

THE EFFECT OF MIND MAPPING BASED ADVANCE ORGANIZER LEARNING MODEL ON STUDENTS' CREATIVE THINKING ABILITY

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Abstract

This study aims to determine the effect of the mind mapping-based Advance Organizer learning model on students' creative thinking ability. The research method used is Quasi Experimental with the type of Nonequivalent Control Group the Design was carried out at one of Junior High School (JHS) in Ngimbang, Lamongan Regency, for the 2022/2023 Academic Year. Data collection techniques were carried out through tests. Hypothesis testing use independent sample t-test and analysis improving students' creative thinking ability using the N-Gain Score test. The results showed that: 1) There are differences between the creative thinking ability of class students in experimental and control classes with a significance value of $0.000 < 0.05$ then H_0 is rejected and H_1 is accepted, 2) There is an increase in students' creative thinking ability based on the N-Gain test the score in experimental class was 0.68 in medium category and control class it was 0.31 for medium category. We conclude that mind mapping-based Advance Organizer learning model has an influence on students' creative thinking ability.

Keywords: Advance Organizer, creative thinking ability, mind mapping

Received: 27 December 2023 | Revised: 30 April 2024 | Accepted: 15 May 2024

INTRODUCTION

Learning in the 21st century does not only prioritize knowledge abilities, but also student competence (Mardiyah, et al., 2021). Competencies in 21st century consist of ability to think critically, think creatively, communicate, and work together (Mayarni & Yulianti, 2020). To produce Human Resources who are innovative and creative and able to adapt quickly, this competency needs to be applied to 21st century learning. Creative thinking is the ability to analyze new information and connect unique ideas to solve problems (Qomariyah & Subekti, 2021).

The fact shows that many students' creative thinking abilities still low. This fact was strengthened through interviews at one of Junior High School (JHS) in Ngimbang District, Lamongan Regency. The results of interviews with class VII science teachers show that the science learning process is still not optimal in leading to creative thinking training. This is also proven by research results of Yolanda, et al., (2021) which states that students' creative thinking abilities are relatively low with an average result of 36.50%. Dongoran (2022) stated that the factor that causes students' low creative thinking abilities is the lack of practice questions. Teachers can find out to what extent students can think creatively, namely by providing material that stimulates students' minds, providing real problems, in this way students can come up with lots of ideas. The large number of ideas raised provides a great opportunity to find good ideas (Widia, et al., 2020).

Problems related to students' limited creative thinking abilities can be solved using learning models. The model used in learning will helps students to think creatively (Wijaya & Harahap, 2022). Advance Organizer (AO) is one of learning model to improve students' creative thinking abilities. The AO model is a comprehensive learning used to integrate new knowledge into students' existing knowledge (Nisyah, et al., 2019). According to Huda (2019), the AO model has three parts, namely the AO presentation, presentation of assignments or learning materials, and strengthening cognitive structures. The AO model can generate new ideas that can motivate students to be creative (Azila, et al., 2019). Ernaeni & Gunawan (2019) stated that the AO model have an impact on students' creative thinking abilities. Therefore, AO model should be integrated with learning methods.

Mind mapping is a learning method that can improve students' creativity in presenting ideas, which are then arranged into a mind map (Kustian, 2021). The mind mapping method emphasizes combining images, colors and shapes which will make students more captivated and enthusiastic in the learning process. In addition, the material absorbed will be easier to understand and remember (Suwaib, et al., 2020). The

relationship between the AO learning model and the mind mapping method was analyzed from several opinions. According to Gusnawati & Muslimin, (2020) the AO model can strengthen students' knowledge, by explaining, combining and linking new material with previous material. According to Saparudin, et al., (2020) the use of mind mapp in AO is as a tool to connect unique new ideas with old ideas, so that students take more specific actions. Students carry out these actions by using colors and symbols in an interesting way to create a new and different map. This increases students' creativity and strengthens students' memory of lesson information. According to Azila, et al., (2019) research results show that the AO learning model can teach students to think creatively by helping them connect between new concepts and existing concepts.

