

## CORE Teaching Model Based Mnemonic Technique Impact Students' Mathematical Creative Thinking Ability and Metacognitive Awareness

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### ABSTRACT

The purpose of this study was to determine the effect of the Connecting, Organizing, Reflecting, and Extending (CORE) learning model with mnemonic techniques on students' creative thinking skills and metacognitive awareness. The research method was a quasi-experimental design. Data on creative thinking skills were collected using essay test instruments and metacognitive awareness using questionnaires. This research was conducted on the eighth-grade students of a secondary school in Tulang Baawang Lampung with a sample of 60 students taken by using the cluster random sampling technique. The data analysis technique was two-way ANOVA. Based on the test results, the first hypothesis is shown  $F(2) = 12.92, p < .05$ , the CORE learning model affects mnemonic techniques on students' creative thinking abilities. The second hypothesis shown  $F(2) = 19.97, p < .05$ , the high, medium, and low metacognitive awareness categories affect students' creative thinking abilities. The third hypothesis shown that  $F(4) = 1.65, p < .05$ , there is no interaction between the CORE learning model and mnemonic techniques with metacognitive awareness of students' creative thinking abilities. The impact of this research is the model can be a solution for mathematics teaching and learning.

**Keywords:** CORE, creative thinking, mnemonic technique, metacognition awareness.

### ABSTRAK

Tujuan penelitian ini adalah untuk mengetahui pengaruh model pembelajaran Connecting, Organizing, Reflecting, and Extending (CORE) dengan teknik mnemonic terhadap kemampuan berpikir kreatif dan metacognitive awareness siswa. Metode penelitian yang digunakan adalah quasi-experimental design. Pengumpulan data keterampilan berpikir kreatif menggunakan instrumen tes esai dan metacognitive awareness menggunakan angket. Penelitian ini dilakukan pada siswa kelas 8 sekolah menengah pertama di Tulang Baawang Lampung dengan jumlah sampel 60 siswa yang diambil dengan menggunakan teknik cluster random sampling. Teknik analisis data menggunakan ANOVA dua arah. Berdasarkan hasil pengujian hipotesis pertama menunjukkan  $F(2) = 12,92, p < 0,05$ , model pembelajaran CORE berpengaruh terhadap teknik mnemonic terhadap kemampuan berpikir kreatif siswa. Hipotesis kedua menunjukkan  $F(2) = 19,97, p < 0,05$  kategori kesadaran metakognitif tinggi, sedang, dan rendah berpengaruh terhadap kemampuan berpikir kreatif siswa. Hipotesis ketiga menunjukkan bahwa  $F(4) = 1,65, p < 0,05$ , tidak ada interaksi antara model pembelajaran CORE dan teknik mnemonic dengan metacognitive awareness pada kemampuan berpikir kreatif siswa. Dampak dari penelitian ini adalah model dapat menjadi solusi untuk pembelajaran matematika.

**Kata kunci:** berpikir kreatif, CORE, mnemonic technique, metacognitive awareness.

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### Introduction

Consciously or unconsciously, humans often do thinking activities (Hermiati et al., 2021). In working on math problems, students cannot be separated from the thinking process (Mursari, 2020). In the twenty-first century, special skills in thinking skills such as creative thinking, critical thinking, problem-solving, communication, collaboration, metacognition, innovation, creation, and literacy are required for learning activities (Zubaidah, 2016). Creative thinking is one of the abilities that can be developed through mathematics education. Creative thinking is a mental process that generates an infinite number of unique, effective, and applicable ideas. These characteristics are critical in the mathematics learning process (Karim, 2014; Rahma et

al., 2017; Wahsheh, 2017). Defines by Yazar Soyadı (2015), creative thinking as a collection of cognitive activities individuals engage in in response to specific objects, problems, and conditions, or types of efforts directed at specific events and problems based on their capacities (Adiastuty et al., 2020). Thus, students must develop their capacity for creative thinking through their teaching and learning activities (Suherman, et al., 2021).

