Research Article

The Effectiveness of Discovery Learning with Truth or Dare Technique in Improving Students' Logical Thinking Ability

Royyan Arifin[1], Edi Irawan[2]

[12]Jurusan Tadris Ilmu Pengetahuan Alam, Fakultas Tarbiyah dan Ilmu Keguruan,
Institut Agama Islam Negeri Ponorogo, Ponorogo, Indonesia

Corresponding Address: arifinroyyan@gmail.com

ABSTRACT

This research originated from a phenomenon that shows the low ability of students to think logically. This study aims to provide solutions to improve students' logical thinking skills using models discovery learning with techniques truth or dare. This type of research is a quasi-experimental with a two-group pre-test post-test design. The data were collected using a pre-test and post-test of students' logical thinking abilities. The population in this study were students of class VII SMPN 5 Ponorogo. Those who were randomly selected as samples were class VII-F as the experimental class and class VII-I as the control class. Furthermore, data analysis was performed using the t-test. The results showed that the effectiveness of the model of discovery learning techniques truth or dare with conventional learning has significant differences. The ability to think logically between students who use the model discovery learning technique truth or dare is higher than the logical thinking skills of students who use conventional learning. The use of this learning model provides the opportunity for students to find concepts related to the material independently. As a result, students can hone and optimize their logical thinking skills to solve the problems they face during the learning process.

INTRODUCTION

Many experts predict the success of a person in the 21st century will depend on the four primary skills he has. The four skills are known as 4C, which is an acronym for Collaboration, Communication, Critical Thinking, and Creativity (Trilling & Fadel, 2012). Especially in the era of Society 5.0, which demands everything to be digital (E Irawan, 2020). Therefore, education is obliged to ensure that all students must have these four skills (Rotherham & Willingham, 2009). The learning framework in the 21st century must be oriented to prepare

students to be able to adapt to world developments (Bellanca, 2010) quickly. The main goal is, of course, to be able to prepare a qualified future generation.

Students' ability to think logically shows the ability of students to relate an event in real life with the material obtained in the education they take. The ability to think logically is also essential for a child's daily life. Logical thinking has a meaning, which is one branch of the way of thinking to look for information or knowledge that to achieve it must go through a specific pattern sequence, with another logic or a certain logic (Fitriana, 2015). In this case, students actually must have the ability to think logically to make a decision (Nugraha et al., 2017). Some essential things that must be considered by someone in logical thinking, among others; 1) that the person must have a basis for thinking, have concrete facts and concepts; 2) must be able to express opinions; 3) can conclude, lay the basis of thought and opinion into a rationale.

In education, the ability to think logically is defined as the ability that every student must have to think sensibly continuously and must be based on facts that students have learned beforehand so that they can solve the problems they face (Swestyani et al., 2015). Suitable learning activities are practical and efficient learning activities to achieve these learning objectives.

Based on the results of the initial survey using a questionnaire conducted on grade VII students of SMP Negeri 5 Ponorogo, several problems were found in the learning process as follows. First, students do not understand the concept of the lesson. Second, the lack of courage from within students in asking friends or teachers because they will be embarrassed when asking questions. Third, the lack of awareness of students to understand science subject matter so that many students underestimate science lessons. Fourth, the lack of awareness of students in reading the material in science books so that the learning outcomes of students are still far from expected and not optimal.

After conducting interviews with the Natural Science Subject Teacher at SMPN 5 Ponorogo, information was obtained that the learning process was still teacher-centred, namely lectures and sometimes a practicum. The causes of these problems can be identified. Namely, teachers often use lectures in the learning process, the media used in the previous learning process is only PowerPoint where the explanation is dominated by dense material, the learning resources used by the teacher are only textbooks. Not only that, but students' backgrounds are also one of the factors that affect student learning outcomes.

One of the solutions offered through this research is the use of discovery learning models. A learning model in which students not only receive material from the teacher but students also carry out activities that are a stimulus for students to dare to argue with classmates to develop concepts about the material (Balım, 2009; Wahida et al., 2018). So that lessons are not only memorized, but students also experience a fun learning process so that the material can be received well.

Discovery learning has the following learning paths: 1) stimulation, 2) problem statements, 3) data collection, 4) data processing, 5) verification, and 6) generalization (Mayer, 2004). With these stages, discovery learning strongly supports communication and interaction, the ability to reason continuously and can draw one conclusion from the problems that students are facing (Rosarina et al., 2016). In the use of discovery learning, the learning model puts forward the process of understanding the concept of the material to be taught.

