Journal of Primary Education
10 (4) (2021): 421–434

https://journal.unnes.ac.id/sju/index.php/jpe

The Implementation of Guided Discovery-Based E-Worksheets on Students' Mathematical Understanding Concepts and Independent Attitudes

Muhammad Mafaza A'la [1]✉, Iwan Junaedi [2], Bambang Subali[2]

[1.] Sekolah Dasar Negeri 2 Jojo, Mejobo, Kudus, Indonesia
[2.] Pascasarjana, Universitas Negeri Semarang, Indonesia

Article Info

History Articles
Received:
15 October 2021
Accepted:
17 November 2021
Published:
30 December 2021

Keywords:
Distance Learning, E-Worksheet, Guided Discovery Learning, Independent Attitudes, Mathematical Understanding Concept

Abstract

Students' mathematical understanding concepts are challenging enough to be explained virtually during distance learning. The study helps students to understand mathematical concepts and improve their independent attitudes. This study aims to analyze and describe the mathematical understanding concepts and independent attitudes of fourth grade students after the implementation of guided discovery-based e-worksheets in distance learning with synchronous and asynchronous patterns. The method used in this study is mixed-methods with an embedded experimental model design, true experimental pretest-posttest control group. The research population were all fourth-grade students from State Primary School 2 Jojo (experimental) and State Primary School 3 Jojo (control) in Kudus Regency. Sampling was determined by probability sampling technique, with a total of 23 fourth grade students at State Primary School 2 Jojo. Data collection techniques used test items, questionnaire instruments and document studies. The results of n-gain showed that the experimental class was 57% in the quite effective category compared control class of 41% in the less effective category. The results of independent sample t-test showed there was an average difference between two primary schools studied. The posttest average results of the experimental class were 80.43% compared control class of 72.69%, while the questionnaire average results of the experimental class was 77% compared to the control class was 73%. That means, the implementation of guided discovery-based e-worksheets is quite effective and can increase the mathematical understanding concepts and the independent attitudes of fourth grade primary school students.

✉ Correspondence address:
Jalan Sewonegoro RT 03/IX Jekulo Kudus Jawa Tengah
E-mail: mafaza.muhammad@gmail.com

p-ISSN 2252-6404
e-ISSN 2502-4515

INTRODUCTION

The challenge of implementing learning in the 2021/2022 academic year for schools, especially in Indonesia, is the Covid-19 pandemic which has resulted in distance learning. In accordance with the Circular of the Secretary General of the Ministry of Education and Culture number 15 of 2020 instructs that the learning process is required from home to prevent the spread and transmission of Covid-19 in schools.

Distance learning results in a lack of interaction between teachers and students and even between students themselves (Putria et al., 2020). However, the positive impact that can be taken from distance learning is that students can learn anytime and anywhere (Dewi, 2020).

The 21st century learning process has now become disruptive, where there is a massive change caused by various innovations that change the system and order in education (Chuntala, 2019; Sarwi et al., 2019). This is a challenge for the whole world especially in Indonesia, to find effective, efficient learning, be able and adapt to changing era.

Implementation of the 2013 curriculum during the Covid-19 pandemic still requires that it be student-centered, integrate technology, and continue to implement character education and teacher proficiency in operating technology (Chalkiadaki, 2018; Kusumadewi et al., 2020; Purwanto, 2020).

As the method of implementing learning from home according to the Circular of the Secretary General of the Ministry of Education and Culture number 15 of 2020, instructs that the distance learning process can be carried out online using a gadgets through several platforms, learning applications and can be through offline learning using television, radio, independent learning modules, worksheets, printed teaching materials, teaching aids and learning media from objects in the surrounding environment. Thus, the role of educators in making learning schemes must be wise and still pay attention to the interests and conditions of students who are communicated with parents (Anugraha, 2020; Daheri, 2020; Rasmitadila et al., 2020; Yunitasari & Hanifah, 2020).

The quality of education is determined by various factors. One of them is the quality of teachers characterized by their interactions with students who are in control of learning, determining the direction of achieving learning goals (Asikin et al., 2018). Therefore, a good education depends on the quality, performance, professionalism, and competence of teachers.

Often the content of mathematics lessons in Indonesia becomes a subject matter that is feared by students because it is considered difficult and coupled with the Covid-19 pandemic conditions. A common cause of learning difficulties in mathematics is the lack of students' ability to understand mathematical concepts (Ulia & Sari, 2018; Yuwandra & Arnawa, 2020).

Students' ability to understand basic mathematical concepts requires support from the beginning of school to build deep understanding (Hornburg et al., 2021). Thus, the ability to understand mathematical concepts is a basic ability that must be passed by students in order to move up to a higher level of understanding.

The principle of holistic learning must still be implemented by educators during learning from home because growing holistic human beings is the ideal of National Education (Yuliana, 2020).

In accordance with Permendikbud number 20 of 2016 concerning graduation standards for primary and secondary education, holistic learning develops various potentials of students, namely cognitive, affective, psychomotor, moral, social, and language that can be integrated into the content of mathematics lessons.

