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Mind Mapping in A Problem-Based Learning Model to Improve Students' Creative Thinking Skills

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Abstrak

Rendahnya kemampuan berpikir kreatif siswa dalam menganalisis permasalahan dan kurang optimalnya penerapan strategi pembelajaran pada Problem Based Learning (PBL) menyebabkan capaian pembelajaran siswa belum maksimal. Penelitian ini bertujuan untuk mengetahui pengaruh penerapan mind mapping dalam meningkatkan kemampuan berpikir kreatif siswa pada model pembelajaran PBL. Penelitian ini menggunakan metode pre-experimental design dengan rancangan one group pre-test – post-test. Populasi sekaligus sampel dalam penelitian ini adalah siswa kelas XI. Instrumen pengumpulan data berupa tes uraian yang diberikan kepada siswa sebelum dan sesudah pembelajaran. Data dianalisis menggunakan rata-rata nilai pre-test dan post-test, uji normalitas, uji homogenitas, serta uji one sample T-test. Hasil penelitian menunjukkan bahwa penerapan teknik mind mapping berpengaruh signifikan terhadap peningkatan kemampuan berpikir kreatif siswa dalam model pembelajaran PBL. Kesimpulannya, penggunaan mind mapping membantu siswa memahami konsep, meningkatkan kemampuan berpikir kritis, serta mendorong kreativitas dalam pemecahan masalah. Penelitian ini mengimplikasikan pentingnya integrasi strategi pembelajaran inovatif dalam meningkatkan hasil belajar siswa.

Kata Kunci: *Mind Mapping, Berpikir Kreatif, Problem Based Learning.*

Abstract

The low ability of students to think creatively in analyzing problems and the lack of optimal application of learning strategies in Problem Based Learning (PBL) cause students' learning outcomes to not be maximized. This study aims to determine the effect of the application of mind mapping in improving students' creative thinking skills in the PBL learning model. This study uses a pre-experimental design method with a one-group pre-test – post-test design. The population as well as the sample in this study are students of grade XI. The data collection instrument is in the form of a description test given to students before and after learning. The data was analyzed using the average pre-test and post-test scores, normality test, homogeneity test, and one sample T-test. The results of the study show that the application of mind mapping techniques has a significant effect on improving students' creative thinking skills in the PBL learning model. In conclusion, the use of mind mapping helps students understand concepts, improve critical thinking skills, and encourage creativity in problem-solving. This research implies the importance of integrating innovative learning strategies in improving student learning outcomes.

Keywords: Mind Mapping, Creative Thinking, Problem Based Learning.

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1. INTRODUCTION

Efforts to develop students' creative thinking skills can be done with various learning models. Students' creative thinking ability is an important thing that must be possessed by students. Creative thinking skills are the ability to generate new ideas, solve problems in innovative ways, and see a situation from different perspectives (Birgili, 2015; Calavia et al., 2021; De Jager et al., 2013). It is necessary to choose the right strategy and learning model so that students' creative thinking skills can be realized. One of the learning models that can be used by educators is the problem-based learning (PBL) model. PBL, or problem-based learning model, is oriented towards students as student-centered by seeking students to develop the ability to think critically and creatively in solving problems. PBL is a model that is built on a real problem in life and is still unstructured, unclear, and unidentified. so that it

