JPPIPA 11(5) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

The Effect of The Jigsaw Type Cooperative Learning Model Integrated with The Mind Mapping Technique on The Motivation and Learning Outcomes of Elementary School Students in Grade V

Farkhan Nur Mahdi[1*], Akhmad Junaedi[1]

[1]Department of Elementary School Teacher Education, FIPP, Semarang State University, Semarang, Indonesia.

Received: January 02, 2025
Revised: March 21, 2025
Accepted: May 25, 2025
Published: May 31, 2025

Corresponding Author:
Farkhan Nur Mahdi
farkhannurmahdi@students.unnes.ac.id

DOI: 10.29303/jppipa.v11i5.11438

© 2025 The Authors. This open access article is distributed under a (CC-BY License)

Abstract: This study examined the effect of the Jigsaw cooperative learning model integrated with Mind Mapping techniques on fifth-grade students' motivation and learning outcomes at Kalisegoro Elementary School. Using a quasi-experimental design with non-equivalent control groups, 46 students were divided into experimental (n = 23) and control (n = 23) groups. The experimental group received instruction through the Jigsaw cooperative learning model integrated with Mind Mapping, while the control group was taught using an interactive lecture method. Data were collected through cognitive tests and motivation questionnaires. Results showed significant improvements in both groups' learning outcomes ($p < 0.05$), with the experimental group demonstrating greater gains (mean increase from 65.57 to 84.17) compared to the control group (55.30 to 71.13). The Mann-Whitney U test confirmed significant differences between groups ($p = 0.004$) with an effect size of $r = 0.42$ (medium effect). Similarly, learning motivation increased more substantially in the experimental group (68.09 to 76.70) than the control group (66.04 to 73.87), with a significant difference between groups ($p = 0.001$) and an effect size of Cohen's $d = 0.163$ (small effect). The findings suggest that the Jigsaw cooperative learning model with Mind Mapping effectively enhances both motivation and learning outcomes in elementary school science education.

Keywords: Cooperative learning; Jigsaw; Learning outcomes; Mind mapping; Motivation

Introduction

Education plays a vital role in human development by shaping high-quality human resources. According to Indonesia's National Education System Law No. 20 of 2003, Article 1, Paragraph 1, education is defined as a conscious and planned effort to create an atmosphere, process, and student engagement in learning to develop spiritual strength, self-control, good character, intelligence, moral values, and skills needed for society, nation, and state. The national education system aims to develop students' potential to become individuals who are faithful to God, morally upright, healthy, knowledgeable, capable, creative, independent, and democratic citizens with responsibility.

Educational implementation occurs systematically through schools and continuous learning processes. Permendikbudristek No. 5 of 2022 concerning Graduate Competency Standards states that competence represents an integration of attitudes, skills, and

How to Cite:
Mahdi, F. N., & Junaedi, A. (2025). The Effect of The Jigsaw Type Cooperative Learning Model Integrated with The Mind Mapping Technique on The Motivation and Learning Outcomes of Elementary School Students in Grade V. *Jurnal Penelitian Pendidikan IPA*, *11*(5), 550–556. https://doi.org/10.29303/jppipa.v11i5.11438

knowledge that demonstrates students' capabilities resulting from the learning process. Education at all levels must be implemented sequentially to achieve national educational goals, ensuring that learning processes develop not only knowledge but also attitudes and skills relevant to students' holistic developmental needs.

Indonesia's current educational approach employs the "Merdeka Curriculum" (Freedom Curriculum), which emphasizes competency-based learning and provides greater flexibility for schools, instructors, and students to determine optimal methods for meeting each student's learning needs (Lahabu et al., 2024). The curriculum serves as a guideline for the learning process, containing educational objectives, required competencies, and learning materials. The effectiveness of academic institutions in implementing and achieving curriculum goals greatly depends on educators' ability to manage classroom learning processes (Nurjanah et al., 2024).

To achieve curriculum objectives, educators must not only master the subject matter but also create orderly and conducive learning conditions enabling students to engage meaningfully in the learning process (Hanipah et al., 2022). A conducive learning environment can be established by implementing appropriate learning strategies or methods. Therefore, educators should not be limited to a single strategy or method but must master various instructional approaches. This diverse mastery allows teachers to flexibly adjust their teaching approach according to student characteristics, learning objectives, and situational demands. Implementing varied teaching methods can motivate students to participate more actively in the learning process, creating a dynamic and interactive atmosphere that ultimately promotes optimal learning outcomes (Irawati et al., 2024). Additionally, Mardhiyah et al. (2021) assert that implementing specific learning models in the educational process is expected to enhance learning quality while effectively achieving learning objectives.