Along with specialized skills, awareness is a critical component of learning, such as students' metacognitive awareness. Metacognitive awareness is defined as the phenomenon by which a person experiences situations and events in their life and world in various ways (Maftoon & Fakhri Alamdari, 2020). Learners aware of metacognition appear more strategic and perform better than students who are unaware, and will develop students' ability to solve math problems in everyday life (Harrison & Vallin, 2018; Mujib, 2019). Metacognitive awareness refers to the presence or absence of awareness that enables an individual to plan, sequence, and monitor learning in such a way that progress can be seen immediately (Abdelrahman, 2020; Mistianah, 2020; Tamsyani, 2016).

Even though student involvement is critical and influential in learning activities at the secondary school level, many students are still less enthusiastic and less active in mathematics. Each educator or mathematics teacher has their unique method of instructing students on the presented material. Mathematics education is highly dependent on how a teacher conveys the material to his students. There are numerous strategies for ensuring that the subject matter delivered is well understood and accepted by students to enhance their cognitive abilities, including thinking creatively. The following results were obtained from the pre-survey conducted at SMP Nurul Iman:

**Table 1.** Students' Creative Thinking Ability Test Score

Class	Score ( $x$ )		Total Students'
	$x \geq 70$	$x < 70$	
VIII.B1	6	13	19
VIII.B2	7	13	20
VIII.B3	7	10	17
Total	20	36	56

Table 1 shows the data from the pre-survey in the grade 8<sup>th</sup> of SMP Nurul Iman, which is still relatively low, with 36 out of 56 students scoring below the minimum mastery criteria. In this case, the learning process is still teacher-centered, which results in students having low creative thinking abilities, a lack of metacognitive awareness, and many students believing mathematics is an easy subject to learn. The low creative ability of students can be interpreted as a lack of or inability to express their ideas in the context of problem-solving. As a critical component of enhancing educational quality, teaching and learning activities must be modified to help students develop their capacity for creative thinking.

One way to improve one's thinking ability is to use more engaging and innovative learning models. According to research conducted by Gustiara Dova Maya, the CORE learning model has an effect on students' ability to think creatively and collaborate. The disadvantage of this research is that the researcher uses only the model without supplementing it with other techniques and thus misses out on other factors that may affect students (Gustiara Dova Maya, 2020). Maftukhah et al., (2017) discovered that when the CORE learning model was used, the

value of creative thinking skills reached 75% completeness, which was significantly higher than when the expository model was used. Additionally, emotional intelligence has an 80.2 percent positive effect on thinking creatively. The limitation of this study is that it compares only the CORE and expository learning models. Additionally, research by Savitri et al. (2019) that there is a significant effect of 55% on students' creative thinking abilities when the CORE learning model is implemented with the assistance of mind mapping. The researcher examined only the effect of the CORE learning model in conjunction with the mind mapping technique in this study, omitting other variables that could affect students' creative thinking abilities. On the other hand, research by Arifah et al. (2016) was using the CORE learning model in conjunction with case studies improved students' ability to think creatively more than using the expository learning model. Then, students' mathematical creativity can achieve mastery when using the CORE learning model in conjunction with LKPD and students' mathematical creativity skills are superior when using conventional learning models. This study examined students' creative abilities using a learning model aided by LKPD but did not examine other factors that could influence them (Beladina et al., 2013).

This research is novel in that it combines the CORE learning model and mnemonic techniques to train students' creative thinking skills in terms of metacognitive awareness and between classes that use the CORE learning model and mnemonic techniques and classes that use conventional learning models. Then, no research using CORE-based mnemonic techniques. Thus, the purpose of this study was to examine students' ability to think creatively based on their metacognitive awareness through the use of the CORE learning model and mnemonic techniques.

