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Enhancing Junior High School Students' Mathematical Critical Thinking Ability Through the Discovery Learning Model Assisted with Learning Videos

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ABSTRACT

Critical thinking ability is one of the higher orders thinking skills that is highly needed in 21st-century learning. One learning model that can develop and enhance students' necessary thinking skills, especially in learning mathematics, is the Discovery Learning model. Using video media in learning can motivate and assist students in learning mathematics. This study aimed to determine the increase in students' mathematical critical thinking skills through the Discovery Learning model helped by teaching videos. The research method used is quasi-experimental. The samples in this study were students at class VII Bandung National Middle School. The sample was selected by purposive sampling technique. This research shows that students who get the Discovery Learning model assisted by video-assisted learning have a higher mathematical critical thinking ability than those who get conventional models.

Keywords: mathematical critical thinking skills, Discovery Learning Model, learning videos

ABSTRAK

Kemampuan berpikir kritis merupakan salah satu kemampuan berpikir tingkat tinggi yang sangat diperlukan pada pembelajaran abad 21. Salah satu model pembelajaran yang dapat mengembangkan dan meningkatkan kemampuan berpikir kritis siswa terutama dalam pembelajaran matematika adalah model Discovery Learning. Penggunaan media video dalam pembelajaran dapat memotivasi dan membantu siswa untuk belajar matematika. Tujuan dari penelitian ini adalah untuk mengetahui peningkatan kemampuan berpikir kritis matematis siswa melalui model Discovery Learning berbantuan video pembelajaran. Metode penelitian yang digunakan adalah kuasi eksperimen. Sampel dalam penelitian ini adalah siswa SMP Nasional Bandung kelas VII, sampel dipilih dengan teknik sampling purposive. Hasil dari penelitian ini adalah peningkatan kemampuan berpikir kritis matematis siswa yang memperoleh model Discovery Learning berbantuan video pembelajaran lebih tinggi dari siswa yang memperoleh model konvensional.

Kata Kunci: kemampuan Berpikir Kritis Matematis, Model Discovery Learning, Video Pembelajaran

INTRODUCTION

Education is an absolute need that every human being must meet. Education is a conscious and planned human effort or effort to develop self-potential both physically and spiritually to obtain results and achievements. According to Darmadi (2019), teaching, training, and research activities in seeking knowledge, skills, and habits passed down from one generation to another by a group of people are called education.

Education is carried out in schools; the material studied includes mathematics lessons. Mathematics is one element that has an essential role in education. It's no wonder that mathematics is a subject given at all levels of education, from primary to higher education (Tsaniya et al., 2022). According to Sari et al. (2022) the purpose of learning mathematics at school, namely: to 1) be able to understand mathematical concepts, 2) can use reasoning well, 3) so that it can complete problems well, 4) can interact mathematically, and 5) have an attitude of respect. Rahman & Saputra (2022) state that mathematics is the science of logic, thinking patterns, organizing patterns, and logical proof. Mathematics is one of the most important subjects among other subjects and is very useful for everyday life. As stated in Permendiknas No. 22 of 2006 concerning content standards, mathematics is essential in various disciplines and advances human thinking.

Based on the competency standards of graduates described by Permendikbud No. 20 of 2016, critical thinking skills need to be mastered by students. Necessary thinking skills need to be grown in students because critical thinking is a high-level skill. To be able to reason, students must understand the problem because Mathematical understanding ability is an individual's ability to understand, explain, and re-express a subject matter. In mathematics lessons, individuals can use concepts that can translate into other forms, for example, from words to symbols, tables, graphs, or other states. They can be interpreted as a summary explanation and applied to simple or special cases (Hermawan et al., 2021).