The solar system is a celestial body that revolves around the Sun (Nuqisari & Sudarmilah, 2019). This chapter on Earth and the solar system includes three sub-chapters, namely the solar system, the Earth and its satellites, and getting to know the Sun more closely. According to Nikmah & Wijayadi (2021), some materials in the solar system contain theories that need to be memorized, should be studied visually. These characteristics mean that learning on Solar System material needs to be designed so that students are able to organize their knowledge so that it is well organized. Apart from that, as a form of focus on creative thinking abilities, learning needs to be designed that can accommodate both. Erisa, et al., (2022) proved that the results of creative thinking ability tests on solar system material had increased from the pre-cycle stage to cycle 2. The average student's creative thinking ability was initially 26%, then increased to 78%. Therefore, one of the factors that increases students' creative thinking abilities is the material used in learning, especially the solar system. From this explanation, research was carried out the effect of mind mapping based AO learning model on students' creative thinking abilities with Solar System resources. This research was conducted to obtain empirical evidence regarding the effectiveness of the AO and mind map learning models on students' creative thinking abilities. The results of this research will influence students' creative thinking abilities and will be an effort to train students in one of the 21st century skills.

RESEARCH METHODS

This research aims to test whether the mind mapping-based AO learning model influences students' creative thinking abilities in JHS in Ngimbang District, Lamongan Regency. This research uses a type of experimental research that uses Quasi Experimental Design in the form of Nonequivalent Control Group Design. This design uses an experimental class and control class.

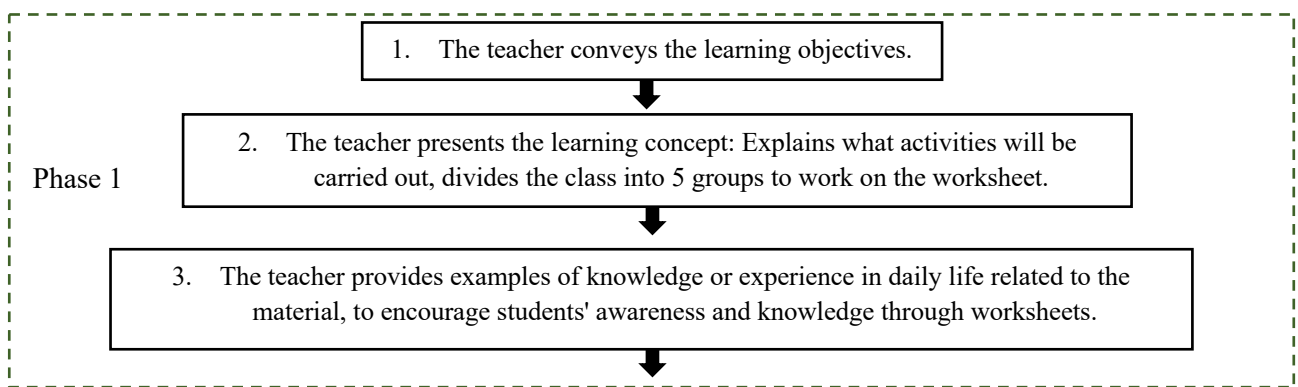
The population is class VII, the samples used were classes VII A and VII F, each class numbering 32 students. Data was collected in 5 sessions, using a creative thinking skills assessment tool. The research tool has passed the peer review stage. The average validation score of lesson plan is 0.98, in the highest category. The average approval rating for an item or content interest is 0.98 with the highest category. The average validity score of the creative thinking ability test is 0.98, in the highest category. The construct validity score of the learning implementation observation sheet is 0.98, in the highest category. The average validation score of student response questionnaire is 0.92, in the highest category.

Analysis of research data includes analysis of the differences in creative thinking abilities of experimental class and control class students (analysis of creative thinking ability tests, accuracy tests, homogeneity tests, and hypothesis tests) and analysis of improving students' creative thinking skills (N-Gain Test Score).

RESEARCH RESULTS AND DISCUSSION

Mind Mapping-based AO Learning Model

Broadly speaking, there are 3 phases in learning AO mind mapping based, namely the AO presentation phase, the task or lesson material presentation phase, and the cognitive structure strengthening phase. The complete learning implementation is shown in Figure 1 below.