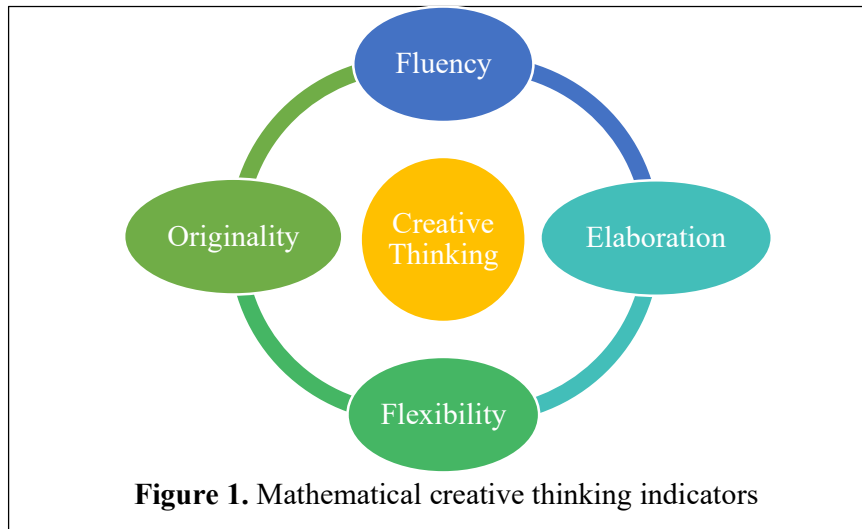
## Research Methods

### *Population and Sample*

The population of this research was 127 in eighth-grade students (female = 75, male = 52) at SMP Nurul Iman in Tulang Bawang, in district Jaya Makmur, Banjar Baru, Lampung, with a cluster random sampling technique used to select the research sample. The sample for this study consisted of two different class categories: experimental and control. The experimental class 1 used the CORE model, the experimental class 2 used the CORE-based mnemonic techniques, and the control class used traditional learning.