Even though learning is carried out online, teachers still get used to character education (Parmin et al., 2020). Therefore, the content of mathematics lessons is not only to hone the cognitive of students but also to hone the character of students, especially in an independent attitude on distance learning.

Attitude is a special characteristic possessed by humans that can be grown through

education so that students are encouraged, strong, and prepared to become future leaders (Sarwi et al., 2020; Kusumadewi et al., 2020). So that, education plays an important role in the process of growing good attitude for a nation and becomes an important aspect in determining the progress of a nation.

It is often found that parents do not instill and familiarize their children with independence from a young age, especially in terms of learning (Sari, 2019; Kusumadewi et al., 2020). During the Covid-19 pandemic, parents became 'impromptu' teachers for their children and many parents complained about the additional cost of buying internet quotas, gadgets, and lack of supervision because they were required to work (Purwanto et al., 2020; Putria et al., 2020). Further, teachers are at the forefront of learning during Covid-19.

In addition to knowledge and skill competencies, the assessment of students carried out by teachers is on social competence. In accordance with the 2013 Curriculum Assessment Guide of the Director General of Education and Culture of the Ministry of Education and Culture in 2016, an independent attitude is an attitude that must be cultivated in students (Warmi et al., 2020; Hidayat et al., 2020).

There are several factors that can affect the low level of students' ability to understand mathematical concepts and independent attitudes. Based on data of the absorption and achievement of student targets in the final semester assessment for the 2020/2021 academic year in Mejobo District, Kudus Regency, Central Java, Indonesia, shows that the content of mathematics lessons on the subject matter of fractional operations in basic competencies 3.2 Explaining various forms of fractions (ordinary, mixed, decimal, and percent) and the relationship between them, obtaining a score of 46.35% with correct answers.

Based on the results of observations and interviews with fourth grade teachers during distance learning, especially in learning mathematics, teachers only use the videos and assignments sent to WhatsApp Groups and students are too dependent on teachers in learning matters because not a few parents complain the difficulty of being an 'impromptu' teacher for their children.

Previously, there was no research that used guided discovery-based e-worksheets in distance learning with synchronous and asynchronous patterns on mathematical understanding concepts and independent attitudes of fourth grade students. So that, this study aims to analyze and describe the implementation of guided discovery-based e-worksheets on mathematical understanding concepts and independent attitudes of fourth grade primary school students.

METHODS

The method used in this research is mix-methods that combines quantitative research and qualitative research at the same time with embedded experimental model design, true experimental pretest-posttest control group. The embedded experimental model design is defined through the embedding of quantitative data in the experimental design so that the data obtained is valid, reliable, comprehensive, and objective.

The population in this study were all fourth-grade students at State Primary School 2 Jojo (experimental) and State Primary School 3 Jojo (control) in Mejobo District, Kudus Regency, Central Java, Indonesia, while the experimental class sample was 23 fourth grade students at State Primary School 2 Jojo. Sampling using probability sampling technique.

The data collection technique used a test instrument for mathematical understanding concepts, questionnaire instruments, and document studies. Then for data analysis, the n-gain test, normality test and homogeneity test respectively using SPSS 25 for windows as a prerequisite for the independent sample t-test.

The n-gain effectiveness category is provided in Table 1.

Table 1. Category of N-Gain Effectiveness (Sundayana, 2016)

Percentage (%)	Criteria
>76	Effective
56-75	Quite Effective
40-55	Less Effective
<40	Ineffective

Meanwhile, to find out the qualifications of the causes for each indicator of mathematical understanding concepts and independent attitudes of students are presented in Table 2.

Table 2. Qualification of Cause Indicator (Riduwan, 2002)

Percentage (%)	Qualification
81- 100	Very Strong
61-80	Strong
41-60	Moderate
21-40	Weak
0-20	Very Weak

RESULTS AND DISCUSSION

The implementation of guided discovery-based e-worksheets in this study was adapted to the emergency learning situation during the Covid-19 pandemic. The learning platforms used in this research include Zoom Meeting, Live worksheets, WhatsApp Group, Quizizz, and Google Form. Distance learning using a synchronous pattern or with direct learning and asynchronous instruction or students interacting with learning materials at the time of their choosing (Fahmi, 2020).

Implementation of appropriate learning media is one of the factors that can make it easier for teachers to deliver learning materials and be easily understood by students (Yahya et al., 2017). Accordingly, the learning media is to support teachers in delivering learning materials during distance learning.

Interactive and innovative learning media can generate learning motivation for students who can interact directly with friends, teachers, and their environment (Wardani et al., 2017; Alfiyani et al., 2020; Subali et al., 2021). Although learning is carried out remotely, a solution in the form of an online platform is one solution that can be used by teachers in delivering fun learning content.

In this study, the implementation of guided discovery-based e-worksheets uses various platforms to support research data collection. The pretest and posttest data in this study used the Quizizz. By using Quizizz, students can do practice questions or homework with their own gadget (Zuhara et al., 2020).