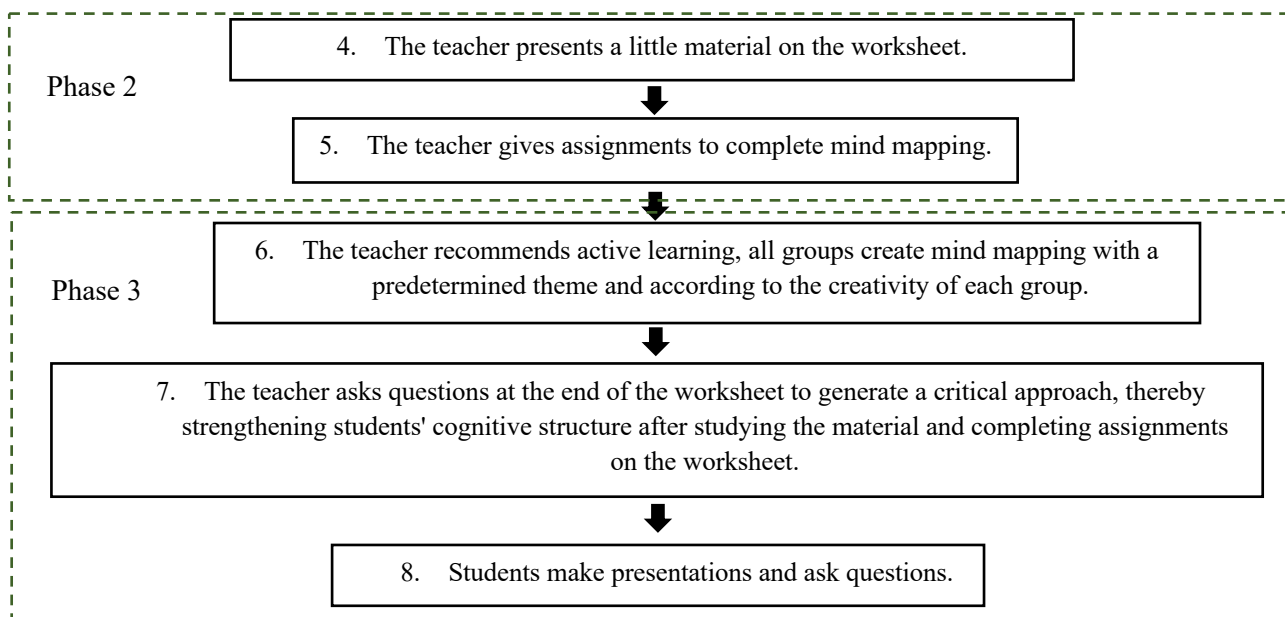


Figure 1. Implementation of learning

Indicators of creative thinking abilities are trained in the mind mapping-based AO learning phases. The first syntax is a mind mapping-based AO presentation, where students are given a presentation of learning concepts first. The presentation of the learning concepts is done by explaining what tasks will be done, by students listening of material and students gathering in groups divided by the teacher, there are 5-6 students working on the worksheet. The teacher also provides examples of knowledge or experience in daily life related to the topic of the 8 planets of the solar system to encourage students' awareness and knowledge through the worksheets given to students. Students can answer the questions that have been presented, thus training students on indicators of flexibility, namely being able to produce answers from their respective points of view.

The second syntax is presentation of assignments or lesson material, the teacher presents a little material on the worksheet and gives assignments to complete the mind mapping. This makes students dig up information to complete the mind mapping through a summary of the material in the worksheet and also the science textbook. This syntax can train students in detailed indicators (elaboration), namely being able to develop answers to problems so that they are complete and detailed through completing mind mapping activities. The third syntax is strengthening cognitive structures, the teacher recommends active learning where all groups create mind maps with predetermined themes and according to the creativity of each group. Before students make mind maps, the teacher provides information about the meaning, steps and examples of mind maps on the worksheet. The teacher has also provided a sheet for students to draw mind maps on, so that they can train students on indicators of originality, namely being able to answer problems using their own language or ideas.

Students carry out the learning steps very well because at each step they receive instructions from the teacher, so that the learning process is organized at every level. The steps of mind map-based AO learning model are utilized well, so that students have new knowledge to connect with previous knowledge. According to David Ausubel, the theory of meaningful learning states that meaningful learning occurs when newly received information can be properly retained in students' cognitive structures (Muamanah & Suyadi, 2020). Apart from that, it is also in accordance with Torrance's learning theory which holds that creativity is not an ability that is innate, but rather a potential that is formed from the learning process and experience (Torrance in Nugraha, et al., 2022).