Japan, China, Singapore, and South Korea are countries at the top list of PISA and TIMMS results. It might be due to mathematics learning in these countries emphasizing reasoning and problem-solving, which starts with critical thinking. Therefore, they were able to produce high-achiever students in mathematics tests. Learning to solve problems is essentially about thinking or reasoning (Darta & Saputra, 2018). One of the reasons for the low level of student's mastery of mathematics is the lack of opportunities that students have for communication and solving mathematical problems, which results in inadequate student reasoning towards mathematics (Limbangan et al., 2022)

The ability to think critically is one of the competencies that students must have in facing the 21st century. In line with the opinion expressed by Ron Germaine et al. (2016) that a person needs a mapping of essential competencies. The crucial successes or competencies people have in facing the 21st century have been formulated by experts in business, education, and other policymakers who are members of The Partnership for 21st Century Skills (P21). The framework proposed by the National Education Association expresses competence in 4C: (1) Critical thinking and problem-solving skills. This ability includes the ability to reason, think, give an evaluation, and solve problems; (2) Communication skills, this ability has oral, written, and non-verbal communication skills in various

forms, contexts, and technologies; (3) Collaboration capability; (4) Ability to think creatively (Bradshaw & Figiel, 2012). To achieve the essential competencies needed in 21st-century learning, mathematics subjects must be given to all students to equip them with logical, analytical, systematic, critical, innovative, and creative thinking skills and the ability to work together. Reasoning skill is a natural mental process when thinking. With the necessity and habituation of deep-thinking learning is expected that students will be able to become critical individuals (Dalimunthe, et al., 2020).

According to Ennis (1996), the process of thinking to make logical decisions about what to believe and do is called critical thinking. In line with that, Brahler et al. (2002) argues that critical thinking is a systematic approach organized through activities such as asking questions, examining carefully, and seeing things from different perspectives. Critical thinking is essential in learning, especially in learning mathematics (Priatna et al., 2020. Necessary thinking skills in learning mathematics are called mathematical critical thinking skills. Hidayat & Sari (2019) states that the essential ability to think processes to analyze arguments and generate ideas for meaning to develop a logical mindset is called critical thinking skills. Mathematical necessary thinking skills need to be owned by every student to solve problems that occur in everyday life and help students survive and solve problems, especially in the face of increasing technological developments (Tresnawati et al., 2017).

The statements above state how students must master essential mathematical critical thinking skills. But the facts in the field found that students' mathematical necessary thinking skills were still low. This is based on research conducted by Lestari & Roesdiana (2021) on students' mathematical critical thinking abilities in a junior high school in West Karawang. The results show that students' mathematical essential thinking abilities are in the less category and significantly less category, with a consecutive percentage of 19.44% and 80.55%.

Meanwhile, research conducted by Sari (2021) shows that students' mathematical critical thinking skills are classified as low It can be seen that there are no students who can fulfill the indicators of essential thinking ability to the fullest. The results of students' necessary thinking skills for determining concepts in problem-solving were 35.66% at the stage of formulating a way to solve the problem of 21.32%. Furthermore, the step of giving arguments in solving problems is 15.07%, and finally, the stage of evaluating situation solving is 14.34%. Seeing the facts above, a breakthrough is needed in designing and implementing classroom learning to maximize students' mathematical critical thinking abilities. Tsaniya et al. (2022) suggest that in choosing the right learning strategy, including specific approaches, models, methods, and learning techniques, a teacher must pay attention to student characteristics. The alternative solution the researchers propose is using the Discovery Learning model assisted by learning videos. According to Bruner, discovery learning is a learning model emphasizing the importance of understanding what is being known, and learning activities require activeness (Naezak et al., 2021). Putri & Eliarti (2018) explain that the guided discovery model is designed through self-observation so students can discover learning concepts.