Prior to the implementation of the guided discovery-based e-worksheets, students were given a pretest. After the implementation of the guided discovery-based e-worksheets, students are given a posttest. The initial stage of the analysis is to test the normality of the pretest and posttest scores. The results of the normality test of pretest and posttest data obtained through the Kolmogorov-Smirnov test are displayed in Table 3.

Table 3. Normality Test Results of Pretest and Posttest Data

Statistic Test	Experiment	Control
Pretest Mean Score	52.39	50.38
Sig. Pretest	0.188	0.200
Posttest Mean Score	80.43	72.69
Sig. Posttest	0.200	0.200

The data normality test criteria using SPSS 25 for windows in Table 3 shows that the pretest and posttest values have Sig > 0.050, so the data is declared to be normally distributed. The Minimum Completeness Criteria (KKM) for the two primary schools is 65. Table 2 shows the pretest scores for the two primary schools are below the KKM, while the posttest scores for the two primary schools reach the KKM.

Furthermore, homogeneity test was carried out using ANOVA on SPSS 25 for windows to determine whether the data was homogeneous or not. The results of the homogeneity test of the pretest and posttest values were obtained through the Levene Test, which is presented in Table 4.

Table 4. Homogeneity Test Results

Data	Statistic Test	Sig.
Pretest	Levene Test	0.342
Posttest		0.412

From Table 4 it is known that the results of the homogeneity test with the Levene Test show Sig > 0.050, so the results of the pretest and posttest are homogeneous data or come from a population with the same variance.

After the data was declared to be normally distributed and homogeneous, then the average similarity test was carried out to find out whether there was a significant difference in effectiveness before and after the implementation of guided discovery-based e-worksheets. The hypothesis in the study are as follows:

H0: There is no significant difference in effectiveness after the implementation of guided discovery-based e-worksheets on students' understanding of mathematical concepts.

H1: There is a significant difference in effectiveness after the implementation of guided discovery-based e-worksheets on students' understanding of mathematical concepts.

Based on the results of the average similarity test were obtained through the independent sample t-test show Sig (0.046) < 0.050 which means H0 is rejected. In other words, H1 is accepted, there is a significant difference in effectiveness after the implementation of guided discovery-based e-worksheets on students' understanding of mathematical concepts.

Furthermore, the n-gain test was carried out to analyze the effectiveness of learning on mathematical understanding concepts based on the pretest and posttest scores in the experimental class and control class which are presented in Table 5.

Table 5. N-Gain Test Results

Statistic Test	Experiment	Control
Mean	56.91	40.52
Minimum	-12.50	-20.00
Maximum	100.00	100.00
Criteria	Quite Effective	Less Effective

Based on the results of the n-gain test in Table 5, it shows that the experimental class obtained an average score of n-gain of 56.91 or 57% and was included in the quite effective category, while the control class obtained an average score of n-gain of 40.52 or 41% and was included in the less effective category. Thus, guided discovery-based e-worksheets are quite effective in understanding mathematics concepts for fourth grade of primary school students.

After knowing the average score of n-gain, next is the analysis of the percentage level indicator of mathematical understanding concepts after the implementation of guided discovery-based e-worksheets. The explanation of the percentage of each indicator of mathematical understanding concepts are listed in Table 6.

Table 6. Percentage of Indicators on Mathematical Understanding Concepts

Indicators	Pretest (%)		Posttest (%)	
	Experiment	Control	Experiment	Control
Restating the concepts that have been studied	66	65	88	77
Presenting concepts in various representations	48	54	80	69
Applying concepts algorithmically	52	42	84	75
Relating various mathematical concepts internally or externally	48	38	87	72
Classifying objects based on mathematical concepts	46	52	67	73
Giving an example or counter example of the concept being studied	52	46	76	65
Mean	52	50	80	73

Based on the data in Table 6 shows that the pretest data in the experimental class, students with indicators restating the concepts that have been studied obtained the highest percentage of 66% with a strong level of qualification and indicators classifying objects based on mathematical concepts obtained the lowest percentage of 46% with a enough level of qualifications. While the percentage of the pretest data in the control class, students with indicators restating the concepts that have been studied obtained the highest percentage of 65% with a strong level of qualification and indicators relating various mathematical concepts internally and externally obtained the lowest percentage of 38% with a weak level of qualification.

Then the percentage of the posttest data in the experimental class, students with indicators restating the concepts that have been studied obtained the highest percentage of 88% with a very strong level of qualification and the indicators of classifying objects based on mathematical concepts obtained the lowest percentage of 67% with strong level of qualification. While the percentage of the posttest data in the control class, students with indicators restating the concepts that have been studied obtained the highest percentage of 77% with a strong level of qualification and indicators giving examples or counter examples of the concepts studied obtained the lowest percentage of 65% with strong level of qualification.

Most students' mathematical understanding concepts increased based on posttest scores. The Selection of three student criteria with the acquisition of the difference in the pretest and posttest scores of high (E22), moderate (E21) and low (E13) with indicators: (1) restating the concepts that have been studied; (2) presenting concepts in various representations; (3) applying concepts algorithmically; (4) relating various mathematical concepts internally or externally; (5) classifying objects based on mathematical concepts; (6) giving an example or counter example of the concept being studied.

