Systematic Literature Review : MATHEMATICAL CRITICAL THINKING ABILITY IN TERMS OF SELF-EFFICACY IN MULTIMEDIA-ASSISTED DISCOVERY LEARNING MODEL

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Abstract
In this digitalization era, the world of education must keep up with the times by innovating learning. one of them is through the application of multimedia-assisted learning. in addition, it can also develop mathematical critical thinking skills. To achieve mathematical critical thinking skills in learning, especially mathematics, students need adequate behavior, one of which is self-efficacy. The purpose of this research is to analyze qualitative studies related to mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models in 2017-2022. The research method used is Systematic Literature Review (SLR) indexed in Google Scholar. Based on the research that has been done, it shows that one of the learning models is appropriate and effective for improving students' mathematical critical thinking skills, and the model can reduce students' self-efficacy levels because this self-efficacy affects mathematical critical thinking skills.

Keywords:
.Mathematical Critical Thinking, Self efficacy, Discovery Learning, Multimedia

1. Introduction

Mathematics is a science that prioritizes the thinking process, and contains substantial aspects that provide direction for students to think logically according to existing patterns and rules. Mathematics has an important role in the development of the times. According to Akhdiyat and Hidayat (2018) mathematics shapes individual abilities to think critically, logically, innovatively, creatively, systematically, and analytically. Research by (Moch. Syakroni et al., 2021) stated that through mathematics, students' mindset in solving a problem can be formed by making objects in everyday life the subject of solution. Therefore, learning mathematics at school has a significant role in the ability to think critically to solve problems related to everyday life.

In developing mastery of lesson concepts when the questions given tend to require analytical power and logical thinking, what is really needed in students is the ability to think critically mathematically. critical thinking skills of Indonesian students are not in accordance with ideal conditions. in accordance with ideal conditions. Based on the 2018 PISA survey, Indonesia is ranked at the bottom, namely 6th place with an average score of 379 in PISA 2018 OECD (2019).The reason for the low critical thinking skills of students according to Wijaya et al. (2020) students do not study and understand the material presented properly so that student activities do not show good results. In research conducted by (Tresnawati et al., 2017) shows students still have difficulty in finding solutions related to questions that require mathematical critical thinking and have not been able to analyze questions. Students who are able to develop critical thinking skills will find it easier to solve the problems given (Syafruddin & Pujiastuti, 2020). Through critical thinking can also optimally increase the potential of students. To achieve mathematical critical thinking skills

in learning, especially mathematics, students need adequate behavior, one of which is self-efficacy.

According to (Adni et al, 2018) An assessment of one's ability to achieve a goal is called self-efficacy. On the other hand, math problem solving can be solved with affective abilities, namely self efficacy (Indahsari et al., 2019). This self-efficacy greatly influences what students do. Students who do not want to try, achieving mathematical critical thinking skills is not easy. This results in many students who eventually get used to cheating or relying on others to solve the problems they face because they are not sure of their own abilities. Whereas this self-efficacy affects the ability to think critically mathematically.

In an effort to improve mathematical critical thinking skills, the selection of learning models has a significant role in teaching and learning activities. One of the learning models that is widely applied is the discovery learning model because this model prioritizes the process over the results and students are required to learn more actively. From the learning process, students can find problems and try to solve these problems, even students can find new knowledge from these problems. (Nabela et al., 2020) in their research found a significant increase in students' critical thinking skills by applying the discovery learning model and generating positive learning activities. In addition to the ability to choose the appropriate learning model, teachers as the main pillar of education, need to make changes in the learning system (Wartono et al., 2018). The object most often used in education is multimedia.

The selection of the right media can determine the success of learning. Learning multimedia is an integration of various forms of media in the learning process (Siregar et al., 2019). Learning multimedia integrates various types of media in the learning process (Paat, Sutopo & Siregar, 2019). Basically, the media is an intermediary that bridges information (learning material) from various learning sources delivered by the teacher as a message distributor to students as message recipients to achieve the learning objectives to be achieved. With the development of media through the Discovery model, it is intended to improve critical thinking skills.

Based on the description that has been presented above, we can know that the purpose of this study is to analyze mathematical critical thinking skills in terms of self-efficacy in the discovery learning learning model assisted by multimedia. It is hoped that this research can provide an overview and alternatives in developing and improving mathematical critical thinking skills through multimedia-assisted discovery learning models.