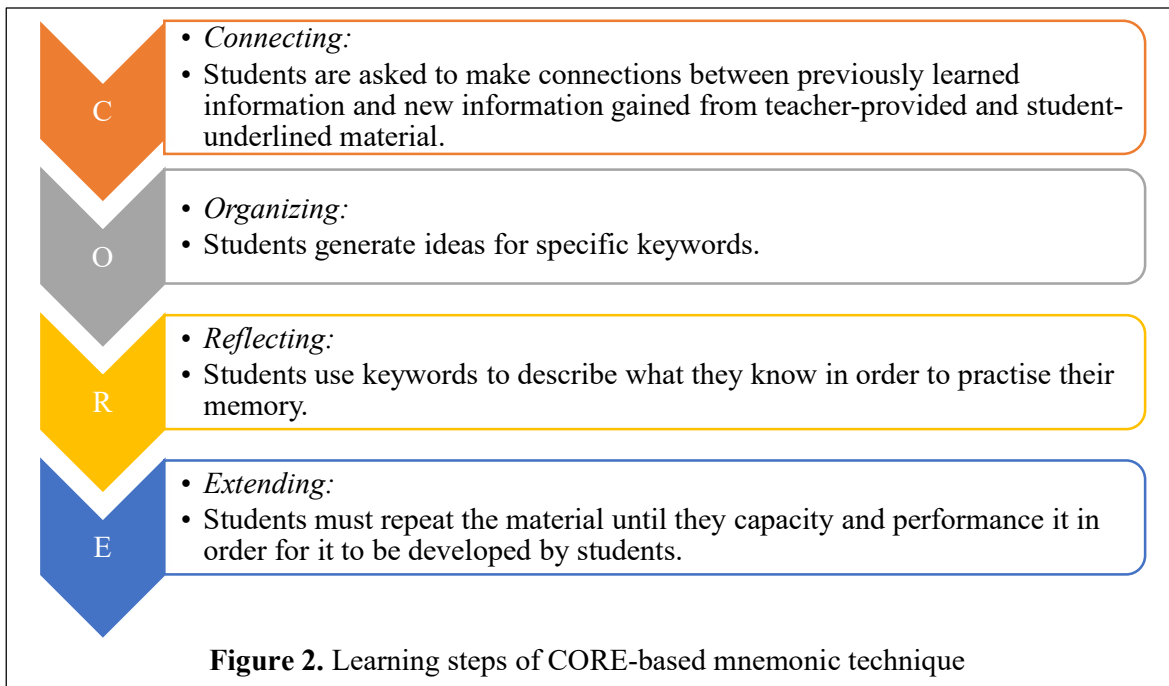
### *Material and Instrumen*

The CORE-based mnemonic techniques enable students to develop their activity and memory to the point where they can recall exactly what they want to remember (Sohimin, 2016; Wang et al., 2019). The research instrument was essay questions designed to assess students' mathematical creative thinking abilities using indicators. Figure 1 illustrates the indicators of mathematical creative thinking ability (Suherman et al., 2021). The mathematical creative thinking indicators are cover 4 elements (i.e. fluency, flexibility, origanality, and elaboration).



*Research Procedure*

The ability to think creatively while learning in the CORE-based mnemonic technique model can be achieved by analyzing and collecting data from educator-provided problems. The research procedure for implementing the learning model is as follows:



The use of models and techniques in the classroom can serve as a link between students and the material being presented (Auliani et al., 2018). Figure 2 illustrates a technique for assisting students in remembering material presented by the teacher. We can see that the step of learning model from connecting, organizing, reflecting, and extending. The CORE-based mnemonic techniques and requires students to connect prior knowledge with new knowledge, formulate ideas using keywords, describe what they know in front of other groups, and repeat the material

until it is truly understood. The research design for the 3x3 factorial study is presented in Table 2.

**Table 2.** Research Design

Teaching ( $A_i$ )	<i>Metacognitive Awareness (<math>B_j</math>)</i>	High ( $B_1$ )	Moderate ( $B_2$ )	Low ( $B_3$ )
	CORE ( $A_1$ )		$A_1B_1$	$A_1B_2$
CORE-based mnemonic techniques ( $A_2$ )		$A_2B_1$	$A_2B_2$	$A_2B_3$
Conventional ( $A_3$ )		$A_3B_1$	$A_3B_2$	$A_3B_3$

Note:

- $A_1B_1$  : CORE with high metacognition awareness
- $A_2B_1$  : CORE-based mnemonic techniques with high metacognition awareness
- $A_3B_1$  : Conventional with high metacognition awareness
- $A_1B_2$  : CORE with moderate metacognition awareness
- $A_2B_2$  : CORE-based mnemonic techniques with moderate metacognition awareness
- $A_3B_2$  : Conventional with moderate metacognition awareness
- $A_1B_3$  : CORE with low metacognition awareness
- $A_2B_3$  : CORE-based mnemonic techniques with low metacognition awareness
- $A_3B_3$  : Conventional with low metacognition awareness

#### Data Analysis

In this study, the test was administered as a final (posttest) and consisted of 6 essay questions based on indicators of mathematical creative thinking ability. The validity was 0.89 and the reliability was 0.96. Hypothesis testing with SPSS 25 software using a two-way ANOVA test with testing prerequisites for normality and homogeneity.

#### Result and Discussions

The researchers divided the subjects into three groups: the experimental group received treatment using the CORE model, the second experimental group received treatment using the CORE model with mnemonic techniques, and the third group received treatment using the lecture method (classical model). When a process is taught in the form of material, mathematical creative thinking ability data is implemented. When data is gathered, it is necessary to use core data to test logical hypotheses. The data illustrates the concept of mathematical continuity by comparing the highest and lowest scores for creative mathematical thinking. Then, after filtering out measures of variation within the coverage group ( $r$ ) and standard deviation ( $s$ ) inferred from observational data on conceptual understanding, look for neutral bias, including means, median, and mode.