Differences in Creative Thinking Abilities of Experiment Class and Control Class Students

The results of the experimental class students' creative thinking ability categories are presented in Table 1.

Table 1. Percentage of experimental class students in each category of creative thinking ability

Category	Pretest		Posttest	
	Frequency	Percentage Amount (%)	Frequency	Percentage Amount (%)
Very good	0	0	15	46.88
Good	0	0	17	53.12
Enough	20	62.5	0	0
Not so good	12	37.5	0	0
Not good	0	0	0	0

Table 1 shows that percentage of students in the pretest creative thinking abilities in experimental class is in not so good category and enough category. The frequency of students in superior category is greater than frequency of students in poor category. The percentage of students posttest is in good and very good category. The frequency of students in good category is higher than very good category. The results of control class students' creative thinking ability categories are presented in Table 2.

Table 2. Percentage of control class students in each category of creative thinking ability

Category	Pretest		Posttest	
	Frequency	Percentage Amount (%)	Frequency	Percentage Amount (%)
Very good	0	0	0	0
Good	0	0	22	68.75
Enough	18	56.25	10	31.25
Not so good	14	43.75	0	0
Not good	0	0	0	0

Table 2 shows that according to the percentage of students in pretest, creative thinking abilities in control class are in not so good category and enough category. The frequency of students who are in superior category is greater than frequency of students in poor category. The percentage of students in posttest is good category and enough category. The frequency of students in good category is greater than enough category.

Differences in creative thinking abilities of experimental class and control class students were tested using an independent sample t-test. Before testing, important tests are carried out, namely accuracy and consistency. The calculation results are displayed in Table 3.

Table 3. Normality and homogeneity test results

Test	Class	Sig.
Normality test	Posttest experimental class	0.054
	Posttest control class	0.158
Homogeneity test	Pretest experimental and control classes	0.070
	Posttest experimental and control classes	0.317

Table 3 The normality test shows post-test significance value for experimental class is 0.054 and control class is 0.158. Statistically significant result ≥ 0.05 are condition for the data obtained to be normally distributed. Therefore, it was concluded that post-test scores are normally distributed, because the significance value was ≥ 0.05 . The homogeneity test shows a preliminary test significance value of 0.070. Therefore, it was concluded that pretest scores had homogeneous data because the significance value was $0.070 \geq 0.05$. Meanwhile, the post-test significance value is 0.317. Therefore, it can be concluded that post-test scores in experimental class and control class with homogeneous data because the significance value is $0.317 \geq 0.05$. The results of the independent sample t-test are show in Table 4.

Table 4. Results of the independent sample t-test pretest and posttest values

<i>Equal Variances Assumed</i>	t-test for Equality of Means				
	Q	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
<i>Pretest</i>	1,088	62	0.281	1.95250	1.79498
<i>Posttest</i>	15,104	62	0,000	23.30813	1.54318

Information:

Q = t count

df = Degrees of freedom

Table 4 shows that the sig result. (2-tailed) in pretest, namely 0.281. Based on the data obtained, the significance value is ≥ 0.05 , which means H_0 is accepted. So it can be said that there is no difference in pretest results of students in experimental class and control class. Result sig. (2-tailed) on the posttest, namely 0.000. Based on the data that has been obtained, a significance value of < 0.05 means that H_0 is rejected. So, it can be said that there are differences in posttest results of students in experimental class and control class.

The difference in the posttest score result for the experimental class and the control class is caused by the difference in the learning model used. The experimental class uses mind mapping-based AO learning model, while the control class uses the conventional lecture method. This difference in the learning model used may cause differences in post-test score result. The influence of learning in the control class using teaching methods on students' creative thinking abilities tends to increase but is not significant. This is because the learning process in the control class is carried out by teachers who take the material directly without group discussions and for problem questions, so that students are not trained in finding solutions to existing problems. The back of practical questions that teach cognitive thinking is one of the factors causing students' low thinking abilities (Dongoran, 2022).

