EMTEKA: Jurnal Pendidikan Matematika
Volume 6, No. 1, 2025. 548-557
DOI: https://doi.org/10.24127/emteka.v6i1.8327

e-ISSN 2746-5594
p-ISSN 2746-5608

ABILITY UNDERSTANDING CONCEPT AND THINKING CREATIVE: IMPLEMENTATION OF BRAIN BASED LEARNING WITH WHOLE BRAIN TEACHING METHOD

Indah Resti Ayuni Suri[1*], Nanang Supriadi[2], Hesti Yuniwati[3], Suherman Suherman[4]

[1*,2,3]UIN Raden Intan Lampung, Lampung, 35131, Indonesia
[4]University of Szeged, Dugonics 6720 , Hungary
*Corresponding author. Puri Rupi Indah Sukabumi. 35134, Bandar Lampung, Indonesia

E-mail: indahrestiayunisuri@gmail.com[1*]
nanangsupriadi@radenintan.ac.id[2]
hestiyuniwati@gmail.com[3]
suherman@edu.u-szeged.hu[4]

Received March 18, 2025; Received in revised form March 27, 2025; Accepted March 30, 2025

ABSTRACT
The ability to understand mathematical concepts and think creatively are abilities that must be mastered by students in order to use the brain-based learning model using the Whole Brain Teaching method. The purpose of this research was to determine the effect of brain-based learning. with the Whole Brain Teaching method simultaneously on the ability to understand mathematical concepts and creative thinking, the effect of Brain Based Learning with the Whole Brain Teaching method on the ability to understand mathematical concepts, and the effect of Brain Based Learning with the Whole Brain method. Quasi Experimental Design with the Post-test Only Control Group Design design used. The population of MT's students throughout South Lampung Regency and the Cluster Random Sampling technique sample were 60 students (experimental class n = 30 control class n = 30). The essay test instrument for understanding concepts 7 questions and mathematical creative thinking 4 questions with the material of rectangular shapes. The data analysis technique is Multivariate Analysis of Variance (MANOVA) with a significance of 50% and a significance value of the ability to understand concepts and think creatively simultaneously of 0.000, a significance value of the ability to understand concepts of 0.000 and a significance value of creative thinking of 0.003 so the significance value is less than 0.05. There is an influence of brain-based learning with Whole Brain Teaching on the ability to understand concepts and think creatively partially or simultaneously. The results of creative thinking are better than the ability to understand mathematical concepts.
Keywords: ability understanding concept, brain based learning, mathematics think creative, whole brain teaching

ABSTRAK
Kemampuan memahami konsep matematika dan berpikir kreatif merupakan kemampuan yang harus dikuasai siswa agar menggunakan model brain based learning dengan menggunakan metode Whole Brain Teaching. Tujuan penelitian untuk mengetahui pengaruh brain based learning. dengan metode Whole Brain Teaching simultan terhadap kemampuan memahami konsep dan berpikir kreatif matematis, pengaruh Brain Based Learning dengan metode Whole Brain Teaching terhadap kemampuan memahami konsep matematika, dan pengaruh Brain Based Learning dengan metode Whole Brain. Quasy Experimental Design dengan desain Posttest Only Control Goup Design yang digunakan. Populasi siswa MTs se-Kabupaten Lampung Selatan dan sampel teknik Cluster Random Sampling ada 60 siswa (kelas eksperimen n=30 kelas kontrol n=30). Instrumen tes essay pemahaman konsep 7 soal dan berpikir kreatif matematis 4 soal dengan materi bentuk reaktangular. Teknik analisis data Multivariate Analysis of Variance (MANOVA) dengan signifikansi=50% serta nilai signifikansi kemampuan memahami konsep dan berpikir kreatif secara simultan sebesar 0,000, nilai signifikansi kemampuan memahami konsep sebesar 0,000 dan nilai signifikansi berpikir kreatif sebesar 0,003 jadi nilai signifikansi kurang dari 0,05. Kesimpulan ada pengaruh brain based learning