**Table 3.** The Description of the Mathematical Creative Thinking Score

Class	Min	Max	Mean	Median	Mode	Range	Std. Dev
Experiment 1	93.00	60.00	79.60	81.00	75	27.50	8.16
Experiment 2	100.00	73.00	85.75	83.50	80	30.00	8.26
Control	75.00	52.00	66.40	67.00	67	27.50	7.23

Table 3 shows the three learning models on students' mathematical creative thinking abilities. As can be seen, experimental class 2 employs the CORE-based mnemonic techniques, has a greater impact on students' mathematical creative thinking abilities. Because the mean and median values are higher than other learning models, which are 85.75 and 83.50, respectively. The following table summarizes the observation data from the metacognitive awareness questionnaire:

**Table 4.** The Description of the Metacognitive Awareness

Class	Min	Max	Mean	Median	Mode	Range	Std. Dev
Experiment 1	112.00	63.00	86.50	85.00	73.00	49.00	17.93
Experiment 2	120.00	69.00	92.90	92.50	73.00	51.00	19.17
Control	110.00	68.00	88.90	90.50	72.00	42.00	14.33

The Table 4 summarizes the descriptive statistics for metacognitive awareness in the conventional and experimental group. The mean score for experimental class 2 is 92.90, while the mean scores for experiment 2 and control are 86.50 and 88.90, respectively. Then, the normality of the mathematical creative thinking ability as follows

**Table 5.** Normality Score

Class	$L_{hitung}$	$L_{0,05;n}$	Results
Experiment 1	0.129		Normal distributed
Experiment 2	0.103	0.190	Normal distributed
Control	0.150		Normal distributed

Table 5 show the results of the normality test.  $L_{count}$  was .129 in experimental class 1, while the score was .103 in experimental class 2, and .150 in control class, respectively. As a result, each sample is considered valid because  $L_{count} < L_{table}$  and the sample are drawn from a normally distributed population. The following table summarizes the results of the Metacognitive Awareness questionnaire's normality test:

**Table 6.** Normality of the Metacognitive Awareness (MA)

Class	MA	$L_{hitung}$	$L_{0,05;n}$	Results
Experiment 1	High	0.116	0.319	Normal distributed
	Moderate	0.126	0.271	
	Low	0.037	0.337	
Experiment 2	High	0.106	0.337	Normal distributed
	Moderate	0.167	0.271	
	Low	0.052	0.319	
Control	High	0.132	0.319	Normal distributed
	Moderate	0.055	0.271	
	Low	0.046	0.337	

Table 6 summarizes the results of the metacognitive awareness normality test in the experimental and control groups. Simultaneously, the results of  $L_{count} < L_{table}$  are displayed for metacognitive awareness, allowing it to be concluded that the population is normally distributed. The homogeneity test was used to determine whether the data were homogeneous

or not. As follows, determine the homogeneity of experimental and control class students' creative thinking abilities:

**Table 7.** Homogeneity results

Class	N	$\chi^2_{hitung}$	$\chi^2_{tabel}$	Results
Experiment 1	20			
Experiment 2	20	2.261	5.991	Homogeneity
Control	20			

Table 7 shows the homogeneity test of creative thinking abilities. The results indicate a significance level of 0.05 and a dk = 2 (5.991), indicating that the data are homogeneous. The following are the results of the Metacognitive Awareness questionnaire's homogeneity test:

**Table 8.** Homogeneity Test of the Metacognitive Awareness (MA)

Class	MA	$\chi^2_{hitung}$	$\chi^2_{tabel}$	Results
Experiment 1	High			
Experiment 2	Moderate	5.797	5.991	Homogeneity
Control	Low			

Table 8 shows the results of the homogeneity test for the Metacognitive Awareness. The data is homogeneous with a significance level of 0.05 and dk = 2 (5.991). The two-way ANOVA tests is followed:

**Table 9.** Two-way ANOVA Result

Resource	JK	Dk	RJK	$F_{count}$	$F_{table}$	P-value
Teaching Model (A)	1825.83	2	912.92	12.92	3.18	0.05
Metacognitive Awareness (B)	2821.52	2	1410.80	19.97	3.18	0.05
Interaction (AB)	466.59	4	116.65	1.65	2.55	0.05
GALAT	3602.64	51	70.64	-	-	-
TOTAL	8716.58	59	-	-	-	-

Table 9 shows the results of the two-way ANOVA. As demonstrated by the p-value 0.05, there is an effect of learning models on students' mathematical creative thinking abilities and an effect of students' metacognitive awareness levels on students' mathematical creative thinking abilities, with ( $F_{count} < F_{table}$ ). On the other hand, has no interaction with metacognitive awareness ( $F(4) = 1.65, p = 0.05$ ).