creates a confusing situation with a number of other problems (Hikmah, 2020; Inayah et al., 2021). Previous research stated that the purpose of PBL is to help students develop thinking skills and problem-solving skills, learn authentic adult roles, and become independent learners (Sholihah & Lastariwati, 2020; Wahyu et al., 2017). Learning with a problem-based learning model can improve students' mastery of concepts, which will have a positive effect on student learning achievement (Fitria, 2019; Kasuga et al., 2022). Learning strategies are decisions made by educators in determining the various activities to be carried out, the methodology used, the material delivered, the facilities and infrastructure used, and the type of media used to carry out learning activities (Sanjani, 2021; Siregar, 2021). Education should equip students with skills that they can use to overcome problems they face in the future (Foster & Yaoyuneyong, 2016; García-Pérez et al., 2021). However, the problem that often occurs in education is the low ability of students to apply critical thinking and creative thinking skills. The learning process is closely related to thinking activities, both critical thinking and creative thinking (Ardiansyah et al., 2023; Chang et al., 2015). Students have a lot of knowledge and information, but they struggle to apply it in real-world situations. The learning process is closely related to the thinking process, including critical and creative thinking. Students often struggle to develop critical thinking and creative thinking skills in solving problems and applying concepts learned at school. By teaching creative thinking skills, students are able to generate alternative solutions to problems.

Creativity is not inherently genetic but is acquired through habitual behavior (Marjanovič-Umek et al., 2014; Mursid & Ayu, 2021). There are six critical and creative thinking skills. (Nuryanti et al., 2018; Ramadhan et al., 2019). These skills are interpretation, analysis, evaluation, inference, explanation, and self-regulation. According to previous research, the aspects measured in students' creative thinking skills are fluency, flexibility, originality, and elaboration (Ernitasari et al., 2022; Islami et al., 2018). Learning that is only guided by books involves students' creative thinking in answering a question and is monotonous and not varied. Learning that is needed in teaching economics is learning that teaches students to train and process creative thinking skills so that different answers are obtained from one student to another. Problem-based learning invites students to find answers to problems.

The problem-based learning model is a development of active learning and student-centered learning approaches. This learning uses unstructured problems (real-world problems or complex simulation problems). In social studies subject matter with economic motives and principles in class VII, there are some students who sometimes still find it difficult to understand the material. Students find it difficult to distinguish, explain the causes, and answer when asked by the teacher. They still lack details in answering the teacher's questions. This is because they have not been able to understand and only memorize, so it cannot be embedded in students' memories for a long time, and the media used is less varied, which motivates students to participate actively in the learning process. Mind mapping is an amazing learning tool to facilitate meaningful learning. Mind mapping is used to generalize, visualize, structure, categorize, and as a stone tool for learning, organizing, problem solving, decision-making, and writing. Mind maps are a natural, spontaneous expression of the mind's path and a guide to the logical and imaginative workings of the brain. With mind mapping techniques, one can select what information needs to be received and store it more clearly. In addition, mind mapping is a tool that can help one think and remember better, solve problems, and act creatively. Mind mapping encourages creativity and flexibility. Mind maps help one to think outside the box. The effectiveness and creativity of the mind mapping model are very helpful for remembering, concentrating, recording, understanding, sorting information and ideas, and being creative by using imagination. Based on the results of observations in class VII at SMP Negeri 5 Atinggola. The results showed that students were

still passive in learning activities, especially in critical thinking and creative thinking activities. Students have not been maximized in processing information, and students have not been able to develop creative thinking skills. Evaluation questions given by the teacher get results below the KKM (75). The method that the teacher applies when teaching in the classroom is limited to lectures, questions and answers, and assignments so that it does not affect students' creative thinking skills. This research will examine the material of economic problems in the economic system using a problem-based learning model using mind mapping because the selection of a good model will support the effectiveness of student learning so that it can increase critical thinking skills and creativity thinking skills in students.

The novelty of this study is that this study focuses on the use of mind mapping in the Problem-Based Learning model to improve students' creative thinking skills, which have not been widely studied in the academic literature. This study examines how the application of mind mapping in the context of problem-based learning can help students in analyzing issues, solving problems, and developing their creativity. This study aims to explore and explain the effectiveness of mind mapping techniques in improving students' creative thinking skills in the Problem-Based Learning model. By identifying the positive influence of mind mapping on creative thinking skills, it is hoped that this research can make an important contribution to the world of education in designing more effective and innovative learning strategies to maximize student learning outcomes.