2. Method

Systematic Literature Review (SLR) is the research method used in this study following the steps (Triandini et al., 2019). The method refers to a research methodology by reviewing, evaluating in a structured manner about research, categorizing and clarifying topics with a certain focus on the results that have been found in previous studies (Sarifah et al., 2021). There are 4 stages to this method. First, Research Question (RQ). RQs are made according to the needs and related topics. There are 3 RQ in this study in the form of (RQ1) What are the objectives and types of research used in articles on mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models in 2017-2022? (RQ2) How is the learning media chosen in articles on mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models in 2017-2022? (RQ3) What are the research trends on mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models in 2017-2022?

Second, the Search Process. At this stage, it is a process of how to obtain solutions to related research questions. This process is carried out through Google Scholar with keywords such as mathematical critical thinking, self-efficacy, discovery learning, multimedia. Third, Inclusion and Exclusion. This stage is used to obtain information that the data used can be adjusted in the Systematic Literature Review or not.

Table 2. 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
National or international articles relevant to mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models.	National or international articles that are not relevant to mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models.
National or international articles that match the research title and topic.	National or international articles that do not match the research title and topic.
Articles published in 2017-2022.	Articles published before 2017 and after 2022.
Use of Indonesian or English.	Use of languages other than Indonesian and English.

There are several assessment criteria that will be used to evaluate the data that has been obtained. There are 3 QA in the study which include (QA1) Was the article published in 2017 - 2022; (QA2) Did the article include the research objectives or the type of research used; (QA3) Did the article write the learning model used? Then, from these 3 QAs, it will provide an answer in the form of yes or no. Fifth, data collection. The data to be reviewed has gone through several stages, namely interviews, observations, or as needed that can support the research. Finally, the deviation of provisions. During the research, there were changes, namely the refinement of word equivalents for the search keywords Mathematical Critical Thinking, Self efficacy, Discovery Learning, Multimedia in the database.

3. Result and Discussion

15 articles were obtained that were relevant to the keywords that had been determined. Then, researchers reviewed the articles relevant to mathematical critical thinking skills in terms of self-efficacy in the discovery learning model assisted by multimedia.

Table 3. 2 Related Research Results Mathematical Critical Thinking Ability in Term of Self Efficacy in Multimedia-Assisted Discovery Learning Model

Source	**Author, Year**	**Journal/Proceedings, Publication Category**	**Research Results**
Google Scholar	(Nurazizah & Nurjaman, 2018)	Jurnal Pembelajaran Matematika Inovatif	there is a significant relationship between self efficacy and critical thinking skills on circle material.

Google Scholar	(Prajono et all; 2022)	Jurnal Pendidikan Matematika	Mathematical critical thinking ability has a relationship with self-efficacy .
Google Scholar	(Rohaeti et all; 2019)	Journal of Physics: Conf. Series	Based on SCS, the relationship between SE and MCTS is insignificant and falls into the low category.
Google Scholar	(Hari et all; 2018)	Jurnal Pembelajaran Matematika Inovatif	Critical thinking skills in junior high school students can be influenced by one factor, namely self-efficacy, amounting to 56.4%, while 43.6% is influenced by factors other than student self efficacy.
Google Scholar	(Sukma & Priatna, 2021)	Jurnal Ilmiah Edukasi Matematika	In mathematics subjects there is an effect of self-efficacy on student CTS.
Google Scholar	Suwarno et all; 2022	Jurnal Derivat	There is a high effect if the discovery learning model is applied to the junior high school level with an average effect size of 2.68 on the straight line equation material which can be interpreted as having a very large effect.
Google Scholar	(Rohaumah, 2018)	Jurnal Gammath	Students' critical thinking skills can be influenced by the learning methods used by teachers, one of which is the discovery learning method.
Google Scholar	(Susanto, 2021)	Jurnal Basicedu	A learning model that can be influential in improving students' mathematical critical thinking skills is the discovery learning model which is supported by the existence of a medium in the form of Nearpod E-media.
Google Scholar	(Haeruman et all; 2017)	JPPM	Learning discovery learning model is better than conventional when it is associated with improving students' mathematical critical thinking skills.
Google Scholar	(Nababan et all; 2021)	Journal of Mathematics Education and Applied	The achievement of the problem posing learning process and the achievement of the discovery learning learning process are still both in the "Very Good" category.
Google Scholar	(Anjarwati et all; 2022)	Jurnal Cendekia: Jurnal Pendidikan Matematika	There is a high and significant effect on learning with Geogebra-assisted discovery learning models