EMTEKA: Jurnal Pendidikan Matematika
Volume 6, No. 1, 2025. 548-557
DOI: https://doi.org/10.24127/emteka.v6i1.8327

e-ISSN 2746-5594
p-ISSN 2746-5608

dengan Whole Brain Teaching terhadap kemampuan memahami konsep dan berpikir kreatif secara parsial maupun simultan. Hasil berpikir kreatif lebih baik dibandingkan kemampuan pemahaman konsep matematika.
Kata kunci: *brain based learning, kemampuan pemahaman konsep, matematika berpikir kreatif, whole brain teaching*

This is an open access article under the Creative Commons Attribution 4.0 International License

Introduction

Mathematics is a discipline that plays a crucial role in everyday life. Therefore, this subject is taught in schools at every level of education as part of the curriculum (Jantiawati, Syafei, Resti, Suri, & Matematika, 2016) . Students need to master various skills, including conceptual understanding and creative thinking skills in mathematics. Conceptual understanding is not only limited to recognizing material, but also includes the ability to explain it again in a simpler way and apply it in real life (Dewimarni, 2017). If there is an error in understanding the concept since elementary education, this can have a negative impact on higher education levels. Comprehending the meaning of a concept in depth (in this case, mathematical concepts related to numbers), identifying and connecting the concept to relevant conditions or real-world problems, being able to provide both appropriate and inappropriate examples of the concept, and applying the concept to solve problems, whether in straightforward situations or in more complex contexts (Khoirudin, Vahlia & E. S., 2024). Based on the Regulation of the Director General of Elementary and Secondary Education Number 506/C/kep/PP/2004 (Njatklama, 2020), the ability to understand concepts can be measured through several indicators, namely: 1)re-expressing a concept, 2)grouping objects based on certain characteristics, 3) providing examples and non-examples of a concept, 4) presenting examples invarious forms of representation, 5)identifying the necessary and sufficient conditions in a concept, 6)selecting, using, and applying certain procedures or operations, and 7) utilizing concepts or algorithms in solving problems. (Kartika, 2018) .

The ability to understand concepts is an essential skill that students must have, but creative thinking also has an equally important role. In the context of mathematics, creative thinking refers to students' efforts to find solutions by exploring various ideas or alternatives when solving mathematical problems. This solution process can be associated with the questions given as one method to measure student learning achievement (Faelasofi, 2017) . Creative thinking can encourage the emergence of various ideas in solving a problem. Creative individuals generally have a high curiosity. Therefore, creative thinking skills need to be cultivated and developed in the mathematics learning process. According to Munandar, indicators of creative thinking include: 1) fluent thinking , 2) flexible thinking , 3) original thinking , and 4) elaborate thinking (Marliani, 2015) .

The low conceptual understanding ability of students is caused by their limited opportunities to learn and discuss with peers. This happens because teachers still often apply conventional learning models (Ratnasari, Subandi, & Putra, 2019) . In addition to conceptual understanding, students' mathematical creative thinking abilities also tend to be low. This is caused by the learning

e-ISSN 2746-5594
p-ISSN 2746-5608

methods applied by teachers, which more often focus on presenting example questions procedural without encouraging exploration of various solutions (Noviyana, 2017) . One of the learning models used is Brain-Based Learning with the Whole Brain Teaching method . The Brain-Based Learning model has various advantages, but still has some disadvantages. This model gives students the freedom to determine their own comfort in the learning process, so that without needing to be directed, they are expected to be able to prepare themselves for learning in class. However, for students who tend to be passive in learning, this model can be a challenge because they may have difficulty in discussing (Shaleha & Kumala, 2019) . To overcome the shortcomings in the Brain-Based Learning model , the Whole Brain Teaching method was applied . In this method, the teacher acts as a facilitator and the main driver in learning. Not only through verbal explanations, but also by using movement as a form of communication. This allows students to be freer in expressing their opinions (Kusumayati, 2014) . The Brain-Based Learning learning model provides students with the freedom to think without pressure, creates a supportive learning environment, and provides various stimuli that can encourage creative thinking (Putri, Munzir, & Abidin, 2019) . The application of the Whole Brain Teaching method in learning is characterized by the teacher's ability to create an innovative and creative learning environment resulting in a more enjoyable and positive learning experience for students (Setiani, Dafik, & Darojat, 2015) . The brain function-based learning approach through teaching methods that involve all parts of the brain is designed to optimize the brain's potential as a whole. By involving students in practical activities, visual observation, and verbal expression, the process of understanding the material becomes more effective. This strategy not only improves students' conceptual understanding but also develops their creative thinking skills, especially in mathematics.