2. METHODS

The experimental research method used in this study combines quantitative approach techniques with a pre-experimental design model. In this study, the subjects were students in one class, and pre-testing and post-testing were conducted as one group. In Table 1, can be seen the research design.

Tabel 1. One grup pre-test – post-test

Group	Pre-test	Treatment	Post-test
Experiments	A	X	B

The study population was all students in class VIII at SMP 5 Atinggola, north gorontalo regency, for a total of 30 people. The sample in this study used the entire population, and the technique used to obtain data for this study was saturated sampling. The method used to obtain data for this study was test instruments, documentation, and direct observation. The form of the instrument is a description question given to students by first observing the learning video. The research stage begins with the preparation stage. At this stage, initial observations were made to determine the class that became the object of research and prepare learning tools, learning materials, and videos in the form of problems. The second stage is the implementation stage. The researcher acts as a teacher at the implementation stage by delivering the material and, after that, conducting a pre- and post-test. The pre- and post-test results were checked with a normality test and a homogeneity test. The last stage is conducting data analysis with the T test. This test is carried out to determine the effectiveness of using video media in analyzing problems in the PBL learning model.

3. RESULTS AND DISCUSSION

Result

This research started by giving a pre-test to students. The investigation was conducted to determine the initial abilities of students before treatment. The test was presented in the

form of a description and multiple-choice questions, which were first tested for reliability and validity. The pre-test data was then analyzed to determine the students' initial scores.There was no comparison class, and the test was given in the same class as the research subject. Test data was obtained from pre- and post-test results. The initial data was obtained from the pre-test value of the experimental class, and then the post-test of the same class was carried out. The subjects were students in class VIII at SMP 5 Atinggola, North Gorontalo Regency.

The implementation of the research was carried out in three stages, namely the first stage by giving an initial test or pre-test by identifying problems without the use of video media. The second stage involves providing material and identifying problems using video media. The third stage involves giving a test or post-test after identifying problems with the use of video media. Table 2 provides the calculation findings for the mean value of the pretest and post-test.

Tabel 2. Descriptive Statistics Pre-Test and Post-Test

Class	Pre-test	Post-test
Mean	67.24	86.57
Median	68.49	86.54
Modus	70	80
Standard Deviation	6.10	3.66
Maximum Value	76	95
Minimum Values	57	82

The findings of the pretest before applying mind mapping in analyzing problems in the experimental class obtained a mean value of 67.24, with the highest value of 76 and the lowest value of 57, in accordance with the mean value of the pretest. In addition, the mode value is 70, the standard deviation is 6.10, and the median value is 68.49. Meanwhile, the post-test results showed that the mean value of learning outcomes was 86.57, with a median value of 86.54, a maximum value of 95, and a lowest value of 82 after the application of mind mapping in PBL. The mean value of learning outcomes has increased by 86.57, according to the post-test results, with a median value of 86.54, mode 80, maximum value 95, and minimum value 82. This shows that the use of mind mapping helps students understand concepts and find solutions faster. Further testing uses homogeneity and normality tests. Table 3 shows the results of the normality test.

Tabel 3. Normality Test

	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig	Statistic	df	Sig
Result	pretest	0.161	21	0.172	0.932	21	0.162
	postest	0.130	21	0.201	0.944	21	0.245

This test is used to determine whether the regression model for the independent and dependent variables is normally distributed. If the significance value exceeds 0.05, the data is considered regularly distributed. According to the findings of the normality test conducted on the pre-test data, the significance value for the Kolmogorov-Smirnov test is 0.161, and the post-test value is 0.201. The Shapiro-Wilk significance value for the pre-test data was 0.162, while that for the post-test data was 0.245. The data showed a normal distribution and fulfilled the prerequisites of parametric analysis because the results of the pretest and posttest normality tests stated that the significance value exceeded 0.05.