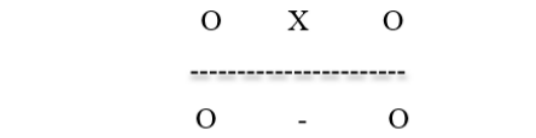
Learning using the Discovery Learning model encourages students to seek conclusions from the activities and observations they are doing. Discovery learning helps recruit activities where students learn for themselves and apply what is known in new situations, leading to influential

learning achievements. Limbangan et al. (2022) said that the discovery learning model makes students more active in learning and trains students to be able to solve and find solutions to problems independently and skillfully in applying the Discovery Learning model. In this case, learning media as well can help. One of the learning media that can help students understand learning is teaching videos. Videos can be used to facilitate different student learning styles and also attract students' interest in education. Using video in the learning process is beneficial in improving learning outcomes. This aligns with the results of research conducted by Azhad et al. (2022), showing that using the Ed Puzzle-assisted Discovery Learning model improves mathematical critical thinking skills. The research undertaken by Sumaji & Wahyudi (2020) shows that using discovery learning, sorogan, and the help of power point-based video media can lead to activeness and enthusiasm for learning within students and hone students' conceptual abilities. The research conducted by Salmina & Mustafa (2019) shows increased interest and learning outcomes in three-dimensional material by applying the Discovery Learning model assisted by learning videos. Based on the things mentioned above, it is felt that it is necessary to make efforts to reveal whether Discovery Learning assisted by learning videos can improve students' mathematical critical thinking skills.

METHOD

The research method is a scientific activity that is planned, structured, and Systematic. and has specific goals both practically and theoretically (Nuranisa et al., 2022). In this study, it was impossible to take students randomly and not to control all influential variables such as learning facilities, class conditions, learning resources, study time, and others that researchers could not condition. So, this study used a quasi-experimental design.

The research design in this study used the Nonequivalent Control Group Design by including the experimental class group and the control class group. The experimental class group is a group of students who receive the treatment of the Discovery Learning model assisted by learning videos. In contrast, the conventional model class group is the control class group. Students' initial ability to think critically mathematically can be seen from the results of the pretest given to the two class groups, both the experimental class and the control class. After receiving the treatment, the difference in students' mathematical critical thinking ability will be seen by being given a posttest. According to Russefendi (2005), the research design can be seen in Figure 1.



X : Treatment of the experimental class (learning the Discovery Learning model assisted by teaching videos).
O : Giving an initial test (pretest) and a final examination (posttest) in the form of critical thinking skills.
----- : Subjects were not grouped randomly

Figure 1. Design of This Research

This research was conducted in one of the junior high schools (SMP) in Bandung. The populations in this study were class VII students at Bandung National Middle School for the 2021/2022 academic year, even the semester. Two categories of samples were selected, consisting of VII D as the experimental class and VII E as the control class. Sampling was done by purposive sampling technique. Sugiyono (2017a, 2017b) states, "Purposive sampling is a sampling technique with certain considerations". The consideration in question is the consideration of the school and the teacher concerned.

The instrument used in this study is to use a test instrument. The instrument is in the form of test questions to measure students' mathematical critical thinking skills, which are given in the form of an initial test (pretest) and a final test (posttest). Before being used, the test instrument was tested first. The trials in question are validity, reliability, discriminatory power, and difficulty level.

Quantitative data processing is done by testing statistics on the results of the pretest, posttest, and gain index data (normalized gain) from classes using the Discovery Learning model and types using conventional models. Quantitative data processing is assisted by using IBM SPSS 25.0 for Windows Software.

RESULT AND DISCUSSION

Pretest Data Analysis

This study aimed to improve the ability to think critically mathematically between students who received the Discovery Learning model assisted by video learning and students who received the conventional model. In this study, at the beginning of the pretest activities, this pretest was to determine the initial mathematical critical thinking abilities of students in both classes and the readiness of students in both courses to receive new material. The steps taken in processing the Pretest data are shown in Table 1.

Table 1. Descriptive Statistics of Experimental Class and Control Class Pretest Data

	N	Minimum	Maximum	Mean	Std. Deviation
Experiment	32	28	85	63.62	17.756
Control	32	28	81	51.75	15.305

Table 1 shows that the experimental class students' average mathematical critical thinking ability is 22.69, with a maximum value of 36 and a minimum value of 11. Meanwhile, the average mathematical essential thinking ability of control class students is 22.78, with a maximum weight of 47 and a minimum value of 6. The standard deviation in the experimental class is 7,267, while the standard deviation in the control class is 9,989. Based on the description above, there are differences in the results of the descriptive test data in the two types. Still, they cannot significantly describe the differences in the mathematical critical thinking abilities of the two classes. Next, tests for normality, homogeneity, and two average difference tests will be carried out.