			compared to using conventional learning models.
Google Scholar	(Nafisa & Wardono, 2019)	PRISMA, Prosiding Seminar Nasional Matematika	There is an increase in students' critical thinking skills when applying a multimedia-assisted discovery learning model. presented as much as 10-15% of the length of the article.
Google Scholar	(Potu & Poluakan, 2020)	SCIENING: Science Learning Journal	Students' critical thinking skills at SMP N 2 Poigar are influenced by learning with an interactive multimedia-assisted discovery learning model.
Google Scholar	(Syafira et all; 2021)	J-PiMat	There is a higher effect if the learning model used is discovery learning assisted by LKPD compared to the conventional model.
Google Scholar	(Pramadela & Ningsih, 2020)	AKSIOMA: Jurnal Matematika dan Pendidikan Matematika	The discovery learning model assisted by e-learning has more effectiveness in achieving students' mathematical problem solving skills.

(RQ1) What are the objectives and types of research used in articles on mathematical critical thinking skills in terms of self efficacy in multimedia-assisted discovery learning models in 2017-2022?

In **Figure 3. 1**, there are 3 research focuses on mathematical critical thinking skills in terms of self-efficacy in different multimedia-assisted discovery learning models. First, the 40% research focus is to analyze the effectiveness of multimedia development through the discovery learning model on students' mathematical critical thinking skills. The existence of the largest percentage compared to the other 2 research focuses, so it can be concluded that research on critical thinking skills in terms of self efficacy in multimedia-assisted discovery learning models has a tendency to focus on the effectiveness of multimedia

development.

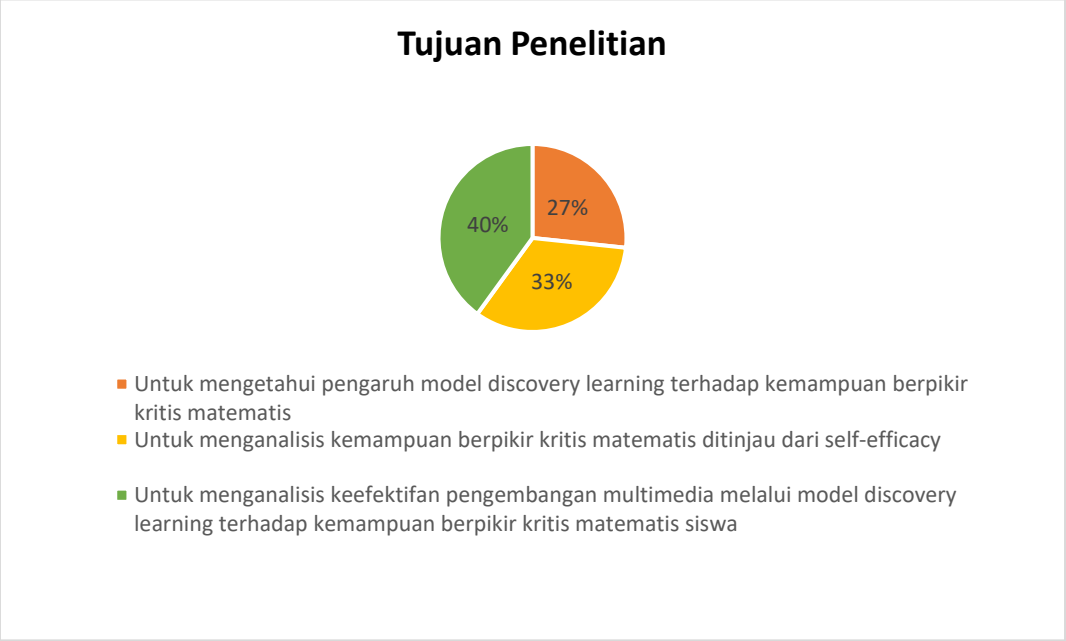

Figure 3. 1 Research Objectives

The third research focus that shows a percentage of 27% is the effect of the discovery learning model on mathematical critical thinking skills. The tendency of the research focus on the effectiveness of multimedia development through the discovery learning model on mathematical critical thinking skills can still be developed further.