Tabel 4. One sample T-test

	T	df	Sig. 3(2-tailed)	Mean Difference2	95% Confidence Interval of the Difference	
					Lower	Upper
Result	-13.732	41	.000	-21.31	-25.50	-21.12

According to the findings of the one-sample T-test, the use of learning videos in the problem-based learning model of the pre-experimental class had an impact on students' ability to solve problems. A significance value of less than 0.05 indicates the use of mind mapping has an impact on students' ability to think creatively.

Discussions

Mind mapping in the Problem-Based Learning (PBL) learning model is a learning method used to improve students' creative thinking skills (Sihombong et al., 2020; Yuniar & Hadi, 2023). PBL is a learning approach that emphasizes problem solving as the core of the learning process. (Saputri & Wardani, 2021; D. F. Tanjung et al., 2020). By integrating mind mapping into the PBL learning model, students can develop creative thinking skills well. Mind mapping makes the learning process easier for students to understand and remember because it uses visualization and associative relationships between concepts. Based on the previous research, The use of mind mapping in PBL has an impact on improving the quality of student learning (Maulidya et al., 2021; Pramitha & Sujana, 2023; Setiani et al., 2020). What is new and different from previous research is that this study examines students' ability to analyze problems using mind mapping so that students can think more creatively in solving a problem. With the visualization of concepts and relationships between information, students can more easily understand the material being taught. Mind mapping can also help students design solutions to problems given in the context of PBL (Asuri et al., 2021; Dewanti et al., 2022). This helps students develop critical and creative thinking skills. In addition, mind mapping in PBL can also improve collaboration between students. Students can work together to compile ideas, thus enriching the ideas produced.

In the PBL learning process, students often work in groups to solve a given problem. With mind mapping, students can more easily share their ideas and thoughts in a visualization that is easily understood by all group members. This strengthens cooperation among students and increases their effectiveness in solving problems together (Asyah et al., 2024; Meilina et al., 2024). In PBL, students are given a problem or case that must be solved. Mind mapping can be used by students as a tool to help identify problems faced by students by connecting previously learned information and finding innovative solutions. By using mind mapping, students can see the relationship between various concepts and new ideas that arise during the problem-solving process. The use of mind mapping can be an effective solution for learning (Mitra, S. N. et al., 2023; Ridho & Imron, 2023; Rochanah, 2021). Mind mapping is an information visualization technique that helps students understand concepts in a more systematic and structured way (Ardiansyah, 2023; Rohman, 2022). With mind mapping, students can connect ideas logically, identify relationships between concepts, and broaden their perspective when solving problems.

Mind mapping can also help students develop lateral thinking skills, which are the ability to look at a problem from various points of view and generate ideas that are outside the box. By using mind mapping, students can explore their creative potential, which may not be fulfilled by using conventional learning approaches (Khuri et al., 2022; Masliani et al., 2019). Mind mapping in PBL can help students understand information more deeply and thoroughly (Nuramalina et al., 2022; Ridwanulloh et al., 2022). With attractive visuals, it becomes easier for students to remember the information they have learned and relate it to

new concepts encountered in the learning process. The use of mind mapping in the PBL learning model has several benefits. First, mind mapping allows students to organize their ideas visually, making it easier to understand the relationships between complex concepts. In this way, students can solve problems more systematically and in a in a structured manner. Secondly, mind mapping can also help students hone their critical thinking skills, as they are required to develop logical arguments and reasons to support their ideas. Third, mind mapping can also increase students' creativity, as this technique allows them to explore more widely in finding solutions to a problem. Through the use of mind mapping in the PBL learning model, students can summarize the information obtained more efficiently, visualize the relationship between concepts clearly, and create a deep understanding of the problem at hand (Nurasiah et al., 2024; H. R. S. Tanjung et al., 2024).