The students' test instruments are 20 questions, which have been determined according to the six indicators of mathematical understanding concepts. The explanations three samples of students on mathematical understanding concepts are presented in Table 7.

Tabel 7. Percentage of Pretest and Posttest Sample Correct Answers

Indicators	Pretest (%)			Posttest (%)		
	E22	E21	E13	E22	E21	E13
1	75	100	75	100	100	50
2	0	0	100	100	50	100
3	50	50	75	100	75	75
4	25	0	50	100	75	75
5	0	50	25	100	75	0
6	50	100	50	50	100	50
Mean	33	50	63	92	79	58

Based on the data in Table 7 shows that students with a high score difference namely E22, with the highest pretest percentage on the 1st mathematical concept understanding indicator of 75% correct answers and the lowest percentage on the 2nd and 5th indicators of 0% correct answers. While the highest percentage of posttest on the 1st; 2nd; 3rd; 4th; 5th indicators is 100% correct answers, and the lowest percentage is on the 6th indicator is 50% correct answers.

The next data is students with a moderate score difference namely E21, with the highest pretest percentage on the 1st and 6th mathematical concept understanding indicator of 100% correct answers and the lowest percentage on the 2nd and 4th indicators of 0% correct answers. While the highest percentage of posttest on the 1st and 6th indicators is 100%

correct answers and the lowest percentage is on the 2nd indicator is 50% correct answers.

Then the data from students with low score difference namely E13, with the highest pretest percentage on the 2nd mathematical concept understanding indicator of 100% correct answers and the lowest percentage on the 5th indicators of 25% correct answers. While the highest percentage of posttest on the 2nd indicators is 100% correct answers and the lowest percentage is on the 5th indicator is 0% correct answers.

It can be concluded from the data in Table 7, there is an increase in the pretest and posttest scores after the implementation of guided discovery-based e-worksheets on students' mathematical understanding concepts.

Based on the analysis of recapitulation data on posttest score of the mathematical understanding concepts, the posttest scores of the experimental class showed that question number 1 with indicators restating the concepts that have been studied were most 22 students answered correctly because students are trained by questions about converting fractions from the guided discovery-based e-worksheets. While for question number 10 with indicators classifying objects based on mathematical concepts were at least 12 students answered correctly because students cannot memorize or confused to distinguish of various forms of fractions.

In accordance with Permendikbud number 22 of 2016 states that teachers must use learning models, methods, or strategies to achieve learning objectives in the 2013 curriculum (Purwantoro et al., 2020). In addition, the teacher's skills in using various learning are an important factor to support the learning process (Nurma'ardi et al., 2020).

The guided discovery learning model is one of the models suggested by government to support the learning process in the 2013 curriculum (Lestari, 2017; Restika et al., 2020). This is in line with Surahmat's research (2020) states that the achievement of learning objectives is pursued through innovation, especially by teachers who provide direct experience to students. Therefore, implementing guided discovery-based e-worksheets in this study can be meaningful, interactive, fun, motivating, and challenging students to participate actively during learning.

Mathematical understanding concepts of primary school students are influenced by the learning model implemented by the teacher and can use worksheets or e-learning (Astuti et al., 2018: Ulia & Sari, 2018). So that, implementing of guided discovery learning models can make students play an active role during the learning process (Dwilestari et al., 2017; Lubis et al., 2019).

In addition, the guided discovery learning model studied by Wihardjo et al., (2020) is effective in improving the cognitive, affective, and psychomotor competencies of primary school students. Meanwhile, the research conducted by Winoto & Prasetyo (2020) concluded that the guided discovery learning model is more effective than the problem-based learning model on the fourth-grade primary school mathematics learning outcomes.

During the Covid-19 pandemic, many teachers carried out learning using various platforms in distance learning (Wahyono et al., 2020; Rasmitadila et al., 2020). Therefore, a professional teacher will be able to adapt of the circumstances and progress of the era.

Next is the analysis of the percentage level of the independent attitude indicators of students after the guided discovery-based e-worksheets are implemented. The explanation of the percentage of each student's independent attitude indicator are listed in Table 8.

Table 8. Percentage of Independent Attitude Indicators

Indicator	Experiment (%)	Control (%)
Non-Dependent	80	72
Self-Confidence	77	66
Discipline	75	77
Responsibility	79	76
Behave on own initiative	74	68
Self-Control	79	77
Mean	77	73

Based on the data in Table 8, it shows that the average score of independent attitudes of the experimental class obtained a percentage of 77% higher than the average score of independent attitudes of the control class obtained a percentage of 73%.

The percentage level in the experimental class, students with indicators of non-dependence obtained the highest percentage of 80% with a strong level of qualification and indicators of behave on their own initiative obtained the lowest percentage of 74% with a strong level of qualification. While the percentage in the control class, students with indicators of discipline and self-control obtained the highest percentage of 77% with a strong level of qualification, then the indicator of self-confidence obtained the lowest percentage of 66% with a strong level of qualification.