Several previous studies that have applied the Brain-Based Learning model have shown that this approach can improve various student abilities. For example, research by Solihah (2019) found that this model can improve critical thinking skills of MTs students, while Widiana, Bayu, & Jayanta (2017) revealed that this model has an effect on improving creative thinking skills. In addition, research by Sunaryo & Nuraida (2017) showed that Brain-Based Learning can support problem-solving skills, while Rosita & Nur (2016) found that this model contributes to increasing student independence. On the other hand, research related to the Whole Brain Teaching method has also been conducted. Irsyadi & Sari (2020) found that this method can improve learning outcomes, while Risdianty, Dafik, Prastiti, Universitas, & Terbuka (2016), stated that this method plays a role in improving students' memory. In addition, research by Amalia (2015) showed that Whole Brain Teaching can increase students' interest in learning.

Research that has been conducted regarding the ability to understand concepts that can be improved by applying auditory, intellectual, and repetition models (Fitri & Utomo, 2016), numbered heads together model (Sari, 2018), guided discovery model (Mawaddah & Maryanti, 2016), interactive multimedia (Novitasari, 2016), guided inquiry learning method (Murnaka & Dewi, 2018), guided discovery learning model (Arifah, Suyitno, & Dewi, 2018), auditory intellectually repetition learning model (Sarniah, Anwar, & Putra, 2019). In

e-ISSN 2746-5594
p-ISSN 2746-5608

addition to the ability to understand concepts, creative thinking skills have also been studied previously, the results of which are that creative thinking skills can be improved by implementing creative problem solving. (Faturohman & Afriansyah, 2020), project based learning model (Noviyana, 2017), inquiry learning model (Ulandari, Putri, Ningsih, & Putra, 2019), realistic mathematical approach (Siregar, Mujib, Hasratuddin, & Karnasih, 2020), problem based learning model (Abdurrozak & Jayadinata, 2016), discovery learning model (Cintia, Kristin, & Anugraheni, 2018), missouri mathematics project learning model (Marliani, 2015), Learning Creativity (Supriadi, 2025).

Previous studies have discussed the application of brain-based learning models and whole brain teaching methods separately. However, there has been no research that combines the two approaches. Therefore, researchers are trying to combine the steps of the brain-based learning model with the whole brain teaching method. With this combination, it is expected to bring innovation to the learning process in the classroom, which has an impact on improving students' conceptual understanding and creative thinking skills in mathematics. Based on these reasons, the author is interested in conducting a study entitled "Implementation of the Brain-Based Learning Model with the Whole Brain Teaching Method on Concept Understanding and Creative Thinking Skills in Mathematics."

Research Methods

This research uses a quantitative approach with numerical data. The method applied is Quasi-Experimental Design with a Posttest Only Control Group Design pattern . The research design is arranged in a 2×2 factorial form, which allows for analysis of the interaction between two independent variables, each consisting of two levels. Can be seen in Table 1 below:

Table 1. Design 2×2 factorial

The ability that researched (Y) / **Model (X)**	**Understanding concept (Y1)**	**Think creative (Y2)**
Learning model B *rain based learning* with method w*hole brain teaching*	X_1Y_1	X_1Y_2
Learning model conventional	X_2Y_1	X_2Y_2

This research involved students of grade VII MTs in South Lampung Regency as the population. Sampling was done randomly by selecting two classes, namely the experimental class (30 students) that implemented the brain-based learning model through the whole brain teaching method and the control class (30 students) that used the conventional approach. The research instrument was in the form of a descriptive test to measure the ability to understand concepts (7 questions) and mathematical creative thinking (4 questions). Before being used, the instrument was tested for validity, reliability, level of difficulty, and item discrimination. The brain-based learning model was applied in seven stages: pre-exposure,

e-ISSN 2746-5594
p-ISSN 2746-5608

preparation, initiation and acquisition, incubation and memory storage, verification and checking of beliefs, and celebration and integration.