The difference in the learning model in the assessment class is to use a mind mapping-based AO model which requires students to actively study and evaluate material at the level of the AO model which refers to decision making in solving problems happening around them, thus making students active in learning. In addition, the application of the AO model is simplified through the mind map process. This is in accordance with the research results of Nawar, et al., (2022) that the mind map method has the ability to eliminate boredom and increase student learning activities. Apart from that, mind mapping method could improve students' creative thinking abilities because students automatically create their own thinking patterns (Ananda, 2019). This affects the post-test results. The learning process can have a good impact if it actively involves students in discovering the concepts being studied (Ekantini, 2020).

Differences in the results of students' creative thinking abilities are not only influenced by the differences in learning models used, but also because of several other influencing factors. This is because every student has the potential to be creative, but the facts in the field are that not all of this potential can make students creative. Other factors that support this research are the existence of worksheets which contain mind mapping-based AO learning steps, making mind maps according to student creativity, and presentation and discussion activities so that students are actively involved during learning. Based on the results of this analysis, students' creative thinking abilities can be influenced by students' active attitudes in learning. This is because using mind mapping to teach students to solve environmental problems can train students to think creatively. Therefore, the mind mapping-based AO learning model in experimental class has a greater influence on students' creative thinking abilities compared to control class. Based on data presented, it can be concluded that there are differences in students' creative thinking abilities in experimental class and control.

Increasing Students' Creative Thinking Abilities

The results of N-Gain Score calculation can be seen in Table 5.

Table 5. N-Gain Score test results for each indicator in the experimental class and control class

No.	Indicator	Experimental Class		Control Class	
		N-Gain Score	Category	N-Gain Score	Category
1.	Fluency	0.20	Low	0.08	Low
2.	Flexibility	0.27	Low	0.10	Low
3.	Originality	0.22	Low	0.15	Low
4.	Elaboration	0.31	Currently	0.13	Low
Average		0.68	Currently	0.31	Currently

Table 5 explain the experimental class experienced a higher increase in each index compared to control class. The highest value in experimental class is the detail (elaboration) index, while the highest value in control class is originality indicator. The minimum value in experimental class and control is same in fluency indicator. Based on the results of table 5, it can be seen that learning in experimental class and control can improve students' creative thinking abilities.

The increase in students' creative thinking abilities in experimental class was better. This is because the steps of the mind mapping-based AO learning model can train students' creative thinking. The activity steps include an AO presentation, presentation of assignments or learning materials, and strengthening cognitive structures (Huda, 2019). Torrance (in Patmawati, et al., 2019) states that there are 4 indicators of creative thinking, namely authenticity, fluency, detail and flexibility. The mind mapping-based AO learning model is applied to encourage students to manage new information with the information they have.

Increasing students' creative thinking abilities can be analyzed at each indicator. The first indicator is fluency. Based on the results of table 5 in experimental class, a point of 0.20 was obtained in low category. Meanwhile, the result in control class were 0.08 in low category. The experimental class experienced better improvement than control class in fluency indicators, because students had been trained to think creatively through worksheets at the stage of strengthening cognitive structures. The questions presented train students to think fluently, because the more students provide ideas, concepts or answers, the more fluently students can think creatively.

The second indicator is flexibility. Based on the results of table 5 in experimental class, a point of 0.27 was obtained in low category. Meanwhile, the results in control class obtained a point of 0.10 in low category. The experimental class experienced better improvement than control class in flexibility indicator, because students had been trained to think creatively through worksheets at the AO presentation stage. The questions presented train students to think flexibility, because students are able to produce ideas that vary according to their views, so that one student and another will have differences in providing answers.

The third indicator is originality. Based on the results of table 5 in experimental class, a score of 0.22 was obtained in low category. Meanwhile, in control class, a point of 0.15 was obtained in low category. The experimental class experienced better improvement than control class in originality indicator, because students had been trained to think creatively through worksheets at the cognitive structure strengthening stage. The questions presented are in the form of creating mind mapping works according to the creativity of each group, thereby training students to be able to create ideas that other people have never imagined.

The fourth indicator is detail (elaboration). Based on the results of table 5 in experimental class, a point of 0.31 was obtained in currently category. Meanwhile, in control class, a score of 0.13 was obtained in low category. The factor that causes this is because students in experimental class have been trained to think creatively through worksheets at the assignment or lesson material presentation stage. The questions presented are in the form of completing mind mapping, where previously students were only given a little material, so that students were able to develop answers to be more complete and detailed.