Independent character development of students can be grown using learning modules (Nafisa et al., 2021). However, learning is currently hampered by the Covid-19 pandemic. Learning activities are distanced and all parties are forced to adapt without exception the schools, families, and communities. At the primary school level, learning from home is a challenge for students and their parents when learning is carried out online (Sari, 2019). Then, independence learning is something that must be started to be trained for students.

As a manifestation of Permendikbud number 20 and 37 of 2018 concerning strengthening character education in schools, explained that strengthening character education is an educational movement that is responsible for strengthening the character of students through harmonization of heart, thought, taste, and exercise. So, the family is the main key to getting used to character education during distance learning (Purandina & Winaya, 2020).

Independent attitude is behavior that does not depend on others in completing tasks or problems and its responsible for oneself (Neroni et al., 2018). As research from Sari (2019) suggests that independence attitude can be grown through learning and is in line with research conducted by Mulyono (2017) argues that learning models with independence attitude can improve students' achievement.

The positive things about learning from home is students has a lot of time and opportunity to explore their knowledge and curiosity independently, the role of teachers and parents in accompanying, facilitating, and providing validation and evaluation are necessary. However, the negative things about learning from home is if the level awareness of students' learning is low, it is used as an opportunity to be lazy.

After obtaining the data, the researcher conducted interviews with students, namely E-1 and E-22 who obtained the posttest scores which increased significantly from the pretest scores. Based on the results of interviews with the two students, it shows that the two students always pay attention when given an explanation by the researcher; more disciplined and more independent when completing tasks; and be serious during learning.

The next individual students case namely E-16 and E-21 in the posttest scores with a moderate category from the pretest scores. Based on the results of interviews from the two

students, it shows that they are more often assisted by other people (brothers or parents) and open the internet when completing assignments; still often dependent; sometimes late in completing assignments; but always be serious during learning.

Then individual students case namely E-13 and E-15 with a posttest score in the lower category of pretest scores. Based on the results of interviews with the two students, it shows that they are more often assisted by other people (brothers or parents); still often dependent; lack of discipline when completing tasks; but always be serious during learning.

Based on the results of interviews researchers with parents shows heterogeneous conditions in each family are one of the factors that influence the student learning. There are parents who are very concerned about success and failure of their children, and there are parents who just let it go and hand over learning matters entirely to the schools. For example, parents of students (E11) able to accompany their children when studying online because they have a lot of time and work from home; provide verbal motivation to their children; provide children's learning needs such as gadgets, internet quota and various distance learning facilities; and trying to increase the time to supervise their children during distance learning. So that E11 got the highest score on the pretest and posttest in this study.

The next is parents of students (E12) unable to accompany their children directly during online learning because they work outside the home but take the time to accompany their children for study after they come home from work; provide verbal motivation to their children; provide children's learning needs such as gadgets, internet quota and various distance learning facilities; and trying to supervise her child during distance learning via call or WhatsApp. So that E12 got a moderate score on the pretest and posttest in this study.

Parents of students (E17) unable to accompany their child directly during online learning because they work outside the home; provide verbal motivation to their children; less providing for children's learning needs such as gadgets, internet quota and various distance learning facilities; and unable to supervise their children during distance learning. So that E17 got a low score on the pretest and posttest in this study.

During the Covid-19 pandemic, it brings both positive and negative sides. The positive side for parents who require working from home can monitor, accompany, and guide their children in learning. However, the negative side of the pandemic is that parents who work as daily laborers or odd jobs require that they always work outside home with a high risk of being infected the virus and do not have time to accompany and guide their children.

Meanwhile, teaching and learning activities that involve parents influence building stronger communication between teachers and parents (Rohid et al., 2019). With hope that teachers and parents of students do not throw burdens and blame each other during distance learning. Empathy that is exemplified to children, because this difficult situation is felt by almost everyone.

The learning process at home is a challenge for researchers because the different family conditions of students. Some have gadgets and even personal laptops that support learning, but some don't. Parents who are willing to accompany their children, some are not. Therefore, guided discovery-based e-worksheets with synchronous and asynchronous patterns are one of the solutions for distance learning programs.

CONCLUSION

The conclusion in this study is the implementation of guided discovery-based e-worksheets are significantly effective on mathematical understanding concepts and students' independent attitudes. This is evidenced by an increase in the posttest average score of mathematical understanding concepts and the average score of students' independent

attitudes after the implementation of guided discovery-based e-worksheets.

ACKNOWLEDGEMENT

The researcher would like to thank Ahmad Hidayat, S.Pd. as principals of State Primary School 2 Jojo and Hartono, S.Pd. as the principal of State Primary School 3 Jojo who has given the research permit. To Kurniati Styana, S.Pd. as a fourth-grade teacher at State Primary School 2 Jojo and Titik Rahayuningsih, S.Pd. as the fourth-grade teacher of State Primary School 3 Jojo who has helped in the implementation of the research and Khoirun Nikmah, S.Pd. as a third grade teacher at State Primary School 2 Jojo and as a material expert validator.