Table 2. Normality test results for the initial test (pretest) for the experimental class and the control class.

Class		Kolmogorov-Smirnov			Shapiro-Wil		
		Statistic	df	Sig.	Statistic	df	Sig.
Result in Pretest	Experiment	.176	32	.013	.942	32	.085
	Control	.156	32	.046	.951	32	.157

Based on the results of the normality test in Table 2, it was found that the significant value in the experimental class was 0.85. The control class was 0.157 because the Shapiro-Wilk significance value in the significance column of the two categories is more critical than 0.05, which means that the data from the pretest results of the essential mathematical skills of thinking of the two classes come from populations that are usually distributed.

Table 3. Results of the t-test for the initial test (pretest) for the experimental class and the control class

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Pretest	Equal variances assumed	3.785	0.056	-.043	62	0.966
	Equal variances not assumed			-.043	56.630	0.966

Based on Table 3, after processing the two-mean similarity test data, it was found that the significance value (sig. 2-tailed) with the t-test was 0.966. Because the probability value is more than 0.05, Ho is accepted, and Ha is rejected. In other words, there is no significant difference between the mathematical literacy skills of the experimental class and the control class in the pretest.

Final Test Data Analysis (Posttest)

After being given a pretest, students are given a posttest on the last day of activities. The posttest was carried out to determine the achievement of students' mathematical critical thinking skills in both classes after being given different learning. The steps taken in processing the post-test data can be seen in Table 4.

Table 4. Descriptive Statistics of Posttest Experiment Class and Control Class Data

Group	N	Minimum	Maximum	Mean	Std. Deviation
Experiment	32	28	85	63.62	17.756
Control	32	28	81	51.75	15.305

Table 4 shows that the experimental class students' average mathematical critical thinking ability is 63.62, with a maximum value of 85 and a minimum value of 28. Meanwhile, the average mathematical essential thinking ability of control class students is 51.75, with a maximum weight of 81 and a minimum of 28. The standard deviation in the experimental class is 17,756, while the standard deviation in the control class is 15,305. From the description above, it can be seen that

there are differences in the results of the descriptive test data in the two categories. Still, it has not been able to describe the differences in the mathematical critical thinking abilities of the two classes significantly. Next, tests for normality, homogeneity, and two average difference tests will be carried out.

Table 5. Results of the Normality Test for the Posttest for the Experimental Class and the Control Class

	Class	Kolmogorov-Smirnov			Shapiro-Wil		
		Statistic	df	Sig.	Statistic	df	Sig.
Result Post Test	Experiment	.222	32	.000	.892	32	.004
	Control	.132	32	.168	.933	32	.048

Based on the results of the normality test in Table 5, it was found that the Shapiro-Wilk significance value in the significance column for the experimental class was less than 0.05, which means that the posttest results for the mathematical critical thinking skills of the practical course came from a population with an abnormal distribution. Then the Shapiro-Wilk significance value in the significance column for the control class is also less than 0.05, which means that the posttest data for the control class' mathematical critical thinking abilities come from a population with an abnormal distribution. Because the data obtained is not normally distributed, the analysis can be continued by testing non-parametric statistics, namely Mann-Whitney, with a significant level of α = 0.05.

Table 6. Mann-Whitney Test Mann-Whitney Test Results Final Test (Posttest) Experiment Class and Control Class

Statistic	Posttest Result
Mann-Whitney U	288.000
Wilcoxon W	816.000
Z	-3.017
Asymp. Sig. (2-tailed)	.003

Based on the Mann-Whitney test in Table 6 above, an Asymp. Sig. (2-called) value of 0.003 is obtained. Because the significance value is less than 0.05, Ho is accepted, meaning there are differences in the post-test results between the experimental and control classes. In other words, the mathematical critical thinking skills of students who received the Discovery Learning model assisted by learning videos were better than the essential mathematical abilities to think of students who received conventional models.