Data analysis begins with prerequisite tests including normality tests using Kolmogorov-Smirnov and homogeneity tests with *Box's M* to ensure normal data distribution and homogeneous variance matrices. Furthermore, hypothesis testing is carried out through *MANOVA* (multivariate analysis) assisted by the SPSS 23 program at a significance level of 5%. The purpose of this analysis is to test the effect of the brain-based learning model with a whole brain teaching approach on improving students' conceptual understanding and creative mathematical thinking abilities. Each stage in the learning model is designed to encourage the strengthening of both abilities in an integrated manner.

Results and Discussion

Based on the research that has been conducted, data was obtained regarding the value of the ability to understand concepts and mathematical creative thinking. The data was collected from two classes, namely the experimental class that applies the brain-based learning model with the whole brain teaching method and the control class that uses the conventional learning model. The following is a description of the results of the ability to understand concepts and mathematical creative thinking from the two classes in Table 2:

Table 2. Results of description of concept understanding ability

	N	Mean	Std. dev	Min	Max
Experiment	30	78.43	7,347	68	93
Control	30	71.70	5,421	64	82

Based on Table 2, it can be seen that the descriptive data of the concept understanding ability in the post-test of the experimental class showed better results compared to the control class. This can be observed from the average score of the concept understanding ability of the experimental class, which is 78.43 in Table 3.

Table 3. Results of description of concept understanding ability

	N	Mean	Std. Dev	Min	Max
Experiment	30	81.37	8,451	69	94
Control	30	74.53	8,456	63	88

Based on Table 3, the descriptive data of creative thinking ability in the posttest of the experimental class showed superior results compared to the control class. This can be seen from the average score of creative thinking of the experimental class, which is 81.43. From this description, it can be concluded that the brain-based learning model with the whole brain teaching method is more effective than the conventional learning model. Thus, learning using the brain-based learning model with the whole brain teaching method is able to improve students' mathematical conceptual understanding and creative thinking abilities.

EMTEKA: Jurnal Pendidikan Matematika
Volume 6, No. 1, 2025. 548-557
DOI: https://doi.org/10.24127/emteka.v6i1.8327
e-ISSN 2746-5594
p-ISSN 2746-5608

Before conducting a hypothesis test, a normality test and a homogeneity test are first conducted. The initial step taken is to analyze the normality test data using the Kolmogorov-Smirnov test. The results of the normality test calculation for the ability to understand concepts and think creatively can be seen in the following Table 4:

Table 4 Results of normality test of concept understanding and mathematical creative thinking abilities

Variables	Class experiment	Class control	Conclusion
Ability understanding draft	0.165	0.077	**Normally distributed**
Think creative mathematical	0.080	0.063	

Based on Table 4, the results of the normality test show that the data are normally distributed. Thus, it can be concluded that the post-test scores of conceptual understanding and creative thinking abilities are normally distributed. The next step is to conduct a homogeneity test to determine whether the samples have the same variance or not. This homogeneity test is carried out using the Box's M test. The results of the homogeneity test analysis can be seen in the following Table 5:

Table 5 Test homogeneity

Variable	Sig	Conclusion
Ability understanding draft	0.217	**Homogeneous**
Think creative mathematical	0.996	

Based on Table 5, the data on the ability to understand concepts and think creatively in mathematics in the control class and the experimental class are homogeneous. After the prerequisite test is fulfilled, the next step is to conduct a hypothesis test using MANOVA (One-Way Multivariate Analysis of Variance). The first test conducted is to test the influence between variables simultaneously. Results testing the can seen on table following Table 6 :

Table 6 Results of simultaneous manova test

Manova hypothesis		Sig	Conclusion
Brain based learning with whole brain teaching method	Wilks' lambda	0,000	**H0 is rejected**

Based on Table 6, the significance of the MANOVA test using the Wilks' Lambda technique is 0.000 with a significance level set at 0.05. This shows that there is a significant influence of the application of the brain-based learning model with the whole brain teaching method simultaneously on students' mathematical concept understanding and creative thinking abilities.

e-ISSN 2746-5594
p-ISSN 2746-5608

After knowing the results of simultaneous hypothesis testing, the next step is to conduct testing between variables individually. The results of the test can be seen in the following Table 7:

Table 7 Individual manova test results

Variable	Ability	Sig	Conclusion
Brain based learning with whole brain teaching method	Ability understanding draft	0,000	H_0 rejected
	Think creative mathematical	0.003	H_0 rejected

The significance value of conceptual understanding ability is less than 0.05, it can be concluded that the Brain-Based Learning method with the Whole Brain Teaching approach has an effect on students' conceptual understanding ability. In addition, the significance value of mathematical creative thinking which is also less than 0.05 indicates that the method has an effect on students' mathematical creative thinking ability.

