi HOTS. Cakrawala Pendidikan, (2), pp 201-209. doi: 10.21831/cp.v36i2.13123

[13] Rusydiyah, E. F., Purwati, E., & Prabowo, A. (2020). How to Use Digital Literacy As A Learning Resource For Teacher Candidates In Indonesia. Jurnal Cakrawala Pendidikan, 39(2), pp 305-318. doi: 10.21831/cp.v39i2.30551

[14] Sever, I., & Ersoy, A. (2019). Investigation of Decision-Making Skills of Fourth Grade Students According to Student and Teacher Opinions. International Electronic Journal of Elementary Education, 12(2), 167-182. doi: 10.26822/iejee.2019257664

[15] Suryandari, K. C., Sajidan, S., Rahardjo, S. B., Prasetyo, Z. K., & Fatimah, S. (2018). Project-based Science Learning and Pre-Service Teachers’science Literacy Skill and Creative thinking. Jurnal Cakrawala Pendidikan, 37(3), pp. doi: 10.21831/cp.v38i3.17229

[16] Tick, A. (2007, January). Application of Problem-Based Learning in Classroom Activities and Multimedia. In 5th Slovakian Hungarian Joint Symposium on Applied Machine Intelligence and Informatics. Retrieved from http://conf.uni-obuda.hu/sami2007/36_Andrea.pdf.