Gain Index Analysis (Normalized Gain)

Data analysis on improving students' mathematical critical thinking skills using Gain index data (normalized gain). The gain index formula, according to Hake (Ashri, 2018), is as follows:

$$N\ Gain = \frac{skor\ posttest - skor\ pretest}{SMI - skor\ pretest}$$

Information:
SMI: Maximum (ideal) score from pre-test and post-test.

The descriptive statistical results of the normalized gain data for both the Discovery Learning class and the conventional class are shown in Table 7.

Table 7. Descriptive Statistics of Normalized Gain Data

	N	Minimum	Maximum	Mean	Std. Deviation
Experiment	32	.11	.82	.5316	.21324
Control	32	.05	.70	.3747	.18132

From the descriptive statistical analysis above, the experimental class's minimum, maximum, and mean scores were higher than the control class. Then, the two average difference tests were analyzed to see the differences in the increase in the mathematical critical thinking skills of the two types after the treatment. Still, before carrying out the t-test, it is necessary to test its normality and homogeneity first. The following is the result of the data normality test analysis.

Table 8. N-Gain Data Normality Test Results for Experiment Class and Control Class

	Class	Kolmogorov-smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
N-Gain Score	Experiment	.116	32	.200*	.937	32	.063
	Control	.148	32	.073	.949	32	.133

From Table 8. the significant value in the Shapiro-Wilk column is that the significance of the data for increasing the mathematical critical thinking skills of the experimental class is 0.063, and the importance of the control class is 0.133. As the basis of significance is more than 0.05, the N-gain data for both types are typically distributed. The following is the result of the data homogeneity test analysis.

Table 9. Results of N-Gain Data Homogeneity Test for Experiment Class and Control Class

		Levene Statistic	df1	df2	Sig.
N-Gain Score	Based on Mean	.595	1	62	.443

Based on the homogeneity test through SPSS 25.0 for Windows Software, Table 9 above shows a significant value of 0.443. As with testing the hypothesis that the critical value is more than 0.05, it can be concluded that the experimental and control classes have the same variance or that both types are said to be homogeneous. The following results from the analysis of the difference between two normalized average gains.

Comparing the results obtained from the pre-test and post-test shows an increase in students' mathematical critical thinking skills. Having seen from the descriptive statistics, it turns out that the average score of the experimental class experienced a higher increase compared to the control class. Then proceed with testing the significance level of increasing students' mathematical critical thinking skills (gain) using the Discovery Learning model assisted by learning videos. The hypothesis formula is as follows:

Ho : The increase in students' mathematical critical thinking skills who received the Discovery Learning model assisted by learning videos was not higher than that of students who received the conventional model.

Ha : The increase in students' mathematical critical thinking skills who received the Discovery Learning model assisted by learning videos was higher than students who received conventional models..

According to Uyanto (2006), the one-sided hypothesis test sig. (2-tailed) must be divided into two. With the following testing criteria (1) If ½ the significance value is > 0.05, then Ha is rejected, and Ho is accepted, and (2) If ½ the significance value is <0.05, then Ha is accepted, and Ho is rejected.

Table 10. Normalized Data Gain T-test Results for the Experiment Class and Control Class

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Pretest	Equal variances assumed	.595	.443	3.170	62	.002
	Equal variances not assumed			3.170	60.438	.002

T-test for Equality of Means

The results of the normalized gain data t-test in Table 10 show that the significant value (sig.2-tailed) with the t-test is 0.002. Because what is being done is a one-party hypothesis test, the practical value must be divided in half so that $\frac{0.002}{2} = 0.001$

The significant value is 0.001, less than 0.05, so Ha is accepted. It can be concluded that the increase in students' mathematical critical thinking skills who received the Discovery learning model was higher than students who received the conventional model.