Most of the existing research has been carried out on the use of discovery learning and truth or dare models separately. With various advantages of each, this study tries to combine discovery learning models using truth or dare techniques. The goal is, of course, to provide more portions for students to be involved in learning. Through this learning, students will be more honed in their ability to think logically.

This study aims to test whether learning using the truth or dare discovery learning model can improve the logical thinking skills of grade VII students of SMP Negri 5 Ponorogo. This is based on the argument that the use of the discovery learning model truth or dare technique is centred on students and has supporting stages in honing and improving students' logical thinking skills.

METHODS

This study was an experimental study with a two-group pre-test post-test design (Budiyono, 2003). The population in this study were students of class VII SMPN 5 Ponorogo for the 2019/2020 academic year, which consisted of 8 classes with a total of 256 students. The research was conducted by involving two classes selected by random cluster sampling (Sugiyono, 2018). Of the eight classes, class VII-F was selected as the experimental class and class VII-I as the control class. The experimental class used the discovery learning model with truth or dare technique, while the control class used conventional learning using PowerPoint media. The data was collected through a pre-test and post-test of students' logical thinking skills. The instrument used was a test of students' logical thinking ability. Furthermore, the collected data were analyzed using t-test. Technically, the t-test and its prerequisites, namely the normality test and the homogeneity test, are carried out using the help of SPSS software.

There are six stages in this research. First, preliminary observation activities conducted by researchers to observe learning activities carried out in the classroom. In observation, the researcher observes how the teacher teaches and the attitudes of students when learning is carried out. Besides that, it is also a means to dig up the information needed to support research. By making observations, researchers will find it easier to conduct research because researchers already know the conditions of the class and the learning that has been done. Second, the stage of developing a test instrument to measure logical thinking skills. The development was carried out using a validation test by an expert (expert judgment), a test item validity, and a reliability test. The item validity test was carried out using the product-moment correlation (Allen & Yen, 1979; Sugiyono, 2018). While the instrument reliability test was carried out using Cronbach Alpha (Allen & Yen, 1979; Mardapi, 2008). The results were used to determine the items used as instruments in measuring students' critical thinking abilities. Third, the stage of the student's initial ability test. This is done to ensure that the initial abilities of the experimental class and control class students are the same. Fourth, the implementation of the use of discovery learning model truth or dare in the experimental class and conventional learning in the control class. Fifth, after being applied in learning activities, a post-test was carried out to see the students' logical thinking skills after learning. Sixth, in this last stage, the researcher processed and analyzed the post-test data.

RESULTS AND DISCUSSION
Results

This research began with the development of a test instrument for students' logical thinking skills with several stages as follows. First, determine indicators that measure students' logical thinking abilities. Second, the preparation of the question text by referring to these indicators. Third, validate the questions to the expert (expert judgment). Fourth, revise the items according to the advice of the experts. Fifth, trying out the instrument on equal students. The result, then tested for validity using correlation product moment. Technically, the test is carried out using the help of SPSS software. The results are listed in Table 1 below.

Table 1. Results of the Validity Test

|	Item questions	R_Obs	r_table	Conclusion
1.	Cluster thought-1	0.685	0.441	Valid
2.	Cluster thought-2	0.726	0.441	Valid
3.	Cluster thought-3	0.509	0.441	Valid
4.	Ability to argue-1	0.685	0.441	Valid
5.	Ability to argue-2	0.723	0.441	Valid
6.	Ability to argue-2	0.702	0.441	Valid
7.	Drawing of conclusions-1	0.702	0.441	Valid
8.	Drawing of conclusions-2	0.725	0.441	Valid
9.	Drawing of conclusions-3	0.725	0.441	Valid

Table 1 above shows that as many as nine questions developed a valid question. Mathematically, the questions are able to measure what will be measured, namely, students' logical thinking abilities. Furthermore, 9 of these questions were determined as instruments to be tested for reliability. Reliability in this study using the analysis technique Cronbach's Alpha. Technically, the reliability test was carried out using SPSS software. The results of the student's logical thinking ability instrument reliability test are listed in Table 2 below.

Tabel 2. Reliability Test Results

Cronbach's Alpha	Conclusion
0.848	Reliable

Table 2 above shows that the value is Cronbach's Alpha computed0.848. Because the value Cronbach's Alpha Is more than 0.7, it can be concluded that the instrument is reliable (Budiyono, 2003). Based on the results of the reliability test, it shows that this research instrument is reliable so that the instrument used is consistent with the results and can provide data according to reality.