REFERENCES

Alfiyani, P., Sulistyorini, S., & Subali, B. (2020). The Effectiveness of Guided Inquiry-Based of Interactive Media to Incrests and Learning Outcomes. *Journal of Primary Education*, *9*(4), 398-407. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/41137

Anugrahana, A. (2020). Hambatan, Solusi dan Harapan: Pembelajaran Daring Selama Masa Pandemi Covid-19 Oleh Guru Sekolah Dasar. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, *10*(3), 282-289. Retrieved from https://ejournal.uksw.edu/scholaria/article/view/4033

Asikin, M., Junaedi, I., & Cahyono., A. N. (2018). The INNOMATTS: A Model of Mathematics Teacher Training Management. *Journal of Turkish Science Education*, *15*(Special Issue), 76-86. Retrieved from https://tused.org/index.php/tused/article/view/691

Astuti, T. P. Masykur, R., & Pratiwi, D. D. (2018). Pengaruh Model Pembelajaran TANDUR Terhadap Kemampuan Pemahaman Konsep dan Penalaran Matematis Peserta Didik. *Jurnal Pendidikan Matematika*, *7*(2), 201-209. Retrieved from https://ojs.fkip.ummetro.ac.id/index.php/matematika/article/view/1497

Chalkiadaki, A. (2018). A Systematic Literature Review of 21st Century Skills and Competencies in Primary Education. *International Journal of Instruction*, *11*(3), 1-16. Retrieved from https://www.e-iji.net/dosyalar/iji_2018_3_1.pdf

Chuntala, A. D. W. (2019). Scientific Approach in 21st Century Learning in Indonesian Language Learning Vocational School of Pharmacy. *International Journal of Active Learning*, *4*(2), 71-77. Retrieved from https://journal.unnes.ac.id/nju/index.php/ijal/article/view/17181

Daheri, M., Juliana., Deriwanto., & Amda, A. D. (2020). Efektivitas *WhatsApp* Sebagai Media Belajar Daring, *Jurnal Basicedu*. *4*(4), 775-783. Retrieved from https://jbasic.org/index.php/basicedu/article/view/445

Dewi, W. A. F. (2020). Dampak Covid-19 Terhadap Implementasi Pembelajaran Daring di Sekolah Dasar. *Edukatif Jurnal Ilmu Pendidikan*, *2*(1), 55-61. Retrieved from https://edukatif.org/index.php/edukatif/article/view/89

Dwilestari, S., Robandi, B., & Fitriani, A. D. (2017). Penerapan Model Guided Discovery Learning untuk Meningkatkan Pemahaman Konsep Matematik Siswa Kelas V Sekolah Dasar. *Jurnal Pendidikan Guru Sekolah Dasar*, *2*(4), 30-41. Retrieved from https://ejournal.upi.edu/index.php/jpgsd/article/view/14003

Fahmi, M. H. (2020). Komunikasi Synchronous dan Asynchronous dalam E-Learning Pada Masa Pandemic Covid-19. *Jurnal Nomosleca*, *6*(2), 146-156. Retrieved from https://jurnal.unmer.ac.id/index.php/n/article/view/4947/0

Hidayat, D. R., Rohayana, A., Nadine, F., & Ramadhan, H. (2020). Kemandirian

Belajar Peserta Didik dalam Pembelajaran Daring Pada Masa Pandemi Covid-19. *Jurnal Perspektif Ilmu Pendidikan*, *34*(2), 147-154. Retrieved from http://journal.unj.ac.id/unj/index.php/pip/article/view/17184

Hornburg, C. B., Brletic-Shipley, H., Matthews, J. M., & McNeil, N. M. (2021). Improving Understanding of Mathematical Equivalence. *International Journal of Mathematics Teacher: Learning and Teaching PK-12*, *114*(1), 16-26. Retrieved from https://pubs.nctm.org/view/journals/mtlt/114/1/article-p16.xml

Kusumadewi, R. F., Yustiana, S., & Nasihah, K. (2020). Menumbuhkan Kemandirian Siswa Selama Pembelajaran Daring Sebagai Dampak Covid-19 di SD. *Jurnal Riset Pendidikan Dasar*, *1*(1), 7-13. Retrieved from http://jurnalnasional.ump.ac.id/index.php/jrpd/article/view/7927

Lestari, W. (2017). Efektivitas Model Pembelajaran Guided Discovery Learning Terhadap Hasil Belajar Matematika. *Jurnal Susunan Artikel Pendidikan*, *2*(1), 64-74. Retrieved from https://journal.lppmunindra.ac.id/index.php/SAP/article/view/1724

Lubis, A. B., Miaz, Y., & Putri, I. E. (2019). Influence of The Guided Discovery Learning Model on Primary School Students' Mathematical Problem-Solving Skills. *Jurnal Mimbar Sekolah Dasar*, *6*(2), 253-266. Retrieved from https://ejournal.upi.edu/index.php/mimbar/article/view/17984