The CORE learning model and the CORE learning model with mnemonic techniques are superior to conventional learning models in developing students' mathematical creative thinking abilities. Based on the steps of the CORE and CORE learning models, students are invited to practice recalling prior knowledge, developing their curiosity, and attempting to motivate themselves for future learning (Birenbaum et al., 2015). CORE learning teaches students to connect previously acquired knowledge in order to develop strategies for acquiring new knowledge. After acquiring new knowledge, students learn to critically examine their findings to apply them to a problem (Miller & Calfee, 2004).

The experimental class learning process starts with the preparation stage. The researcher provides motivation or positive suggestions to students before they begin learning. After receiving motivation, students become more enthusiastic and ask a lot of questions, fostering student curiosity. The researcher presents the topic in the delivery stage by using more relaxed language, avoiding boring expressions, and connecting with students so that they remain attentive and are not confused. During the training phase, the researcher splits students into groups and then gives them worksheets on the SPLDV topic to discuss. Students debate the subject with their groups before working on the worksheets provided by the researcher. Questions and answers at this level of development are one of the components that make students appear highly active, help them understand the content better, keep the class atmosphere from becoming repetitive, and can teach students psychologically.

Students' interest in the CORE learning model with mnemonic techniques can be seen in the atmosphere of the learning process as participants feel happy, comfortable, and active in participating in learning and are able to communicate well in delivering material and motivate students to learn by using the CORE learning model with mnemonic techniques on this SPLDV material. There are still students who are less active when the CORE learning model is used with mnemonic techniques, specifically when conveying the results of the discussion, because some students lack confidence, but students respond well to this learning model and can understand the material provided in general.

After the learning materials are completed, students are given posttest questions to determine whether the CORE learning model with mnemonic strategies influences students' mathematical creative thinking abilities. Student reactions to the CORE model with mnemonic techniques are good, indicating that students are interested in using the CORE learning model with mnemonic techniques on SPLDV material.

The CORE learning model is comprised of several stages, the first of which involves an educator activating students' prior knowledge (Saregar et al., 2021). The CORE learning model is a model of learning that is expected to enable students to connect (Connecting), organize (Organizing), and then rethink the concept being studied (Reflecting), as well as to expand their knowledge during the learning process (Extending) (Budianto, 2016). However, relying solely on learning models is insufficient to enhance students' mathematical creative thinking abilities. As a result, the CORE learning model is combined with mnemonic techniques to help students retain and sharpen the knowledge they already possess.

In comparison to traditional models of education, the teaching and learning process is highly monitored and verbal (Fahrudin et al., 2021). A student will accept only what an educator offers. In practice, this model emphasizes lecture and question-and-answer sessions. According to the findings of this study, the CORE learning model and the CORE learning model with mnemonic techniques have a greater impact on students' mathematical creative thinking abilities than the conventional learning model.

## **Conclusion**

The research objectives and the analysis of the research data indicate that the CORE-based mnemonic techniques and the level of metacognitive awareness affect students' mathematical creative thinking abilities. Students' creative thinking abilities improve when they use the CORE-based mnemonic techniques instead of when they use conventional learning models. The CORE model places a premium on memory and higher-order thinking skills training. The

limitation of this research was only measuring of students' mathematical creative thinking abilities, it can be expanded with additional variables by other researchers. This research can be expanded by combining the CORE learning model with an alternative approach.