The results of this study are in line with previous findings by Adi Apriadi Adiansha, who stated that learning with the Brain-Based Learning method is influenced by creativity. This happens because students acquire concepts and knowledge directly through interactions with peers, thus allowing new ideas to emerge in discussions about material that has never been studied before. (Adiansha, Sumantri, & Makmuri, 2018) . According to research conducted by Cira Meyrin Denisa, learning methods are one of the strategies that can be used to support teachers in the learning process and help students understand concepts and their applications in everyday life. One of the effective learning methods is Whole Brain Teaching (Denisa, Ruhiat, & Septiyanto, 2018) .

The results of the study indicate that the Whole Brain Teaching method in the Brain-Based Learning model can simultaneously influence students' ability to understand concepts and think creatively in mathematics. With this approach, students are more actively involved in the learning process because this method is centered on them. In addition, students are not only taught to memorize concepts, but also to understand the material in depth, which contributes to improving creative thinking skills in solving mathematical problems. The analysis and statistical tests in this study indicate that the Brain-Based Learning model is more effective than the conventional model, and there is an influence of the Brain-Based Learning model with the Whole Brain Teaching method on students' mathematical concept understanding and creative thinking abilities, both partially and simultaneously.

Conclusion and Suggestions

Based on the results of the analysis and discussion that have been carried out, it can be concluded that the application of Brain-Based Learning with the Whole Brain Teaching method on the material of rectangular plane figures has a positive impact on students' understanding of concepts and creative mathematical thinking skills, both individually and simultaneously. This approach has been

e-ISSN 2746-5594
p-ISSN 2746-5608

proven to have a more significant influence on understanding concepts and mathematical thinking creativity compared to conventional teaching methods used in the school, both separately and simultaneously. The results of the study also showed that students' creative thinking skills were superior compared to understanding mathematical concepts in both types of treatments given.

Reference

Abdurrozak, R., & Jayadinata, A. K. (2016). The Influence of Problem Based Learning Model on Students' Creative Thinking Skills. *Jurnal Pena Ilmiah*, *1*(1), 871–880.

Adiansha, A. A, Sumantri, M. S, & Makmuri, M. (2018). The Influence Of Brain Based Learning Model On Students' Mathematical Communication Skills In Terms Of Creativity. *Premiere Educandum: Journal of Elementary Education and Learning*, *8*(2), 127-137. https://doi.org/10.25273/pe.v8i2.2905

Amalia, T. N. (2015). Implementation of Whole Brain Teaching Strategies to Improve Student Interest in Learning Science Physics Class VII SMPN 29 In Improving Student Interest in Learning Science Physics Class VII SMPN 29 Pekanbaru , *1*(1), 1–8.

Arifah, U., Suyitno, H., & Dewi, N. R. (2018). Theoretical Review: Improving Mathematical Critical Thinking Skills Through Brain Based Learning Model Assisted by Powtoon. *PRISMA 2019*, *2*(2) , 718–723.

Cintia, NI, Kristin, F., & Anugraheni, I. (2018). Application of Discovery Learning Model to Improve Creative Thinking Skills and Student Learning Outcomes. Perspective of Educational Science , *32*(1), 67–75. https://doi.org/10.21009/PIP.321.8

Denisa, C. M, Ruhiat, Y., & Septiyanto, R. F. (2018). Effectiveness of Whole Brain Teaching (WBT) Method to Improve Newton's Law Learning Outcomes for Grade X Students at SMA Negeri 1 Kragilan. Proceedings of the National Seminar on Physics Education, Untirta , *1*(1), 32–36.