The instrument that has been developed and shows that it is valid and reliable is then used to measure students' logical thinking skills, both in the pre-test and post-test. The average pre-test and post-test results of students' logical thinking abilities in the experimental class and control class are presented in Figure 1 below.
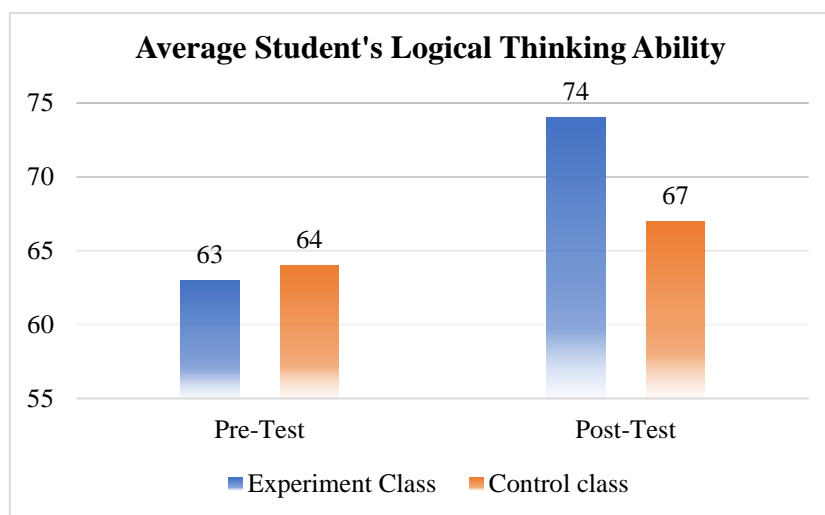
Figure 1. Comparison of Logical Thinking Ability in Experiment Class and Control Class

Figure 1 above shows that students' logical thinking ability in the experimental and control class before the treatment is relatively the same. However, after the discovery learning model was applied, the truth or dare technique in the experimental class and

conventional learning in the control class showed that there were differences in students' logical thinking abilities.

As an effort to ensure the similarity of the abilities of the two classes, a statistical test was carried out using the t-test on the pre-test data. Before the t-test is carried out, a prerequisite test is first carried out, which includes the normality test and the homogeneity test. The results are listed in Table 3 below.

Table 3. Results for Pre-Test Normality Test

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Class VII-F	0.135	30	0.170	0.962	30	0.339
Class VII-I	0.113	30	0.200*	0.964	30	0.383

Table 3 above shows that the normality test results for the experimental class are 0.170, and the control class is 0.200. The significance value of the experimental and control classes is greater than the significance level used, namely 0.05. This shows that the data in the experimental and control classes are normally distributed (Edi Irawan, 2014).

After the normality test is carried out, the homogeneity test is then carried out to find out the data that has been obtained is homogeneous or not (Wulansari, 2016). The homogeneity test was carried out using the test Levene which was technically carried out with the help of SPSS software. The results of the pre-test data homogeneity test are listed in table 4 below.

Table 4. Results of the Pre-Test Homogeneity

Levene Statistic	df1	df2	Sig.
2.667	1	58	0.108

Table 4 above shows that the significance value pre-test of students' logical thinking skills in the experimental class and control class is 0.108. This significant value is greater than 0.05, so it can be concluded that the data in the experimental and control classes are homogeneous (Edi Irawan, 2014).

After all the prerequisites have been met, then a comparative test is carried out using the t-test. The results of the comparative test using the t-test with the help of SPSS software are listed in Table 5 below.

Table 5. T-test Results Pre-test

		t-test for Equality of Means						
		T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Score	Equal variances assumed	0.409	58	0.684	0.533	10.303	-20.075	30.142
	Equal variances not assumed	0.409	570.187	0.684	0.533	10.303	-20.076	30.143

Based on the t-test results listed in Table 5 above, it is known that The significance value of the t-test is 0.684. This significant value is far more than the significance level (0.05), so it can be concluded that the logical thinking skills of the experimental class and the control class students before the treatment were equally good.

After the initial test carried out on the pre-test data showed the same ability, then the treatment was carried out. The experimental class was taught using the discovery learning model of truth or dare technique, while the control class was taught using conventional learning models. After the learning was carried out, the pre-test was then carried out to determine the students' logical thinking skills after the treatment.