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### Bibliography

- Abdelrahman, R. M. (2020). Metacognitive awareness and academic motivation and their impact on academic achievement of Ajman University students. *Heliyon*, 6(9), e04192. <https://doi.org/10.1016/j.heliyon.2020.e04192>
- Adiastuty, N., Waluya, S. B., Rochmad, & Aminah, N. (2020). Neuroscience study: Gender and mathematical creative thinking skills in vocational high school students. *Journal of Physics: Conference Series*, 1613, 012056. <https://doi.org/10.1088/1742-6596/1613/1/012056>
- Arifah, Y. N., Rochmad, & Sugiman. (2016). Keefektifan Model Pembelajaran Core Berbantuan Strategi Studi Kasus Terhadap Kemampuan Berpikir Kreatif Siswa Smp. *Journal of Mathematics Education*, 5(2).
- Auliani, Karim, & Amalia, R. (2018). *Pengaruh Model Pembelajaran CORE Terhadap Kemampuan Matematis Siswa SMP Kelas VIII*. 112–117.
- Beladina, N., Suyitno, A., & Kusni. (2013). Keefektifan Model Pembelajaran Core Berbantuan LKPD Terhadap Kreativitas Matematis Siswa. *Unnes Journal of Mathematics Education*, 2(3). <https://doi.org/10.15294/ujme.v2i3.3363>
- Birenbaum, M., DeLuca, C., Earl, L., Heritage, M., Klenowski, V., Looney, A., Smith, K., Timperley, H., Volante, L., & Wyatt-Smith, C. (2015). International trends in the implementation of assessment for learning: Implications for policy and practice. *Policy Futures in Education*, 13(1), 117–140.
- Budianto, M. A. (2016). *Sintaks 45 Model Pembelajaran dalam Student Centered Learning (SCL)*. Universitas Muhammadiyah Malang.
- Fahrudin, Ansari, dan Ichsan, A. S. (2021). *Pembelajaran Konvensional Dan Kritis Kreatif Dalam Perspektif Pendidikan Islam*. 18, 64–80.
- Gustiara Dova Maya, F. (2020). *Pengaruh Model Pembelajaran Core (Connecting, Organizing, Reflecting, Extending) Terhadap Kemampuan Berpikir Kreatif Dan Keterampilan Kolaborasi Siswa Pada Materi Fisika* (Doctoral dissertation, UIN Raden Intan Lampung).
- Harrison, G. M., & Vallin, L. M. (2018). Evaluating the metacognitive awareness inventory using empirical factor-structure evidence. *Metacognition and Learning*, 13(1), 15–38. <https://doi.org/10.1007/s11409-017-9176-z>
- Hermiati, K., Suprihatiningsih, S., & Annurwanda, P. (2021). Visual Thinking Ability of Mathematics Education Students on Geometry Transformation Learning Material. *AlphaMath: Journal of Mathematics Education*, 7(2), 84. <https://doi.org/10.30595/alphamath.v7i2.12034>
- Karim, A. (2014). Mengembangkan Berfikir Kreatif Melalui Membaca Dengan Model Mind Map. *Jurnal Perpustakaan Libraria*, 2(1), 32.
- Maftoon, P., & Fakhri Alamdari, E. (2020). Exploring the effect of metacognitive strategy instruction on metacognitive awareness and listening performance through a process-based