Based on the analysis of the research data, it was found that there was no significant difference between the mathematical critical thinking abilities of the experimental class students. These students received mathematics learning through the Discovery Learning model assisted by teaching videos and the control class. Namely, students received conventional models in the initial test (pretest). This situation is conducive to seeing how the improvement of students' critical thinking skills after learning takes place. After studying and post-testing, the experimental and control classes, it turns out that there is a difference between the essential mathematical skills of thinking in the practical course and the control class in the final test (posttest).

The mathematical critical thinking skills of students who obtain the Discovery Learning model assisted by learning videos are higher than the essential mathematical abilities to think of students who receive conventional models. Judging from the average value of the absolute power of students' mathematical understanding in the Discovery Learning model class assisted by learning videos, the average value is higher than the average value of the conventional model class. It can be seen in the answers of the Discovery Learning model class and the traditional model class, which are slightly different in the posttest of mathematical critical thinking skills.

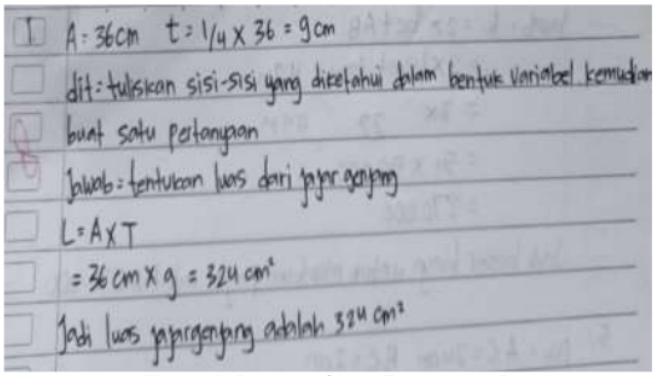


Figure 2. Posttest Class Experiment Results

Figure 2 shows an example of student answers in the experimental and control classes. In the post-test responses above, we can see that students who received the Discovery Learning model could solve critical thinking skills questions with indicators of compiling questions with reasons.

Students in the experimental class can solve the questions asked, where students make questions from variables already known in the problem. However, from the answers of students who obtained the conventional model, they could not do the questions correctly.

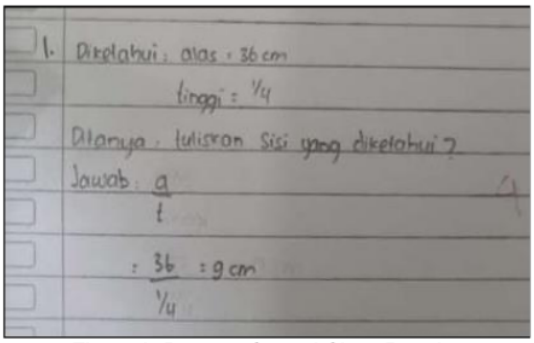


Figure 3. Posttest Control Class Results

Based on Figure 3. Students in the control class do not understand the questions given, and where students only write down the variables asked and are still not precise in solving the questions.

In addition, it can be seen from the results of previous studies revealed that Discovery Learning was quite successful in improving students' critical thinking skills, such as research conducted by Azhad et al. (2022), which showed that using the Ed Puzzle-assisted Discovery Learning model increased essential skills of thinking mathematically. The research undertaken by Wati et al. (2018) found that groups of students using the Discovery Learning learning model were better than conventional approaches to thinking skills. The research conducted by Haeuruman et al. (2017) shows that the Discovery Learning model can improve students' critical thinking skills.

CONCLUSION

Based on the data analysis and discussion results, it is concluded that learning mathematics using the Discovery Learning model assisted by learning videos states that the increase in students' mathematical critical thinking abilities using the Discovery Learning model helped by learning videos is higher than students using conventional models. This research implies that teachers will conduct learning with the discovery learning model assisted with learning videos on other materials that match the characteristics of the material

REFERENCES

Azhad, S., Yani, N., & Nuriadin, I. (2022). Mendesain Pembelajaran dengan Model Discovery Learning Perbantuan Eddpuzzle dalam Optimalisasi Berpikir Kritis Matematis Siswa SMP. *JOEAI: Journal of Education and Instruction*, 5(1),98-106. https://doi.org/10.31539/joeai.v5i1.3245

Bradshaw, C. P., & Figiel, K. (2012). Prevention and intervention of workplace bullying in schools. *National Education Association*.