In **Figure 3. 2**, it shows that there are 7 different types of research from 15 articles on mathematical critical thinking skills in terms of self efficacy in multimedia-assisted discovery learning models in 2017-2022 that have been obtained. Quasi-experimental research has the largest percentage of 38%, so it can be said that this type of research tends to be more widely used in this study.

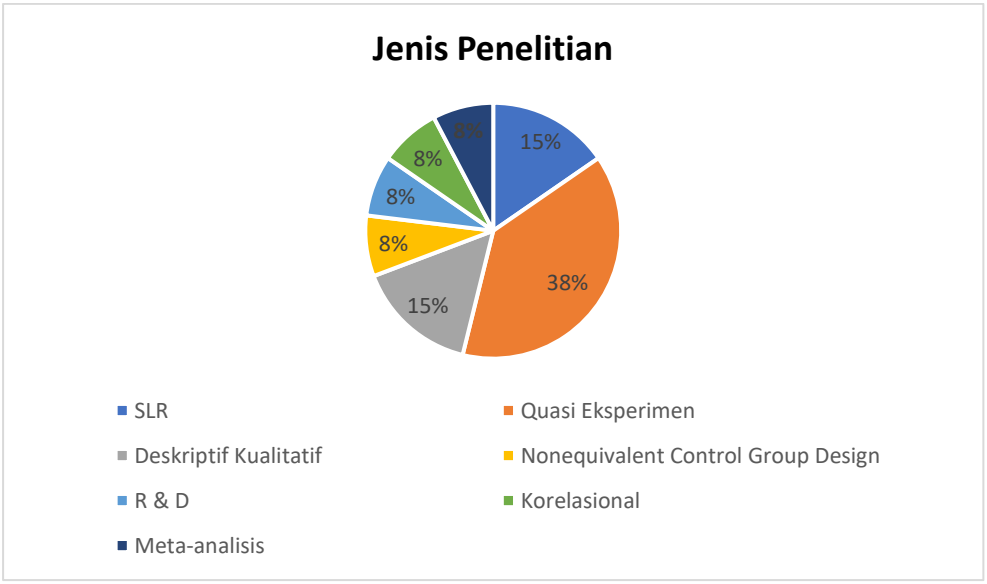

Figure 3. 2 Type of Research

(RQ2) What is the learning media chosen in the article on mathematical critical thinking skills in terms of self efficacy in multimedia-assisted discovey learning models in 2017-2022?

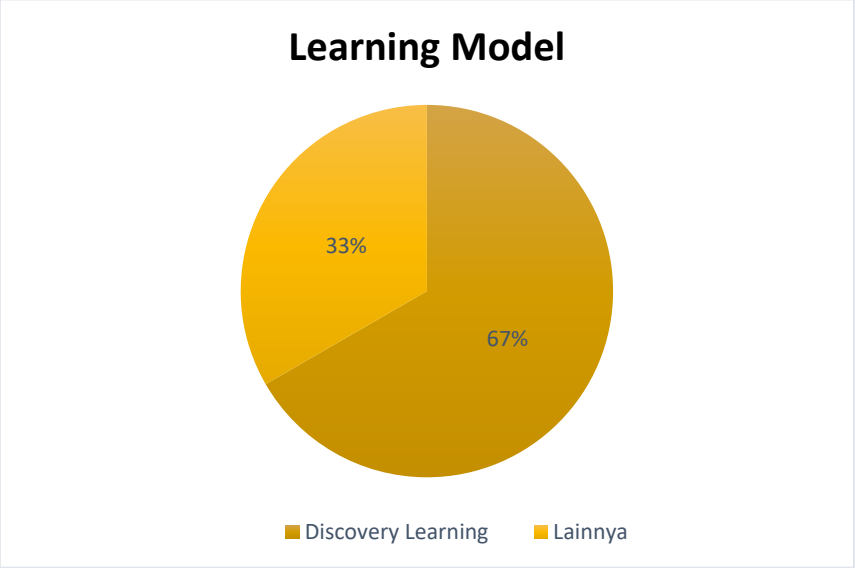

Figure 3. 3 Learning Model

Figure 3. 3 shows that the discovery learning model is a learning model that is widely used in research on mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models in 2017-2022.

(RQ3) What is the trend of research on mathematical critical thinking skills in terms of self efficacy in multimedia-assisted discovery learning models in 2017-2022?