Mind mapping can also facilitate the solution-finding process, as students can see the overall picture of the problem and look for patterns that may be connected (Maharrany & Kuntjoro, 2022; Meilina et al., 2024). Students will be trained to think creatively in finding innovative and effective solutions. Students will be accustomed to seeing problems from various points of view, identifying relationships between concepts, and developing creativity in formulating solutions. Thus, students' creative thinking skills will continue to be honed and fostered optimally. The results of this study make an important contribution to understanding how the use of mind mapping in the problem-based learning model can improve students' creative thinking skills. This study shows that mind mapping plays a significant role in helping students organize information, develop ideas, and design creative solutions to the problems they face. In addition, this technique allows students to be more actively involved in the learning process, thereby encouraging the development of critical and creative thinking skills more optimally. This research underscores the importance of innovative learning methods that facilitate the development of creative thinking skills among students, which is in line with the demands of 21st century education. These findings can be the basis for the development of more effective learning strategies, where mind mapping and problem-based learning can be more widely integrated in the educational curriculum. One of the limitations of this study is the lack of observation of external factors such as variations in students' learning styles or technological support that can affect the effectiveness of mind mapping use. These factors require further research to get a more complete picture of the role of mind mapping in improving creative thinking skills. Further research recommendations include further exploration of how the integration of technology, such as mind mapping software, can strengthen learning outcomes, as well as deeper observations of the influence of mind mapping in various learning contexts. An interdisciplinary approach involving educational psychology and learning technology can also enrich understanding of the effectiveness of these methods.

4. CONCLUSION

The results showed that the use of mind mapping really helped students to improve students' thinking creativity. Students' ability to analyze a problem is faster with the help of mind mapping. The use of mind mapping in the PBL learning model can make a great contribution to improving students' creative thinking skills. Through mind mapping, students can learn to solve problems collaboratively, develop students' creativity, and understand information more deeply. By utilizing mind mapping techniques in PBL learning, students will be better able to understand complex concepts, hone their critical thinking skills, and improve their creativity in solving problems.

5. REFERENCES

Ardiansyah, A. (2023). Pengembangan Bahan Ajar PAI Berbasis Model Mind Mapping pada Materi Sholat Berjamaah Kelas II di SDN 2 Keniten. *Social Science Academic*, *1*(1), 201–212. https://doi.org/10.37680/ssa.v1i1.3363.

Ardiansyah, A., Hardiyanti, W. E., Arif, R. M., & Alwi, N. M. (2023). Efek Kinerja Guru terhadap Etensi Peserta Didik Kelas Awal dengan Media Gambar sebagai Variabel Moderating. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *7*(3), 2977–2986. https://doi.org/10.31004/obsesi.v7i3.3284.

Asuri, A. R., Suherman, A., & Darman, D. R. (2021). Penerapan Model Problem Based Learning (PBL) Berbantu Mind Mapping dalam Pembelajaran Fisika untuk Meningkatkan Kemampuan Pemecahan Masalah pada Materi Usaha dan Energi. *Jurnal Penelitian Pembelajaran Fisika*, *12*(1), 22–28. https://doi.org/10.26877/jp2f.v12i1.7624.

Asyah, S., Faradiba, A., & Bahri, A. (2024). Systematic Literature Review: Using Mind Mapping to Improve Students' Creative Thinking Abilities. *Journal Of Digital Learning And Distance Education*, *3*(1), 921–929. https://doi.org/10.56778/jdlde.v3i1.269.

Birgili, B. (2015). Creative and critical thinking skills in problem-based learning environments. *Journal of Gifted Education and Creativity*, *2*(2), 71–80. https://doi.org/10.18200/JGEDC.2015214253.

Calavia, M. B., Blanco, T., & Casas, R. (2021). Fostering creativity as a problem-solving competence through design: Think-Create-Learn, a tool for teachers. *Thinking Skills and Creativity*, *39*, 100761. https://doi.org/10.1016/j.tsc.2020.100761.

Chang, Y., Li, B. D., Chen, H. C., & Chiu, F. C. (2015). Investigating the synergy of critical thinking and creative thinking in the course of integrated activity in Taiwan. *Educational Psychology*, *35*(3), 341–360. https://doi.org/10.1080/01443410.2014.920079.