Initial observations conducted in December 2024 at Kalisegoro Elementary School's fifth-grade class revealed several challenges in the learning process. The most significant finding was that 65% of students scored below the Learning Objective Achievement Criteria (KKTP) in science subjects, indicating a critical academic performance issue. This quantitative evidence was supported by qualitative data from interviews with classroom teachers, which identified multiple contributing factors including students' dissatisfaction with current teaching methods, lack of interest in certain subjects, weak internal student motivation, and insufficient parental attention at home.

This underperformance stems from teachers' inappropriate use of learning model approaches, causing student boredom and a lack of enthusiasm, which leads to classroom disruptions. Observations indicate that students tend to be less actively engaged in class, creating a cycle of poor academic outcomes and decreased motivation.

Recognizing that student learning outcomes remain low, efforts to improve them must focus on enhancing the learning process (Indria, 2023). This research addresses a critical gap by proposing the integration of two complementary pedagogical approaches: The Jigsaw cooperative learning model and Mind Mapping techniques. While previous studies have examined these methods separately, few have systematically investigated their combined effect on both motivation and learning outcomes in elementary science education. Furthermore, this study provides practical evidence for addressing the specific challenges identified at Kalisegoro Elementary School, where Interactive lecture methods have proven insufficient for meeting diverse learning needs.

The Jigsaw learning model is part of the cooperative learning approach that emphasizes peer learning through structured group work. In this model, students are organized into home groups where each member is responsible for learning a distinct subtopic and teaching it to peers. This arrangement enables students to assist one another in comprehending information about related subjects, creating interdependence that ensures both individual accountability and group success (Hugerat et al., 2021). Furthermore, this model emphasizes cooperation and individual responsibility within groups, ensuring students learn not only for themselves but also help other group members understand the material (Lathifa et al., 2024).

The Jigsaw model aligns perfectly with 21st-century learning requirements, which emphasize critical thinking, collaboration, communication, and creativity, commonly known as the 4Cs. According to Rosvadiana et al. (2023), the Jigsaw model embodies essential elements of 21st-century learning by creating structured peer-teaching opportunities where students become both learners and teachers. This dual role develops communication skills as students must articulate complex concepts clearly to peers while simultaneously building critical thinking abilities through the synthesis and reorganization of information for teaching purposes. The collaborative problem-solving inherent in this approach enables students to address challenges in science subjects collectively, thereby enhancing individual cognitive abilities (Fani et al., 2024).

However, effective implementation of the Jigsaw cooperative learning model requires appropriate learning media support Mind mapping serves as a powerful complementary tool, described as "a powerful graphic technique that provides a universal key to unlock the potential of the brain" (Swadarma, 2013). This medium allows students to visually organize information, map relationships between concepts systematically, and make information more comprehensible. Through mind mapping, students can summarize learned material creatively and engagingly, potentially increasing their learning motivation while supporting the knowledge organization required in Jigsaw activities.

Several studies demonstrate the effectiveness of combining Jigsaw learning models with mind mapping in educational settings. Auva et al. (2021) found that the Jigsaw cooperative learning model with mind mapping significantly improved thematic learning outcomes of fifth-grade students at SDN 01 Bengkulu Tengah, with experimental groups outperforming control groups in multiple subject areas.

Similarly, Irawati et al. (2024) documented substantial improvements in both motivation (from 2.15 to 3.83) and learning outcomes (from 42 to 80% completion) when implementing the Jigsaw cooperative learning model with supporting media in fifth-grade science classes. Hasmawati et al. (2024) further confirmed the efficacy of mind mapping methods, revealing significantly higher science learning outcomes compared to conventional approaches (t_{count} 6.189 > t_{table} 1.666) among elementary school students.

Based on the identified problems and supporting literature, this research focuses on investigating the effect of the Jigsaw cooperative learning model integrated with mind mapping techniques on improving student motivation and learning outcomes in fifth-grade science education.

Method

This research employed a quantitative method with a quasi-experimental design, specifically using the nonequivalent control group design. This design was chosen as it allows for testing cause-effect relationships in more flexible conditions while maintaining research validity when random assignment is not feasible. According to Sugiyono (2013), this design includes a control group but cannot fully function to control external variables that may influence the implementation of the experiment.

O_1	X	O_2
O_3		O_4

Figure 1. Nonequivalent control group design

The symbols O_1 and O_3 represent pretest assessments conducted prior to learning model implementation. Symbol X indicates the treatment or learning process (implementation of the Jigsaw model integrated with Mind Mapping). Symbols O_2 and O_4 represent post-test assessments conducted after the implementation of the learning model.