Based on N-Gain Score result for each indicator, experimental class and control class experienced the same level of improvement, namely low, although in experimental class it was higher. One of the contributing factors is the failure to implement experimental class learning model. Apart from that, it is proven by the highest development results in the test class which is detailed references (elaboration). This is because during the learning process, students are trained to develop answers to an object using example questions on the worksheet, namely completing mind mapping. In the question of making mind maps, students looked very enthusiastic compared to working on other questions. So that students' creative thinking abilities on detailed indicators (elaboration) experienced the highest increase, meaning that on average students were able to add the details of an object. Meanwhile, the indicator of creative thinking ability that experienced the lowest increase was the fluency indicator. This is because during the learning process students do not pay attention to the instructions in the questions, for example when asked to name 3 reasons why the planets in the solar system do not collide with each other, there are students who only answer 1 to 2 reasons. So the fluency indicator experienced the lowest increase, which means that the average student was not able to think clearly or produce many ideas or answers.

From the result N-Gain Score measurement, it shows that experimental class experienced a better increase in creative thinking abilities than control class. The mind mapping-based AO learning model used in writing allows students' thinking abilities to develop better. Because the AO learning model can improve students' thinking abilities individually and in groups (Parenta, 2020). Apart from that, the mind mapping method in the AO model can help students connect old ideas with new ideas, so that students take more specific actions. Students carry out these actions by using colors and symbols to create new and different

maps (Saparudin, et al., 2020). In accordance with the research results of Polat & Aydin (2020) that mind mapping could improve students' abilities, so that experimental class students achieve better development than control classes. Based on this, the mind mapping-based AO learning model is proven to be able to improve students' creative thinking abilities, because it allows students to work on providing new ideas.

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

Based on data analysis from research results and discussions, it is proven that the mind mapping-based AO learning model has an effect on creative thinking abilities of class VII JHS students and there are differences in students' creative thinking abilities. After testing the hypothesis using the Independent Sample T-test, Sig.(2-tailed) value in the post test results of the experimental class and control class is $0.000 < 0.05$ then H_0 is rejected. Students' creative thinking skills improved better in experimental class which used Mind mapping-based AO learning model compared to control class which used traditional lecture method. This is proven by N-Gain Score for experimental class of 0.68 for medium category, while for control class it is 0.31 for medium category.

B. Suggestion

The mind mapping-based AO learning model requires intensive supervision, so that all students can form a good cognitive structure from the information obtained. The mind mapping-based AO learning model takes a long time, so good time management is needed to achieve learning objectives optimally. The research results showed that the highest improvement was experienced by students in the detailed indicators (elaboration), while the lowest were in the fluency indicators. So, it is necessary to add emphasis to training creative thinking skills in worksheet so that students' creative thinking skills increase evenly across all indicators.

ACKNOWLEDGEMENT

We thank all parties who have helped during the data collection process until the completion of this article.

REFERENCES

- Ananda, R. (2019). Penerapan Metode *Mind mapping* untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar. *Jurnal Basicedu*, 1(1), 1–8.
- Apriliantika, D., Ahied, M., & Rosidi, I. (2019). Implementasi Model Pembelajaran *Advance Organizer* dengan bantuan *Mind mapping* terhadap Motivasi dan Daya. *Natural Science Education Research*, 1(1), 48–58.
- Azila, S. N., Muharrami, L. K., Rosidi, I., & Munawaroh, F. (2019). Pengaruh Model Pembelajaran *Advance Organizer* berbasis *Mind mapping* terhadap Kreativitas Siswa. *Journal of Natural Science Education Research*, 1(1), 148–154.
- Budiyanto, M. A. K. (2016). *Sintaks 45 Model Pembelajaran dalam Student Centered Learning (SCL)*. Malang: Universitas Muhammadiyah Malang.
- Dongoran, P. (2022). Pengaruh Model Pembelajaran Inkuiri terhadap Kemampuan Berpikir Kreatif Di SMA Negeri 1 Portibi. *NUSANTARA: Jurnal Ilmu Pengetahuan Sosial*, 9(5), 1945–1949.
- Ekantini, A. (2020). Efektivitas Pembelajaran Daring pada Mata Pelajaran IPA di Masa Pandemi Covid-19: Studi Komparasi Pembelajaran Luring dan Daring pada Mata Pelajaran IPA SMP. *Jurnal Pendidikan Madrasah*, 5(2), 187–193.
- Erisa, H., Hadiyanti, A. H. D., & Saptoru, A. (2021). Model *Project Based Learning* untuk meningkatkan Kemampuan Berpikir Kreatif dan Hasil Belajar Siswa. *Jurnal Pendidikan Dasar*, 12(01), 1–11.
- Ernaeni, L., & Gunawan, I. (2019). Model *Advance Organizer*: Pengaruhnya terhadap Kemampuan Berpikir Kreatif. *Indonesian Journal of Science and Mathematics Education*, 2(1), 79–83.
- Febnasari, S. D., Arifin, Z., & Setianingsih, E. S. (2019). Efektifitas Penggunaan Metode Pembelajaran Diskusi Kelas dengan Strategi “TPS” untuk Meningkatkan Motivasi Belajar. *Jurnal Ilmiah Sekolah Dasar Volume*, 3(3), 310–318.
- Hasanah, U., Sarjono, & Hariyadi, A. (2021). Pengaruh Model Problem Based Learning terhadap Prestasi Belajar IPS SMP Taruna Kedung Adem. *AKSARA: Jurnal Ilmu Pendidikan Nonformal*, 07(01), 43–52.