De Jager, C., Muller, A., & Roodt, G. (2013). Developing creative and innovative thinking and problem-solving skills in a financial services organisation. *SA Journal of Human Resource Management*, *11*(1), 1–10. https://doi.org/10.4102/sajhrm.v11i1.502.

Dewanti, B. A., Aprilia, N. S., & Susanti, I. (2022). Analisis Literasi Sains Siswa SMP pada Pembelajaran IPA dengan Model Problem Based Learning Disertai Mind Mapping. *PSEJ (Pancasakti Science Education Journal)*, *7*(2), 89–96. https://doi.org/10.24905/psej.v7i2.149.

Ernitasari, A. O., Susanto, S., Safrida, L. N., Sunardi, S., & Oktavianingtyas, E. (2022). Keterampilan Berpikir Kreatif Siswa Dalam Menyelesaikan Masalah Segiempat Ditinjau dari Self-Confidence. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *5*(5), 1231–1242. https://doi.org/10.22460/jpmi.v5i5.1231-1242.

Fitria, Y. (2019). Mampukah Model Problem Based Learning meningkatkan Prestasi Belajar Sains Mahasiswa Calon Guru Sekolah Dasar? *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, *3*(1), 83–91. https://doi.org/10.24036/jippsd.v3i1.106372.

Foster, J., & Yaoyuneyong, G. (2016). Teaching innovation: equipping students to overcome real-world challenges. *Higher Education Pedagogies*, *1*(1), 42–56. https://doi.org/10.1080/23752696.2015.1134195.

García-Pérez, L., García-Garnica, M., & Olmedo-Moreno, E. M. (2021). Skills for a working future: How to bring about professional success from the educational setting. *Education Sciences*, *11*(1), 1–25. https://doi.org/10.3390/educsci11010027.

Hikmah, M. (2020). Penerapan Model Project Based Learning Untuk Meningkatkan Partisipasi Dan Hasil Belajar Pemrograman Dasar Siswa. *Jurnal Teknodik*, *24*(1), 27–

38. https://doi.org/10.32550/teknodik.v0i2.376.

Inayah, Z., Buchori, A., & Pramasdyahsari, A. S. (2021). The effectiveness of problem based learning (PBL) and project based learning (PjBL) assisted kahoot learning models on student learning outcomes. *International Journal of Research in Education*, *1*(2), 129–137. https://doi.org/10.26877/ijre.v1i2.8630.

Islami, F. N., Putri, G. D., & Nurdwiandari, P. (2018). Kemampuan fluency, flexibility, orginality, dan self confidence siswa SMP. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *1*(3), 249–258. https://doi.org/10.22460/jpmi.v1i3.p249-258.

Kasuga, W., Maro, W., & Pangani, I. (2022). Effect of Problem-Based Learning on Developing Science Process Skills and Learning Achievement on the Topic of Safety in Our Environment. *Journal of Turkish Science Education*, *19*(3), 872–886. https://doi.org/10.36681/tused.2022.154.

Khuri, A. D., Kusumaningrum, S. R., & Dewi, R. S. I. (2022). Development Of An E-Module Based On A Mind MAP Strengthening Student's Critical Thinking In Class IV SD. *Jurnal Ilmiah Mandala Education*, *8*(4), 3074–3081. https://doi.org/10.58258/jime.v8i4.4081.

Maharrany, A. A., & Kuntjoro, S. (2022). Profile of Mind Mapping Utilization in Learning During 2018-2022. *IJORER: International Journal of Recent Educational Research*, *3*(3), 288–300. https://doi.org/10.46245/ijorer.v3i3.212.

Marjanovič-Umek, L., Fekonja-Peklaj, U., & Podlesek, A. (2014). The effect of parental involvement and encouragement on preschool children's symbolic play. *Early Child Development and Care*, *184*(6), 855–868. https://doi.org/10.1080/03004430.2013.820726.