Mulyono, D. (2017). The Influence of Learning Model and Learning Independence on Mathematics Learning Outcomes by Controlling Students' Early Ability. *International Electronic Journal Of Mathematics Education*, *12*(1), 689-708. Retrieved from https://www.iejme.com/article/the-influence-of-learning-model-and-learning-independence-on-mathematics-learning-outcomes-by

Nafisa, D., Sukestiyarno., Hidayah, I. (2021). Critical Thinking Skill Seen from Curiosity on Independent Learning Assisted by Module. *Unnes Journal of Mathematics Education Research*, *10*(2), 168-174. Retrieved from https://journal.unnes.ac.id/sju/index.php/ujmer/article/view/36799

Neroni, J., Meijs, C., Leontjevas, R., Kirschner, P. A., & Groot, R. H. M. D. (2018). Goal Orientation and Academic Performance in Adult Distance Education. *International Review of Research in Open and Distributed Learning*, *19* (2), 193-208. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/3440

Nurma'ardi, H. D., Rusdarti., & Murwatiningsih. (2020). The Effectiveness Analysis of Discovery Learning Assisted by Interactive Video toward Social Study Critical Thinking Skiils of Primary School. *Journal of Primary Education*, *9*(3), 278-285. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/37935

Parmin., Junaedi I., Purwantoyo, E., Mubarak, I., Toni, M., & Fitriani, F. (2020). Character Index of Mathematics and Science Student Teachers in Online Learning. *Jurnal Pendidikan Indonesia*, *9*(3), 381-388. Retrieved from https://ejournal.undiksha.ac.id/index.php/JPI/article/view/26418

Purandina, I. P. Y., & Winaya, I. M. A. (2020). Pendidikan Karakter di Lingkungan Keluarga Selama Pembelajaran Jarak Jauh pada Masa Pandemi Covid-19. *Jurnal Ilmu Pendidikan*, *3*(2), 270-286. Retrieved from https://jayapanguspress.penerbit.org/index.php/cetta/article/view/454

Purwanto, A., Pramono, R., Asbari, M., Santoso, P. B., Wijayanti, L. M., Hyun, C. C., & Putri, R. S. (2020). Studi Eksploratif Dampak Pandemi Covid-19

Terhadap Proses Pembelajaran Online di Sekolah Dasar. *Journal of Education Psychology and Counseling*, *2*(1), 1-12. Retrieved from https://ummaspul.e-journal.id/Edupsycouns/article/view/397

Purwantoro, I., Wiyanto., & Wahyudin, A. (2020). The Effectiveness of ICT Media to Improve Students' Activities and Science Learning Achievement at Fourth Grade. *Journal of Primary Education*, *9*(4), 445-453. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/42440

Putria, H., Maula, L. H., & Uswatun, D. A. (2020). Analisis Proses Pembelajaran Dalam Jaringan (Daring) Masa Pandemi Covid-19 Pada Guru Sekolah Dasar. *Jurnal Basicedu*, *4*(4), 861-872. Retrieved from https://jbasic.org/index.php/basicedu/article/view/460

Rasmitadila., Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The Perceptions of Primary School Teachers of Online Learning During The Covid-19 Pandemic Period: A Case Study In Indonesia. *International Journal of Ethnic and Cultural Studies*, *7*(2): 90-109. Retrieved from http://www.ejecs.org/index.php/JECS/article/view/388/0

Restika, V. N., Wibowo, M. E., & Linuwih, S. (2020). Implementation of Guided Discovery Based Thematic Learning Modules to Improve Independence and Learning Achievement. *Journal of Primary Education*, *9*(1), 84-92. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/29110

Riduwan. (2002). *Skala Pengukuran Variabel-Variabel Penelitian*. Bandung: Alfabeta.

Rohid, N., Suryaman., & Rusmawati, R. (2019). Students' Mathematical Communication Skills (MCS) in Solving Mathematics Problems: A Case in Indonesian Context. *Anatolian Journal of Education*, *4*(2), 19-30. Retrieved from http://files.eric.ed.gov/fulltext/EJ1244446.pdf

Sari, E. N., & Zamroni. (2019). The Impact of Independent Learning on Students' Accounting Learning Outcomes at Vocational High School. *Jurnal Pendidikan Vokasi*, *9*(1), 141-150. Retrieved from https://journal.uny.ac.id/index.php/jpv/article/view/24776

Sarwi., Alim., Fathonah, S., & Subali, B. (2020). The Analysis of Ethnoscience-Based Science Literacy and Character Development Using Guided Inquiry Model. *Journal of Physics: Conference Series*, *1567*(2), 1-6. Retrieved from https://iopscience.iop.org/article/10.1088/1742-6596/1567/2/022045

Sarwi., Ellianawati., & Suliyanah. (2019). Grounding Physics and its Learning for Building Global Wisdom in the 21st Century. *Journal of Physics: Conference Series*, *1171*(1), 1-6. Retrieved from https://iopscience.iop.org/article/10.1088/1742-6596/1171/1/012001

Subali, B., Ulqia, N., Ellianawati., & Siswanto, S. (2021). Momentum Concept Learning Using Tracker as a Virtual Experiment Model: Looking at Students' Learning Independence. *Jurnal Ilmiah Pendidikan Fisika Al-BiRuNi*, *10*(1), 19-28. Retrieved from http://ejournal.radenintan.ac.id/index.php/al-biruni/article/view/7007

Sundayana, R. (2016). *Statistika Penelitian Pendidikan.* Bandung: Alfabeta.