- Hasriadi. (2022). Metode Pembelajaran Inovatif di Era Digitalisasi. *Jurnal Sinestesia*, 12(1), 136–151.
- Hidapenta, D., Dwiputri, F. A., Nur, F., Kurniawati, A., & Febriyanti, N. (2023). Analisis Keterampilan Guru dalam Mengadakan Variasi Metode Pembelajaran di Kelas III Sekolah Dasar. *Journal on Education*, 05(02), 3375–3380.
- Hidayat, H., Mulyani, H., Fatimah, A. S., Sholihat, A., & Latifah, A. Z. (2020). Penerapan Metode *Mind mapping* untuk meningkatkan Kreativitas pada Pembelajaran Pendidikan Kewarganegaraan. *Jurnal Pendidikan*, 21(1), 38–50.
- Hikmawati, N. (2020). *Mind mapping* dalam Pembelajaran IPA Sekolah Dasar. *Kariman*, 08(02), 303–326.
- Huda, M. (2019). *Model-Model Pengajaran dan Pembelajaran*. Yogyakarta: Pustaka Belajar.
- Kustian, N. G. (2021). Penggunaan Metode *Mind mapping* dalam Meningkatkan Hasil Belajar Siswa. *ACADEMIA : Jurnal Inovasi Riset Akademik*, 1(1), 30–37.
- Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. *Lectura: Jurnal Pendidikan*, 12(1), 29–40.
- Marsih, T., & Sunarti. (2019). Pengaruh Sarana Belajar, Lingkungan Belajar dan Kemampuan Membaca Pemahaman terhadap Prestasi Belajar IPS. *Jurnal Sosialita*, 15(1), 141–158.
- Mayarni, & Yulianti, Y. (2020). Hubungan antara Kemampuan Berpikir Kritis dengan Kemampuan Berpikir Kreatif Siswa pada Materi Ekologi. *PENDIPA Journal of Science Education*, 4(3), 39–45.
- Muamanah, H., & Suyadi. (2020). Pelaksanaan Teori Belajar Bermakna David Ausubel Dalam Pembelajaran Pendidikan Agama Islam. *Belajar: Jurnal Pendidikan Islam*, 5(01), 23–36.
- Muliaman, A., Sakdiah, H., Ginting, F. W., Sabrin, N., & Zahara. (2022). Analisis *Employability Skill* dan Literasi Sains Siswa melalui *Authentic Self-Assessment* pada Kurikulum Merdeka Di SMA Aceh Utara. *JPF (Jurnal Pendidikan Fisika)*, 11(1), 24–32.
- Nawar, G. A., Makaborang, Y., & Ina, A. T. (2022). Penerapan Metode *Mind mapping* berbantuan Media Torso untuk Meningkatkan Hasil Belajar Siswa Kelas XI pada Materi Sistem Gerak. *Bioscientist : Jurnal Ilmiah Biologi*, 10(2), 1184–1191.
- Nikmah, N. I., & Wijayadi, A. W. (2021). Pengembangan Media *Flashcard* pada Materi Tata Surya Kelas VII di MTSN 11 Jombang. *Ed-Humanistics*, 06(02), 829-835.
- Nisyah, M., Gunawan Gunawan, Harjono, A., & Kusdiastuti, M. (2019). Perangkat Pembelajaran Model Inkuiri dipadu *Advance Organizer* untuk meningkatkan Penguasaan Konsep dan Kemampuan Pemecahan Masalah Fisika Siswa. *J. Pijar MIPA*, 14(2), 1–6.