Dewimarni, S. (2017). Communication Skills and Understanding of Linear Algebra Concepts of Students of Putra Indonesia University 'YPTK' Padang. *Al-Jabar: Journal of Mathematics Education*, *8*(1), 53-60. https://doi.org/10.24042/ajpm.v8i1.763

Faelasofi, R. (2017). Identification of Creative Thinking Ability in Mathematics, Topic of Probability. *E-DuMath Journal*, 3(2), 155–163. https://doi.org/10.26638/je.460.2064

Faturohman, I., & Afriansyah, E. A. (2020). Improving Students' Mathematical Creative Thinking Skills through Creative Problem Solving. *Mosharafa: Journal of Mathematics Education*, 9(1), 107–118. https://doi.org/10.31980/mosharafa.v9i1.596

Fitri, S., & Utomo, R. B. (2016). The Influence Of Auditory, Intellectually, And Repetition Learning Models On Conceptual Understanding Abilities At SMP Pustek Serpong. Jurnal E-DuMath , *2*(2), 193–201.

Irsyadi, M. K., & Sari, A. S. L. (2020). Application of Whole Brain Teaching Learning Method on Maple Material. *Jurnal Tadris Matematika*, *3*(1), 31–42. https://doi.org/10.21274/jtm.2020.3.1.31-42

Jantiawati, R., Syafei, I., Resti, I., Suri, A., & Matematika, P. (2016). Application of Cubes and Star Problem Solving Strategy for Grade VIII Students on Flat-Sided

e-ISSN 2746-5594
p-ISSN 2746-5608

Space Structure Material. *Proceedings of the National Seminar on Mathematics and Mathematics Education UIN Raden Intan Lampung APPLICATION*, *1*(1), 495–498

Kartika, Y. (2018). Analysis of the Ability to Understand Mathematical Concepts of Grade VII Junior High School Students on Algebraic Form Material. T*ambusai Education Journal* , *2*(58), 777–785.

Khoiruddin, M., Vahlia, I., & ES, Y. R. (2024). Analisis Pemahaman Konsep Peserta Didik Ditinjau dari Kemampuan Metakognisi Peserta Didik pada Materi Bilangan Pecahan. *EMTEKA: Jurnal Pendidikan Matematika*, *5*(2), 522-530.

Kusumayati, L. D. (2014). The Use of Whole Brain Teaching (WBT) to Improve Students' Speaking Ability. *Widya Wacana*, 9(1), 11–17.

Marliani, N. (2015). Improving Students' Mathematical Creative Thinking Skills through the Missouri Mathematics Project (MMP) Learning Model. F*ormative: Scientific Journal of Mathematics and Natural Sciences Education*, *5* (1), 14–25.

Mawaddah, S., & Maryanti, R. (2016). The Ability of Junior High School Students' Mathematical Concept Understanding in Learning Using the Guided Discovery Model (Discovery Learning). *EDU-MAT: Journal of Mathematics Education*, *4* (1), 76–85. https://doi.org/10.20527/edumat.v4i1.2292

Murnaka, N. P., & Dewi, S. R. (2018). Application of Guided Inquiry Learning Method to Improve Mathematical Concept Understanding Ability. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, *2*(2), 163-170. https://doi.org/10.31331/medives.v2i2.637

Supriadi, N & W.Z., Jamaluddin, Wan Z., S., Suherman, Suherman, K., Komarudin, Komarudin. (2025). The Role of Blended Learning in Improving Students' Numerical Ability and Learning Creativity: *Revista de Educación a Distancia.* https://doi.org/10.6018/red.619061

Supriadi, N., Jamaluddin, W., Suherman, S., & Komarudin, K. (2025). The Role of Blended Learning in Improving Students' Numerical Ability and Learning Creativity. *Revista de Educación a Distancia (RED)*, *25*(81), 1-21. https://doi.org/10.6018/red.619061

Ntjalama, K. M., & Murdiyanto, T. (2020). Pengaruh model pembelajaran kooperatif tipe stad berbantuan media kahoot ! Terhadap kemampuan pemahaman konsep matematis siswa. Jurnal Riset Pendidikan Matematika Jakarta, *2*(2), 13–20. https://doi.org/10.21009/jrpmj.v2i1.16279

Novitasari, D. (2016). The Effect of Using Interactive Multimedia on Students' Mathematical Concept Understanding Ability. *FIBONACCI: Journal of Mathematics and Mathematics Education*, *2* (2), 8-15.