Brahler, C. J., Quitadamo, I. J., & Johnson, E. C. (2002). Student critical thinking is enhanced by developing exercise prescriptions using online learning modules. *Advances in Physiology Education*, *26*(3), 210-221. https://doi.org/10.1152/advan.00018.2001

Dalimunthe, S. A., Darta, Kandaga T., Hermawan, V. (2020). Analisis Kemampuan Berpikir Kritis Matematis Melalui Model Learning Cycle 7e Di Sekolah Menengah. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*. Vol. 7 No. 1. b https://doi.org/10.23969/symmetry.v5i2.3263

Darmadi, D. H., & PD, M. (2019). *Pengantar Pendidikan Era Globalisasi: Konsep Dasar, Teori, Strategi dan Implementasi dalam Pendidikan Globalisasi*. Animage.

Darta, D., & Saputra, J. (2018). Indicators that influence prospective mathematics teachers representational and reasoning abilities. *IOP Conf. Series: Journal of Physics: Conf. Series* 948 (2018) 012053. https://doi.org/10.1088/1742-6596/948/1/012053

Depdiknas. (2006). Permendiknas No 22 Tahun 2006 Tentang Standar Isi. Jakarta: Depdiknas.

Ennis, R. H. (1996). Critical thinking dispositions: Their nature and assessability. *Informal logic*, *18*(2). https://doi.org/10.22329/il.v18i2.2378

Haeruman, L. D., Rahayu, W., & Ambarwati, L. (2017). Pengaruh Model Discovery Learning terhadap Peningkatan Kemampuan Berpikir Kritis Matematis dan Self-Confidence ditinjau dari Kemampuan Awal Matematis Siswa SMA di Bogor Timur. *Jurnal Penelitian Dan Pembelajaran Matematika*, 10(2). https://doi.org/10.30870/jppm.v10i2.2040.

Hermawan, V., Anggiana, A. D., Septianti, S. (2021). Analisis Kemampuan Pemahaman Matematis Melalui Model Pembelajaran *Student Achievemen division* (STAD*). Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*. Vol. 6 No. 1. https://doi.org/10.23969/symmetry.v6i1.

Hidayat, W., & Sari, V. T. A. (2019). Kemampuan berpikir kritis matematis dan adversity quotient siswa SMP. *Jurnal Elemen*, *5*(2), 242-252. http://doi.org/10.29408/jel.v5i2.1454

Kemendikbud. (2016). Permendikbud No 20 tahun 2016 Tentang Standar Kompetensi Lulusan Pendidikan Dasar Dan Menengah. Jakarta: Kemendikbud.

Lestari, S. Z. D., & Roesdiana, L. (2021). Analisis Kemampuan Berpikir Kritis Matematis Siswa SMP pada Materi Himpunan. MAJU: Jurnal Ilmiah Pendidikan Matematika, 8(1).

Limbangan, N. A. P., Putra, B. Y. G., & Kandaga, T. (2022). Analisis Kemampuan Komunikasi Matematis Siswa Sekolah Menengah Dalam Implementasi Model Discovery Learning. Symmetry: Pasundan Journal of Research in Mathematics Learning and Education, 7(1), 71-79. http://dx.doi.org/10.23969/symmetry.v7i1.5843.

Naezak, N. A., Savitri, E. N., & Fibriana, F. (2021). Simple Terrarium Teaching Aid for Guided Inquiry Learning Model: The Development of Learning Instruments to Students' Concept Understanding in Global Warming and Environmental Awareness. *Journal of Innovation in Educational and Cultural Research*, *2*(2), 51-59. https://doi.org/10.46843/jiecr.v2i2.37

Nuranisa, P., Putra, B.Y.G., Fisher, D. (2022). Analisis Kemampuan Komunikasi Matematis Dan *Selfefficacy* Siswa dalam Implementasi Strategi Pembelajar *Relating, Experiencing, Applying,* dan *Transferring* (REACT). *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*. Vol. 7 No. 1.