The next stage is to conduct a post-test data comparison test using the t-test with the following conditions.

Table 6. Post-test Normality Test

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Class VII-F	0.156	26	0.103	0.926	26	0.061
Class VII-I	0.161	26	0.083	0.903	26	0.018

Table 6 above shows that the experimental class normality test results amounted to 0.103 and 0.083 of the control class. The significance value of the experimental and control classes is greater than the significance level used, namely 0.05. This shows that the final data on the ability to think logically in the experimental and control classes are normally distributed.

Furthermore, the results of the post-test data homogeneity test of students' logical thinking abilities are listed in table 7 below.

Table 7. Homogeneity Test Results Post-test

Levene Statistic	df1	df2	Sig.
3,504	1	50	0.067

Table 7 above shows that the significance value of the post-test logical thinking ability of the experimental class and control class students is 0.067. This significant value is greater than 0.05, so it can be concluded that the final data on the ability to think logically in the experimental and control classes are homogeneous.

After fulfilling all the prerequisites, the final data comparison test is carried out using the t-test. The results of the comparative test using the t-test with the help of SPSS software are listed in Table 8 below.

Table 8. Hasil Uji-t Data Post test

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Score	Equal variances assumed	8,000	58	0,000	12,500	1,562	9,372	15,628
	Equal variances not assumed	8,000	48,996	0,000	12,500	1,562	9,360	15,640

Table 8 above shows that the significant value of the t-test for comparison of post-test data is 0,000. This significance value is less than the significance level (0.05), so it can be concluded that the students' logical thinking skills in the experimental class and the control class after the different treatment. Based on the mean of the experimental class and the control class, as shown in Figure 1, it is known that the logical thinking skills of the experimental class students are higher than the control class.

Specifically, students' logical thinking abilities on each indicator, both in the experimental and control classes, are presented in Figure 2 below.

Average Logical Thinking Ability According to the Indicators
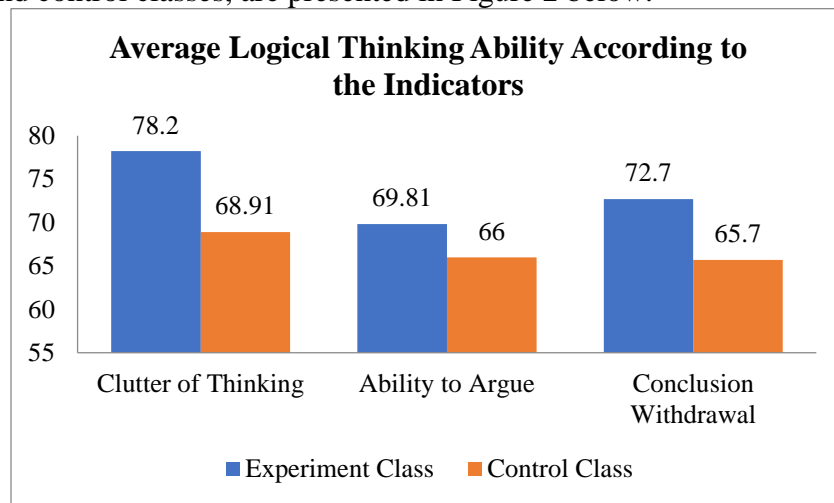
Figure 2. Students According to The Indicators Logical Thinking Ability

Figure 2 above shows that it is known that the scores of all indicators of logical thinking ability in the experimental class are higher than the control class. The highest value is found in confusion thinking indicator of 78.2, while the lowest value is in the argumentation ability indicator amounting to 69.87. For the control class, the highest score is in the sequence of thinking indicators of 68.91, while the lowest value is in the conclusion drawing indicator amounted to 65.7. This shows that the three indicators of logical thinking ability of class VII students of SMP Negeri 5 Ponorogo in science subjects increased after the discovery learning model of truth or dare was applied.

Discussion

The stages of learning using discovery learning can provide more opportunities for students to hone their logical thinking skills. The impact, students who learn using the discovery learning model of truth or dare have the ability to think logically higher than students who use conventional learning. This is in line with other research which states that discovery learning models are effective in improving problem-solving abilities (Sulistyowati et al., 2012; Ulfa et al., 2017). Besides, the results of this study are also in line with the results of other studies which state that the discovery learning model is effective in improving student learning outcomes (Astari et al., 2018; Lestari, 2017; Rosdiana et al., 2017; Yerimadesi et al., 2017).