Noviyana, H. (2017). The Influence of Project Based Learning Model on Students' Creative Thinking Ability in Mathematics. *Edumath Journal* , *3* (2), 110–117.

Putri, C. A., Munzir, S., & Abidin, Z. (2019). Students' Mathematical Creative Thinking Ability through Brain-Based Learning Model. *Journal of Mathematics Didactics* , *6* (1), 13–28. https://doi.org/10.24815/jdm.v6i1.9608

Ratnasari, D., Subandi, & Putra, F. G. (2019). The Influence Of The Power Of Two Cooperative Learning Model On Students' Understanding of Mathematical Concepts. *Proceedings of the National Seminar on Mathematics and Mathematics Education* , *2* (1), 163–174.

Risdianty, G., Dafik, Prastiti, DT, University, J., & Terbuka, U. (2016). Development

e-ISSN 2746-5594
p-ISSN 2746-5608

of Science Learning Devices on the Topic of Water Cycle Based on Whole Brain Teaching in Improving the Memory of Fifth Grade Students of SDN Jember Lor 04. *Jurnal Pendidikan Karakter* , *2* (1), 978–979.

Rosita, I., & Nur, D. (2016). Improving Students' Mathematical Creative Thinking Skills and Learning Independence by Using the Brain Based Learning Model. *Unsika Education Journal*, *4* (1), 26–41.

Sari, D. P. (2018). The Effect of Numbered Heads Together Learning Model on the Ability to Understand Mathematical Concepts. *Jurnal Mathematic Paedagogic* , *2* (2), 196-201. https://doi.org/10.36294/jmp.v2i2.220

Sarniah, S., Anwar, C., & Putra, R. W. Y. (2019). The Effect of Auditory Intellectually Repetition Learning Model on Mathematical Concept Understanding Ability. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang* , *3* (1), 87-97. https://doi.org/10.31331/medivesveteran.v3i1.709

Setiani, I., Dafik, & Darojat, O. (2015). Development of Learning Devices Based on Scientific Approach with Whole Brain Teaching Technique on Curved Side Space Material for Grade IX Students. *Pancaran* , *4*(1), 193–210.

Shaleha, P. R., & Kumala, F. N. (2019). Critical Thinking Skills: Brain-Based Learning Model and Whole Brain Teaching Model. *Journal of Elementary Education (JBPD)*, *3* (2).

Siregar, R. N, Mujib, A., Hasratuddin, & Karnasih, I. (2020). Improving Students' Creative Thinking Skills Through a Realistic Mathematics Approach. *Edumaspul Journal of Education*, *4*(1), 56–62. https://doi.org/10.33487/edumaspul.v4i1.338

Solihah, S. (2019). Improving Critical Thinking Skills in Mathematics of MTs Students Using Brain Based Learning Method. *TEOREMA: Theory and Research of Mathematics* , *4* (1), 55-65. https://doi.org/10.25157/teorema.v4i1.1934

Sunaryo, Y., & Nuraida, I. (2017). The Effect Of Applying The Brain-Based Learning Model On Students' Mathematical Problem Solving Abilities. *Journal of Mathematics Education and Teaching Research* , *3* (2), 89–96.

Supardi. (2017). *Educational Research Statistics Calculation, Presentation, Explanation, Interpretation, and Conclusion Drawing* . Depok: PT Raja Grafindo.

Syazali, & Novalia. (nd). *Educational Research Data Processing* .

Ulandari, N., Putri, R., Ningsih, F., & Putra, A. (2019). The Effectiveness of Inquiry Learning Model on Students' Creative Thinking Ability on Pythagorean Theorem Material. *Jurnal Cendekia: Jurnal Pendidikan Matematika* , *3*(2), 227–237. https://doi.org/10.31004/cendekia.v3i2.99

Widiana, I. W., Bayu, G. W., & Jayanta, I. N. L. (2017). Brain Based Learning, Cognitive Style Creative Thinking Ability and Student Learning Outcomes. *JPI (Jurnal Pendidikan Indonesia)*, *6*(1), 1–15. https://doi.org/10.23887/jpi-undiksha.v6i1.8562