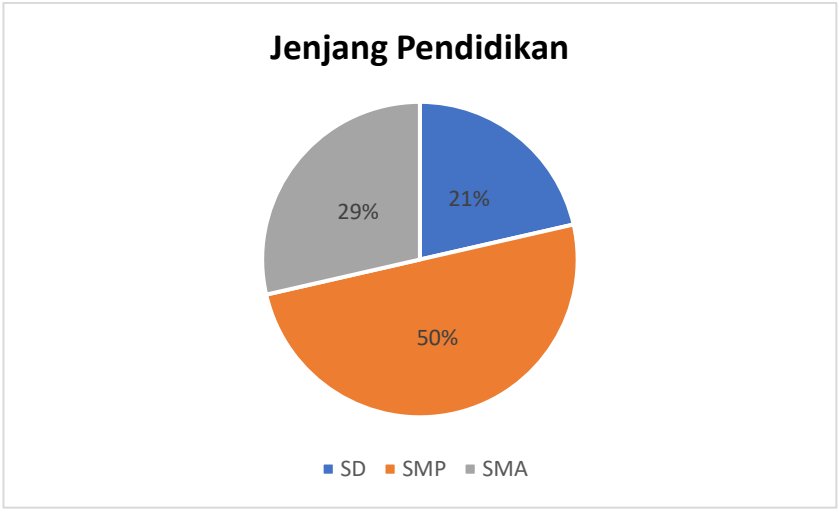

Figure 3. 4 Education Level

Figure 3. 4 shows that research on mathematical critical thinking skills in terms of self efficacy in multimedia-assisted discovery learning models was conducted at several educational levels, namely elementary, junior, and high school. Research conducted at the elementary level shows a percentage of 21%, A percentage of 50% is shown at the junior high school level, and 29% is shown at the senior high school level. Based on the percentage

in the figure above, it can be said that the junior high school level is the level that is more interested in research on critical thinking skills.

Based on 15 articles with publications 2017-2022 that have been reviewed, research on learning using multimedia-assisted discovery learning models can be developed in learning. The application of the discovery learning model in the learning process is better and more effective than other learning models. (Haeruman et all, 2017; Rohaumah, 2018; Anjarwati et all, 2022). Then there is a significant relationship between mathematical critical thinking ability and self-efficacy (Nurazizah & Nurjaman, 2018; Prajono et all, 2022; Hari et all, 2018; Sukma & Priatna, 2021).

4. Conclusions

Based on the description of the results and discussion of 15 articles with publications in 2017-2022 regarding mathematical critical thinking skills in terms of self-efficacy in the multimedia-assisted discovery learning model that has been reviewed, it can be concluded that there is a tendency to test the effectiveness of multimedia development through the discovery learning model on mathematical critical thinking skills. then, the next tendency is the use of experimental types in the form of quasi-experiments. Second, of the 15 articles tend to use the discovery learning model. Third, research on mathematical critical thinking skills in terms of self-efficacy in multimedia-assisted discovery learning models is mostly conducted on junior high school students. Then from the results and trends obtained, it can be said that one of the learning models that can improve students' mathematical critical thinking skills is the discovery learning model. the influence of self efficacy on critical thinking skills so that the discovery learning model can reduce the level of self efficacy in students.

REFERENCES

Adni, D. N., Nurfauziah, P., & Rohaeti, E. E. (2018). Analisis kemampuan koneksi matematis siswa SMP ditinjau dari self efficacy siswa. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *1*(5), 957-964.

Anjarwati, D., Juandi, D., Nurlaelah, E., & Hasanah, A. (2022). Studi Meta-Analisis: Pengaruh Model Discovery Learning Berbantuan Geogebra Terhadap Kemampuan Berpikir Kritis Matematis Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(3), 2417–2427. https://doi.org/10.31004/cendekia.v6i3.1506

Hari, L. V., Zanthy, L. S., & Hendriana, H. (2018). *PENGARUH SELF EFFICACY TERHADAP KEMAMPUAN*. *1*(3), 435–444. https://doi.org/10.22460/jpmi.v1i3.435-444

Hareuman, 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*. *10*(2).

Jiang, T., & Munguia-lopez, J. G. (n.d.). *Correlation of self-efficacy and mathematical critical thinking skills based on student ' s cognitive stage Correlation of self-efficacy and mathematical critical thinking skills based on student ' s cognitive stage*. https://doi.org/10.1088/1742-6596/1315/1/012034

Matematika, M. P., Sukma, Y., & Priatna, N. (2021). *Pengaruh Self-Efficacy terhadap Kemampuan Berpikir Kritis Siswa Pada*. *9*(1), 75–88.