The success of the discovery learning model in improving students' logical thinking skills is, of course, supported by the use of techniques truth or dare. The combination of the two can have a significant impact on improving students' logical thinking skills. The results of this study are in line with the results of research which states that technique truth or dare can improve student learning outcomes (Priatmoko et al., 2008; Tarigan & Saskia, 2019). The use of techniques truth or dare will increase motivation to learn by discovery learning because technique truth or dare has been proven effective in increasing student motivation (Attaqiana et al., 2016; Rahayu, 2019). The technique is truth or dare also able to improve learning activities (Santika, 2019; Susanti, 2019), self-concept (Puspitasari & Pratiwi, 2020), and positive personality of students (Rusmilasari, 2020).

The use of discovery learning models with truth or dare techniques adds new alternatives to learning in the 21st century. The combination of the two is proven to be able to improve logical thinking skills significantly. The combination of the two needs to be further

explored and innovated in order to be able to find the best learning model that is most effective for achieving 21st-century skills.

CONCLUSION

The use of discovery learning to model truth or dare technique is very significant to improve the logical thinking skills of grade VII students of SMPN 5 Ponorogo. The results of the t-test used to compare the experimental class, and the control class showed that the logical thinking abilities of students who used the discovery learning model, truth or dare, were not the same as those who used conventional learning. Students who use the truth or dare discovery learning model can think logically higher than students who use conventional learning. Discovery learning with truth or dare technique provides a larger portion for students to hone their logical thinking skills.

REFERENCES

Allen, M. J., & Yen, W. M. (1979). *Introduction to Measurement Theory*. Waveland Press.

Astari, F. A., Suroso, S., & Yustinus, Y. (2018). Efektifitas Penggunaan Model Discovery Learning dan Model Problem Based Learning Terhadap Hasil Belajar IPA Siswa Kelas 3 SD. *Jurnal Basicedu*, *2*(1), 1–10.

Attaqiana, M. R., Saptorini, S., & Binadja, A. (2016). Pengembangan Media Permainan Truth and Dare Bervisi Sets Guna Memotivasi Belajar Siswa. *Jurnal Inovasi Pendidikan Kimia*, *10*(2).

Balım, A. G. (2009). The Effects of Discovery Learning on Students' Success and Inquiry Learning Skills. *Eurasian Journal of Educational Research (EJER)*, *35*.

Bellanca, J. A. (2010). *21st Century Skills: Rethinking how Students Learn*. Solution Tree Press.

Budiyono. (2003). *Metodologi Penelitian Pendidikan* (Pargiyo (ed.); 1st ed.). UNS Press.

Fitriana, S. (2015). Pengaruh Efikasi Diri, Aktivitas, Kemandirian Belajar dan Kemampuan Berpikir Logis Terhadap Hasil Belajar Matematika Pada Siswa Kelas VIII SMP Negeri. *Journal of Educational Science and Technology (EST)*, *1*(2). https://doi.org/10.26858/est.v1i2.1517

Irawan, E. (2020). Pelatihan Blended Learning Sebagai Upaya Menghadapi Society 5.0. *Aksiologiya: Jurnal Pengabdian Kepada Masyarakat*, *4*(2). http://journal.um-surabaya.ac.id/index.php/Aksiologiya/article/view/3499

Irawan, Edi. (2014). *Pengantar Statistika Penelitian Pendidikan*. Aura Pustaka.

Lestari, W. (2017). Efektivitas Model Pembelajaran Guided Discovery Learning Terhadap Hasil Belajar Matematika. *SAP (Susunan Artikel Pendidikan)*, *2*(1).

Mardapi, D. (2008). *Teknik Penyusunan Instrumen Tes dan Nontes*. Mitra Cendekia.

Mayer, R. E. (2004). Should There be a Three-Strikes Rule Against Pure Discovery Learning? *American Psychologist*, *59*(1), 14.

Nugraha, A. J., Suyitno, H., & Susilaningsih, E. (2017). Analisis Kemampuan Berpikir Kritis Ditinjau dari Keterampilan Proses Sains dan Motivasi Belajar Melalui Model PBL. *Journal of Primary Education*, *6*(1), 35–43.