Surahmat, W., Doyin, M., & Yusuf, A. (2020). The Effectiveness of Scientific Approach Based Guided Discovery Learning Model to Improve Student Learning Outcomes. *Journal of Primary Education*, *9*(4), 436-444. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/42150

Ulia, N. (2018). Efektivitas Collaborative Learning Berbantuan Media Short Card Berbasis IT Terhadap Pemahaman

Konsep Matematika. *Jurnal Ilmiah Pendidikan Dasar*, *5*(2), 68-78. Retrieved from http://jurnal.unissula.ac.id/index.php/pendas/article/view/2796

Ulia, N., & Sari, Y. (2018). Pembelajaran Visual, Auditory dan Kinestetik Terhadap Keaktifan dan Pemahaman Konsep Matematika Siswa Sekolah Dasar. *Jurnal Pendidikan Guru MI*, *5*(2), 175-190. Retrieved from https://syekhnurjati.ac.id/jurnal/index.php/ibtida/article/view/2890

Wahyono, P., Husamah, H., & Budi, A. S. (2020). Guru Profesional di Masa Pandemi Covid-19: Review Implementasi, Tantangan, dan Solusi Pembelajaran Daring. *Jurnal Pendidikan Profesi Guru*, *1*(1), 51-65. Retrieved from https://ejournal.umm.ac.id/index.php/jppg/article/view/12462

Wardani, S., Lindawati, L., & Kusuma, S. B. W. (2017). The Development of Inquiry by Using Android-System-Based Chemistry Board Game to Improve Learning Outcome and Critical Thinking Ability. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 196-205. Retrieved from https://journal.unnes.ac.id/nju/index.php/jpii/article/view/8360

Warmi, A., Adirakasiwi, A. G., & Santoso, E. (2020). Motivasi dan Kemandirian Belajar Siswa Pada Mata Pelajaran Matematika di Masa Pandemi Covid-19. *Jurnal Education and Development*, *8*(3), 197-202. Retrieved from https://journal.ipts.ac.id/index.php/ED/article/view/1937

Wihardjo, R. S. D., Nurani, Y., & Ramadhan, S. (2020). The Comparison Between The Effectiveness of Guided Discovery Model And Inquiry Model for Early Childhood Education Students. *International Journal of Innovation, Creativity and Change*, *11*(3): 409-418. Retrieved from https://www.ijicc.net/images/vol11iss3/11333_Wihardjo_2020_E_R.pdf

Winoto, Y. C., & Prasetyo, T. (2020). Efektivitas Model Problem Based Learning dan Discovery Learning Terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Basicedu*, *4*(2), 228-238. Retrieved from https://jbasic.org/index.php/basicedu/article/view/348

Yahya, S., Imam, S. K., & Masturi. (2017). Satesik (Sains, Tekhnologi & Musik) untuk Meningkatkan Minat Belajar dan Pemahaman Konsep. *Journal of Innovative Science Education*, *6*(1), 104–115. Retrieved from https://journal.unnes.ac.id/sju/index.php/jise/article/view/17070

Yuliana, N., Dahlan, M. R., & Fahri, M. (2020). Model Pendidikan Holistik Berbasis Karakter di Sekolah Karakter Indonesia Heritage Foundation. *EduHumaniora: Jurnal Pendidikan Dasar*, *12*(1), 15-24. Retrievied from https://ejournal.upi.edu/index.php/eduhumaniora/article/view/15872

Yunitasari, R., & Hanifah, U. (2020). Pengaruh Pembelajaran Daring Terhadap Minat Belajar Siswa pada Masa Covid-19. *Edukatif: Jurnal Ilmu Pendidikan*, *2*(3), 232-243. Retrieved from https://edukatif.org/index.php/edukatif/article/view/142

Yuwandra, R., Arnawa, I. M. (2020). Development of Learning Tools Based on Contextual Teaching and Learning in Fifth Grade of Primary Schools. *Journal of Physics: Conference Series*, *1554*(012077), 1-5. Retrieved from http://lib.unnes.ac.id/43376/1/1603996713_Trimurtini2020J.Phys.Conf.Ser.1663012050%20-%20Elok%20Fariha%20Sari.pdf

Zuhara, N. R., Supardi., K. I., & Susilaningsih, E. (2020). The Effect of The Problem Based Learning Model using Quizizz Evaluation on Students' Cognitive Science Learning Outcomes in Elementary School. *Journal of Primary Education*, *9*(4), 364-376. Retrieved from

https://journal.unnes.ac.id/sju/index.ph p/jpe/article/view/40752