Mentari, W. (2014). Pengaruh Model Discovery Learning Terhadap Kemampuan Berpikir Kritis Dan Hasil Belajar Siswa. *Paper Knowledge . Toward a Media History of Documents*, *7*(2), 107–115.

Moch. Syakroni, Endang Suprapti, & Junaidi Fery Efendi. (2021). Peningkatan Berpikir Kritis dan Kreatif pada Pelajaran Matematika ditinjau dari Jenjang Satuan Pendidikan. *Jurnal Absis: Jurnal Pendidikan Matematika Dan Matematika*, *4*(1), 414–428. https://doi.org/10.30606/absis.v4i1.972

Nababan, R. (2021). Perbedaan Kemampuan Berpikir Kritis Matematis Siswa Antara Model Pembelajaran Problem Posing Dan Discovery Learning. *Sepren*, *2*(2), 1–10. https://doi.org/10.36655/sepren.v2i2.550

Nabela, A., Mariyam, M., & Nurhayati, N. (2020). Pengaruh Guided Discovery Learning Terhadap Kemampuan Berpikir Kritis Matematis Siswa Smpn 6 Singkawang. *J-PiMat : Jurnal Pendidikan Matematika*, *2*(1), 116–125. https://doi.org/10.31932/j-pimat.v2i1.666

Nafisa, D. (2019). *Model Pembelajaran Discovery Learning Berbantuan Multimedia Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa*. *2*, 854–861.

Ningsih, S. C., & Pramaeda, T. D. O. (2020). Efektivitas Model Pembelajaran Discovery Learning Berbantuan E-Learning Ditinjau Dari Kemampuan Pemecahan Masalah. *AKSIOMA : Jurnal Matematika Dan Pendidikan Matematika*, *11*(1), 116–130. https://doi.org/10.26877/aks.v11i1.5576

Nurazizah, S., & Nurjaman, A. (2018). *ANALISIS HUBUNGAN SELF EFFICACY TERHADAP*. *1*(3), 361–370. https://doi.org/10.22460/jpmi.v1i3.361-370

Prajono, R., Gunarti, D. Y., & Anggo, M. (2022). *Analisis Kemampuan Berpikir Kritis Matematis Peserta Didik SMP Ditinjau dari Self Efficacy Mosharafa : Jurnal Pendidikan Matematika Mosharafa : Jurnal Pendidikan Matematika*. *11*, 143–154.

Rohaumah, C. (2018). Pengaruh Metode Pembelajaran Discovery Learning Terhadap Kemampuan Berpikir Kritis siswa dalam Pembelajaran Matematika. *Jurnal Gammath*, *3*(1), 28–37.

Siregar, N., Sutopo, H., & Paat, M. (2019). Mobile multimedia-based batakologi learning model development. *Journal of Mobile Multimedia*, *15*(4), 271–288. https://doi.org/10.13052/jmm1550-4646.1541

Susanto, T. A. (2021). *Jurnal basicedu*. *5*(5), 3498–3512.

Syafira, A. R., Salsabila, E., & Purwanto, S. (2021). *Pengaruh LKPD Berbasis Discovery Terhadap Berpikir Kritis Matematis Siswa Melalui Google Classroom*. *3*(2), 407–416.

Syafruddin, I. S., & Pujiastuti, H. (2020). Analisis Kemampuan Berpikir Kritis Matematis: Studi Kasus pada Siswa MTs Negeri 4 Tangerang. *Suska Journal of Mathematics Education*, *6(2)*(2), 89–100. http://ejournal.uin-suska.ac.id/index.php/SJME/article/view/9436

Syarifah, L., Holisin, I., & Shoffa, S. (2021). Meta Analisis: Model Pembelajaran Project Based Learning. *Jurnal Penelitian Pembelajaran Matematika*, *14*(2), 256–272.

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*, *2*, 116–122. https://doi.org/10.23969/symmetry.v2i2.616

Zul Hanifah, S., Febriana, K., & Sandha, S. (2022). Meta Analisis: Pengaruh Model Discovery Learning Terhadap Peningkatan Kemampuan Berpikir Kritis Matematika. *Jurnal Derivat: Jurnal Matematika Dan Pendidikan Matematika*, *9*(2), 153–164. https://doi.org/10.31316/jderivat.v9i2.4240