- Nugraha, E., Syihabuddin., & Damaianti, V. S. (2022). Kemampuan Berpikir Kreatif Mahasiswa dalam Menulis Cerpen dengan menggunakan Model Pembelajaran Berbasis Masalah. *LITERASI, Jurnal Ilmiah Pendidikan Bahasa Dan Sastra Indonesia*, 12(1), 11–33.
- Nuqisari, R., & Sudarmilah, E. (2019). Pembuatan Game Edukasi Tata Surya dengan Construct 2 Berbasis Android. *Jurnal Teknik Elektro*, 19(02), 86–92.
- Parenta. (2020). *Model Pembelajaran Advance Organizer Collaboration: Sulawesi Selatan: Aksara Timur*.
- Patmawati, K., Puspitasari, N., Mutmainah, S. N., & Edi, B. (2019). Profil Kemampuan Berpikir Kreatif ditinjau dari Kemampuan Akademik Mahasiswa. *Journal Pendidikan Sains & Matematika*, 7(2), 11–18.
- Polat, O. I., & Aydın, E. (2020). The Effect of *Mind mapping* on Young Children's Critical Thinking Skills. *Journal Pre-Proof*, 38, 1–23.
- Qomariyah, D. N., & Subekti, H. (2021). Analisis Kemampuan Berpikir Kreatif: Studi Eksplorasi Siswa di SMPN 62 Surabaya. *PENSA E-JURNAL : Pendidikan Sains*, 9(2), 242–246.
- S, R. (2020). Penerapan Model Pembelajaran *Advance Organizer* dalam Upaya peningkatan Hasil Belajar Matematika pada Peserta Didik Kelas V SDN 143 Lemo. *Diferensial Journal*, 1(1), 23–28.
- Suwaib, Riyanto, Y., & Subroto, W. T. (2020). Penerapan Model *Problem-Based Learning* berbantuan Metode *Mind mapping* untuk meningkatkan Aktivitas dan Hasil Belajar IPS Peserta Didik Kelas IV SD Negeri 002 Sebatik Utara Kabupaten Nunukan. *Jurnal Review Pendidikan Dasar Jurnal Kajian Pendidikan Dan Hasil Penelitian*, 6(2), 1–11.
- Trismayanti, S. (2019). Strategi Guru dalam Meningkatkan Minat Belajar Peserta Didik di Sekolah Dasar. *Jurnal Pendidikan Islam*, 17(2), 141-158.
- Wati, K., Hidayati, Y., Wulandari, A. Y. R., & Ahied, M. (2019). Pengaruh Model Pembelajaran *CORE (Connecting Organizing Reflecting Extending)* untuk Meningkatkan Keterampilan Berpikir Kritis Siswa. *Journal of Natural Science Education Reseach*, 1(2), 108–116.
- Widia, Syahrir, & Sarnita, F. (2020). Berpikir Kreatif merupakan Bagian Terpenting dalam Meningkatkan *Life Skills* di Era Industri 4.0. *Jurnal PIPA: Pendidikan Ilmu Pengetahuan Alam*, 01(01), 1–6.

- Wijaya, I. M. E., & Harahap, F. (2022). Kemampuan Berpikir Kreatif Siswa SMP Menggunakan Teknik Provokasi Pada Materi Pemanasan Global Model Pembelajaran *Problem Based Learning*. *SCIENING: Science Learning Journal*, 3(2), 125–133.
- Yolanda, S. B., Mahardika, I. K., & Wicaksono, I. (2021). Penggunaan Media Video *Sparkol* terhadap Kemampuan Berpikir Kreatif Siswa pada Pembelajaran IPA di SMP. *JPF (Jurnal Pendidikan Fisika)*, 9(2), 189-203.