- approach. *International Journal of Listening*, 34(1), 1–20.  
<https://doi.org/10.1080/10904018.2016.1250632>
- Maftukhah, N. A., Nurhalim, K., Dasar, P. P., & Semarang, U. N. (2017). Kemampuan Berpikir Kreatif dalam Pembelajaran Model Connecting Organizing Reflecting Extending Ditinjau dari Kecerdasan Emosional. *Journal of Primary Education*, 6(3), 267–276.
- Miller, R. G., & Calfee, R. C. (2004). *Building a Better Reading-Writing Assessment: Bridging Cognitive Theory, Instruction, and Assessment*. 26, 6–13.
- Mistianah, M. (2020). Analisis Perbedaan Gender pada Kemampuan Marsi (Metacognitive Awareness Reading Strategy) Mahasiswa Prodi Pendidikan Biologi IKIP Budi Utomo Malang. *Paradigma: Jurnal Filsafat, Sains, Teknologi, Dan Sosial Budaya*, 26(1), 1–7.  
<https://doi.org/10.33503/paradigma.v26i1.639>
- Mujib. (2019). Penjenjangan Kemampuan Berpikir Kritis Matematis Berdasarkan Teori Bloom Ditinjau Dari Kecerdasan Multiple Intelligences. *Desimal : Jurnal Matematika*, 2(1), 87–103.
- Mursari, C. (2020). Deskripsi Kemampuan Berikir Kritis Matematis dan Kemandirian Belajar Siswa Ditinjau dari Gaya Belajar. *AlphaMath : Journal of Mathematics Education*, 5(2), 40. <https://doi.org/10.30595/alphamath.v5i2.7345>
- Rahma, S., Farida, F., & Suherman, S. (2017). Analisis berpikir kritis siswa dengan pembelajaran socrates kontekstual di SMP negeri 1 padangratu lampung tengah. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika*, 1(1), 121–128.
- Saregar, A., Cahyanti, U. N., Susilowati, N. E., Anugrah, A., & Muhammad, N. (2021). CORE Learning Model: Its Effectiveness towards Students' Creative Thinking. *International Journal of Evaluation and Research in Education*, 10(1), 35–41.  
<https://doi.org/10.11591/ijere.v10i1.20813>
- Savitri, E., Saadi, P., & Leny. (2019). Model Pembelajaran CORE Berbantuan Mind Mapping Dalam Meningkatkan Kemampuan Berpikir Kreatif Peserta Didik Pada Materi Stoikiometri. *Jurnal Inovasi Pendidikan Sains*, 10(1), 68–75.
- Sohimin, A. (2016). *68 Model Pembelajaran Inovatif dalam kurikulum 2013*. Ar-Ruzz Media.
- Suherman, S., Zaman, A. M., & Farida, F. (2021). Fostering of Mathematical Critical Thinking Ability Using ARCS Model and Students' Motivation. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, 5(1), 134–143. <https://doi.org/10.31764/jtam.v5i1.3798>
- Suherman, Vidákovich, T., & Komarudin. (2021). STEM-E: Fostering mathematical creative thinking ability in the 21st Century. *Journal of Physics: Conference Series*, 1882(1).  
<https://doi.org/10.1088/1742-6596/1882/1/012164>
- Tamsyani, W. (2016). Pengaruh model pembelajaran dan kesadaran metakognitif terhadap hasil belajar peserta didik SMA dalam materi pokok asam basa. *Journal of Educational Science and Technology (EST)*, 2(1), 10-25.
- Wahsheh, R. A. (2017). Difficulties of Applying Creative Thinking Skills in Teaching from the Perspective of Faculty Members in Najran University, Saudi Arabia. *American Journal of Educational Research*, 5(4), 409-418.  
<https://doi.org/10.5296/ire.v5i1.10889>
- Wang, Y., Huang, J., Su, C., & Li, H. (2019). Furnace thermal efficiency modeling using an improved convolution neural network based on parameter-adaptive mnemonic enhancement optimization. *Applied Thermal Engineering*, 149, 332–343.  
<https://doi.org/10.1016/j.applthermaleng.2018.12.048>
- Yazar Soyadı, B. B. (2015). Creative and Critical Thinking Skills in Problem-based Learning Environments. *Journal of Gifted Education and Creativity*, 2(2), 71–71.  
<https://doi.org/10.18200/jgedc.2015214253>

Zubaidah, S. (2016). Keterampilan Abad Ke-21: Keterampilan Yang Diajarkan Melalui Pembelajaran. *Seminar Nasional Pendidikan Dengan Tema “Isu-Isu Strategis Pembelajaran MIPA Abad 21, Desember*, 1–17.