Priatna, N., LORENZİA, S., & Widodo, S. A. (2020). STEM education at junior high school

mathematics course for improving the mathematical critical thinking skills. *Journal for the Education of Gifted Young Scientists*, *8*(3), 1173-1184. https://doi.org/10.17478/jegys.728209

Putri, R. M., & Eliyarti, W. (2018). Perbandingan Model Pembelajaran CORE dengan Discovery Learning dalam Pembelajaran Matematika terhadap Kemampuan Pemecahan Masalah Matematis dan Self-Regulated Learning Siswa SMA. Symmetry: Pasundan Journal of Research in Mathematics Learning and Education, 2(2), 52-61. http://dx.doi.org/10.23969/symmetry.v2i2.605

Rahman, T., & Saputra, J. (2022). Peningkatan Kemampuan Spasial Matematis Siswa Melalui Model Penemuan Terbimbing Berbantuan Geogebra. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, *7*(1), 50-59. https://doi.org/10.23969/symmetry.v7i1.5867

Ruseffendi, E. (2005). *Dasar-dasar penelitian pendidikan dan bidang non eksakta lainnya*. Bandung: Tarsito.

Salmina, M., & Mustafa. (2019). Penerapan Model Pembelajaran Discovery Learning pada Materi Dimensi Tiga dengan bantuan Video Pembelajaran. Numeracy, 6(2), 247-254. https://doi.org/10.46244/numeracy.v6i2.482.

Sari, M. I., Eliyarti, W., Fisher, D., (2022). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Sekolah Menengah Melalui *Creative Problem Solving*. *Jurnal Pedegogik.* Vol 5. No. 1. https://doi.org/10.35974/jpd.v5i1.2648

Sari, V. A. (2021). Analisis Kemampuan Berpikir Kritis Siswa SMP Negeri 1 Kedung Waringin pada Materi Segitiga. MAJU: Jurnal Ilmiah Pendidikan Matematika, 8(1). Retrieved https://ejournal.stkipbbm.ac.id/index.php/mtk/article/view/632

Sugiyono. (2017a). *Metode Penelitian Kuantitatif, kualitatif dan R & D*. Bandung: Alfabeta.

Sugiyono. (2017b). *Statistika untuk Penelitian*. Bandung: Alfabeta.

Sumaji, S., & Wahyudi, W. (2020). Refleksi Pembelajaran Matematika SMK Muhammadiyah Ponorogo Pada Materi Persamaan dan Pertidaksamaan Linear Mutlak. Jurnal Cendekia : Jurnal Pendidikan Matematika, 4(2), 746–755. https://doi.org/10.31004/cendekia.v4i2.281.

Tresnawati, T., Hidayat, W., & Rohaeti, E. E. (2017). Kemampuan Berpikir Kritis Matematis dan Kepercayaan diri Siswa SMA Symmetry: Pasundan Journal of Research in Mathematics Learning and Education. https://doi.org/10.23969/symmetry.v2i2.616.

Tsaniya, N. P., Darta, D., & Fisher, D. (2022). Analysis of the Mathematical Ability of Junior High School Students in terms of the Extrovert-Introvert Personality Type. *IndoMath: Indonesia Mathematics Education*, 5(1), 63-73. http://dx.doi.org/10.30738/indomath.v5i1.16

Wati, D. A., Ariyanto, L., & Sutrisno, S. (2018). Efektivitas Antara Model Pembelajaran Discovery Learning dengan Model Pembelajaran Pair Check terhadap Kemampuan Berpikir Kritis Matematis Siswa Kelas VII. *Media Penelitian Pendidikan: Jurnal Penelitian Dalam Bidang Pendidikan Dan Pengajaran*, 12(1), 12-25. https://doi.org/10.26877/mpp.v12i1.3817

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