Priatmoko, S., Binadja, A., & Putri, S. T. (2008). Pengaruh Media Permainan Truth and Dare Terhadap Hasil Belajar Kimia Siswa SMA dengan Visi Sets. *Jurnal Inovasi Pendidikan Kimia*, *2*(1).

Puspitasari, W., & Pratiwi, T. I. (2020). Pengembangan Modifikasi Permainan Truth or Dare Untuk Meningkatkan Konsep Diri di Kelas XII IPA MAN 2 Gresik. *Jurnal BK UNESA*, *10*(3).

Rahayu, W. (2019). Penggunaan Media Truth or Dare Pada Materi Sistem Ekskresi Manusia Untuk Meningkatkan Motivasi dan Hasil Belajar Peserta Didik di SMP Negeri 3

Sidoarjo. *PENDIDIKAN SAINS*, *7*(2).

Rosarina, G., Sudin, A., & Sujana, A. (2016). Penerapan model discovery learning untuk meningkatkan hasil belajar siswa pada materi perubahan wujud benda. *Jurnal Pena Ilmiah*, *1*(1).

Rosdiana, R., Boleng, D. T., & Susilo, S. (2017). Pengaruh penggunaan model discovery learning terhadap efektivitas dan hasil belajar siswa. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *2*(8), 1060–1064.

Rotherham, A. J., & Willingham, D. (2009). 21st Century. *Educational Leadership*, *67*(1), 16–21.

Rusmilasari, R. (2020). *Model Bimbingan Kelompok Islami Dengan Teknik Truth or Dare Untuk Meningkatkan Kepribadian Positif Siswa SMA di Banjarmasin*. Universitas islam kalimantan MAB.

Santika, A. (2019). *Penerapan Model Problem Based Learning (PBL) Berbantuan Media Truth and Dare Untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Pada Materi Pokok Hidrolisis Garam di SMA Swasta Muhammadiyah 2 Medan*. UNIMED.

Sugiyono. (2018). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Alfabeta.

Sulistyowati, N., Widodo, A. T. W. T., & Sumarni, W. (2012). Efektivitas Model Pembelajaran Guided Discovery Learning Terhadap Kemampuan Pemecahan Masalah Kimia. *Chemistry in Education*, *1*(2).

Susanti, A. (2019). *Penerapan Model Pembelajaran Inkuiri Terbimbing Dengan Berbantuan Media Truth and Dare Untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Pada Materi Hidrolisis Garam*. UNIMED.

Swestyani, S., Rinanto, Y., & Widoretno, S. (2015). Peningkatan Kemampuan Berpikir Logis Melalui Penerapan Discovery Learning Pada Materi Sistem Reproduksi di Kelas XI MIA 1 SMA Batik 2 Surakarta Tahun Pelajaran 2014/2015. *BIO-PEDAGOGI*, *5*(1), 20–24.

Tarigan, D., & Saskia, E. (2019). Pengaruh Media Permainan Truth Or Dare (Tod) Terhadap Hasil Belajar Matematika Siswa Di Kelas V SDN 107399 Bandar Khalipah. *SEMINAR NASIONAL PGSD UNIMED*, *2*(1), 84–95.

Trilling, B., & Fadel, C. (2012). *21st Century Skills: Learning for Life in Our Times*. John Wiley & Sons.

Ulfa, K., Buchori, A., & Murtianto, Y. H. (2017). Efektivitas Model Guided Discovery Learning untuk Video Pembelajaran dalam Mengetahui Perbedaan Kemampuan Pemecahan Masalah Matematika Siswa. *MUST: Journal of Mathematics Education, Science and Technology*, *2*(2), 267–275.

Wahida, S. N., Siswanto, M. B. E., Nasution, N., & Suhanadji, S. (2018). The Effect of Discovery Learning Model on Social skills And Students' Learning Outcomes of Mycultivation Theme in Fourth Grade of Elementary School. *Proceedings of the 2nd International Conference on Education Innovation (ICEI 2018)*. https://doi.org/10.2991/icei-18.2018.36

Wulansari, A. D. (2016). Aplikasi Statistika Parametrik dalam Penelitian. *Yogyakarta: Pustaka Felicha*.

Yerimadesi, Y., Putra, A., & Ririanti, R. (2017). Efektivitas Penggunaan Modul Larutan Penyangga Berbasis Discovery Learning terhadap Hasil Belajar Siswa Kelas XI MIA SMAN 7 Padang. *Jurnal Eksakta Pendidikan (JEP)*, *1*(1), 17–23.