Masliani, M., Putra, A. P., & Winarti, A. (2019). Senior High School Students' Creative Thinking In The Ecological Learning Through Mind Mapping Strategy - A Development Research. *European Journal of Education Studies*, *5*(12), 80–90. https://doi.org/10.5281/zenodo.2600513.

Maulidya, H. Z., Aprilia, N., & Hanafi, Y. (2021). Studi Literatur Peningkatan Kemampuan Analisis Siswa Melalui Model PBL Pada Pembelajaran IPA Biologi. *Journal of Biology Learning*, *3*(2), 55–64. https://doi.org/10.32585/jbl.v3i2.1526.

Meilina, D., Hanafiah, N. A., Fatmawan, A. R., Hamzah, M. Z., Ulimaz, A., & Priyantoro, D. E. (2024). Efektivitas Penggunaan Metode Mind Mapping untuk Meningkatkan Kreativitas Siswa dalam Pembelajaran. *Attractive: Innovative Education Journal*, *6*(1), 27–38. https://doi.org/10.51278/aj.v6i1.1041.

Mitra, S. N., Qomariyah, S., & Rahmawati, S. (2023). Peran Metode Mind Mapping Dalam Meningkatkan Berpikir Sistematis Pada Siswa Di SMP Islam Hegarmanah Sukabumi. *SOKO GURU: Jurnal Ilmu Pendidikan*, *3*(1), 84–103. https://doi.org/10.55606/sokoguru.v3i1.2089.

Mursid, M., & Ayu, K. K. (2021). Perlibatan Orang Tua Dalam Pengembangan Kreativitas Anak Usia Dini Di Kb Tunas Bangsa Ds. Gondang Kec. Subah Kab. Batang. *PELANGI: Jurnal Pemikiran Dan Penelitian Islam Anak Usia Dini*, *3*(1), 1–12. https://doi.org/10.52266/pelangi.v3i1.621.

Nuramalina, A. R., Rahmatan, H., Safitri, R., Pada, A. U. T., Nurmaliah, C., & Evendi, E. (2022). Using Project-Based Learning Model with Mind Mapping Method to Increase Students' Learning Motivation. *Jurnal Penelitian Pendidikan IPA*, *8*(6), 2712–2716. https://doi.org/10.29303/jppipa.v8i6.2152.

Nurasiah, S., Aeni, A. N., & Hanifah, N. (2024). The Influence Of Problem Based Learning Assisted By Mind Mapping On Student Learning Outcomes And Creative Thinking Skills In Class Vi Social Studies Lessons. *Jurnal Cakrawala Pendas*, *10*(1), 108–121. https://doi.org/10.31949/jcp.v10i1.7570.

Nuryanti, S., Masykuri, M., & Susilowati, E. (2018). Analisis Iteman dan model Rasch pada pengembangan instrumen kemampuan berpikir kritis peserta didik sekolah menengah kejuruan. *Jurnal Inovasi Pendidikan IPA*, *4*(2), 224–233. https://doi.org/10.21831/jipi.v4i2.21442.

Pramitha, G. A. K. W., & Sujana, I. W. (2023). Model Problem Based Learning Berbantuan Media Mind Mapping Terhadap Kompetensi Pengetahuan IPS. *Mimbar Pendidikan Indonesia*, *3*(1), 36–41. https://doi.org/10.23887/mpi.v3i1.44974.

Ramadhan, S., Mardapi, D., Prasetyo, Z. K., & Utomo, H. B. (2019). The development of an instrument to measure the higher order thinking skill in physics. *European Journal of Educational Research*, *8*(1), 743–751. https://doi.org/10.12973/eu-jer.8.3.743.

Ridho, A., & Imron, M. (2023). Penerapan Metode Mind Mapping Dalam Upaya Peningkatan Hasil Belajar Siswa. *Journal Creativity*, *1*(2), 88–95. https://doi.org/10.62288/creativity.v1i2.10.

Ridwanulloh, A., Suyahmo, S., & Utomo, C. B. (2022). The Effects of a Problem-Based Learning Model Aided by Mind Mapping on Self-directed Learning in Elementary School Students. *Journal of Primary Education*, *11*(1), 1–13. https://doi.org/10.15294/jpe.v11i1.53645.

Rochanah, S. (2021). Upaya Meningkatkan Daya Ingat Tentang Materi Keseimbangan Lingkungan Dengan Menerapkan Teknik Mind Mapping. *Journal on Education*, *4*(1), 114–127. https://doi.org/10.31004/joe.v4i1.414.

Rohman, F. (2022). Problem Based Learning in Islamic Religious Education: The Case of the Indonesian Pesantren. *Global Journal Al-Thaqafah*, *12*(1), 82–97. https://doi.org/10.7187/GJAT072022-5.

Sanjani, M. A. (2021). Pentingnya Strategi Pembelajaran Yang Tepat Bagi Siswa. *Jurnal Serunai Administrasi Pendidikan*, *10*(2), 32–37. https://doi.org/10.37755/jsap.v10i2.517.

Saputri, Y., & Wardani, K. W. (2021). Meta Analisis: Efektivitas Model Pembelajaran Problem Solving dan Problem Based Learning Ditinjau Dari Kemampuan Pemecahan Masalah Matematika SD. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(2), 935–948. https://doi.org/10.31004/cendekia.v5i2.577.

Setiani, A., Lukman, H. S., & Suningsih, S. (2020). Meningkatan Kemampuan Pemecahan Masalah Matematis Menggunakan Strategi Problem Based Learning Berbantuan Mind Mapping. *Prisma*, *9*(2), 128–135. https://doi.org/10.35194/jp.v9i2.958.

Sholihah, T. M., & Lastariwati, B. (2020). Problem based learning to increase competence of critical thinking and problem solving. *Journal of Education and Learning (EduLearn)*, *14*(1), 148–154. https://doi.org/10.11591/edulearn.v14i1.13772.

Sihombong, T. S., Kurniangsih, S., & Retnowati, R. (2020). Efevtifitas Problem Based Learning dengan Mind Mapping untuk Meningkatkan Keterampilan Berpikir Kritis Siswa SMP. *JSEP (Journal of Science Education and Practice)*, *4*(1), 11–21. https://doi.org/10.33751/jsep.v4i1.2826.

Siregar, R. L. (2021). Memahami tentang Model, Strategi, Metode, Pendekatan, Teknik, dan Taktik. *Hikmah: Jurnal Pendidikan Islam*, *10*(1), 63–75. https://doi.org/10.55403/hikmah.v10i1.251.

Tanjung, D. F., Syahputra, E., & Irvan, I. (2020). Problem based learning, discovery learning, and open ended models: An experiment on mathematical problem solving ability. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, *4*(1), 9–16. https://doi.org/10.31764/jtam.v4i1.1736.

Tanjung, H. R. S., Octavia, M. A. N., & Irawan, S. G. (2024). Upaya Peningkatan Kreativitas Peserta Didik Melalui Model Pembelajaran Project Based Learning (Mind Mapping) Dalam Pembelajaran Sejarah. *Sindoro: Cendikia Pendidikan*, *5*(2), 71–80.

https://doi.org/10.9644/sindoro.v5i2.3957.

Wahyu, E. S., Sahyar, E. M. G., & Ginting, E. M. (2017). The effect of problem based learning (PBL) model toward student's critical thinking and problem solving ability in senior high school. *American Journal of Educational Research*, *5*(6), 633–638. https://doi.org/10.12691/education-5-6-7.

Yuniar, V., & Hadi, S. (2023). Pengaruh Model Pembelajaran PBL Berbasis STEM Menggunakan Bantuan Mind Mapping terhadap Peningkatan Kemampuan Berpikir Kreatif. *Jurnal Tadris IPA Indonesia*, *3*(1), 44–54. https://doi.org/10.21154/jtii.v3i1.1165.