The study population comprised fifth-grade elementary school students in the Dewi Kunthi cluster in Gunungpati, Semarang City. Using purposive sampling, 46 students were selected as the research sample based on specific criteria ensuring comparability between groups. Twenty-three fifth-graders from Kalisegoro Elementary School constituted the experimental group, while twenty-three fifth-graders from Ngijo 01 Elementary School formed the control group. These schools were selected based on similar characteristics regarding academic achievement (based on previous year's assessment data showing comparable mean scores), school facilities (both schools have adequate classroom facilities and learning resources), and socioeconomic background of students (both schools serve communities with similar demographic profiles as indicated by school enrollment data).

The research was conducted in three systematic stages: preparation stage, implementation stage, and assessment stage.

Preparation stage: This phase involved developing and validating research instruments to assess motivation and cognitive learning outcomes through pretests and posttests. Learning modules were developed for both experimental and control groups, tailored to research objectives while ensuring content consistency. The experimental group module incorporated structured Jigsaw activities with Mind Mapping guidelines, while the control group module followed interactive lecture formats.

Implementation stage: Both groups received pretests to determine baseline abilities in learning outcomes and motivation. The experimental group then received treatment using the Jigsaw cooperative learning model integrated with Mind Mapping techniques, following six procedural steps: forming home groups of 4-6 members, receiving material overview from teachers, individual assignment of specific subtopics, expert group discussions for in-depth material exploration, return to home groups for peer teaching, and individual assessments. The control group received instruction through interactive lecture methods using standard school textbooks. Treatment was implemented three times, with each session lasting 70 minutes (equivalent to 2 lesson hours). Both groups covered identical content focusing on the human digestive system, associated disorders, and nutrient types to ensure comparability. Following treatment completion, both groups received posttests to measure changes in motivation and learning outcomes.

Assessment stage: Pretest and posttest data were analyzed using SPSS version 26. Data analysis included descriptive statistics, normality testing using Shapiro-Wilk tests, and appropriate inferential statistics based on data distribution. For normally distributed data, parametric tests (Independent Samples t-test) were employed, while non-parametric tests (Mann-Whitney U and Wilcoxon Signed Ranks tests) were used for non-normally distributed data.

Result and Discussion

The purpose of this research is to measure the effect of the Jigsaw cooperative learning model integrated with Mind Mapping technique on students' motivation and cognitive learning outcomes. Motivation and cognitive outcomes were assessed using pretest and post-test instruments. The pretest and post-test results served as the primary data for testing the research hypothesis (Ekawati & Kusumaningrum, 2020). The pretest and post-test were administered to experimental and the control groups to determine differences in motivation and learning outcomes before and after the intervention.

The findings of this study demonstrate a positive effect of the Jigsaw-type cooperative learning model integrated with the mind mapping technique on both student motivation and cognitive learning outcomes. Assessment was conducted in two groups: the experimental group, which implemented the Jigsaw-type cooperative learning model integrated with mind mapping, and the control group, which applied the interactive lecture method. In the experimental group, the Jigsaw model was implemented following six structured procedural steps: students formed home groups of 4-6 members; teachers provided material overviews; each group member was assigned responsibility for learning a specific subtopic; members studying the same subtopic convened in expert groups for in-depth discussions; after expert group discussions, students returned to home groups to teach peers; and individual assessments were administered at lesson conclusion (Hugerat et al., 2021). Throughout implementation, Mind Mapping techniques were integrated to help students organize and visualize information during both expert group discussion and peer teaching phases.

The control group followed interactive lecture methods using standard school textbooks. Both groups received instruction on identical content focusing on the human digestive system, associated disorders, and nutrient types to ensure comparability. All procedural steps were consistently implemented across the three treatment sessions.

Description of Pretest and Posttest Data

There were 23 students in the experimental group and 23 students in the control group for this study. Learning motivation and cognitive learning outcomes were assessed before (pretest) and after (post-test) the learning model was implemented into the lesson. Cognitive learning outcomes data were obtained through cognitive tests, while learning motivation data were collected using questionnaires.

Learning Outcomes Analysis

Descriptive statistics of the pretest and post-test learning outcomes in the experimental and control groups are presented in Table 1.

Table 1. Descriptive statistics – learning outcomes

	N	Minimum	Maximum	Mean	Std. Deviation
Experiment pretest	23	40	96	65.57	15.480
Experiment post-test	23	52	100	84.17	12.503
Control pretest	23	12	96	55.30	21.291
Control posttest	23	40	100	71.13	14.818

The descriptive statistical analysis revealed differences in mean scores between the experimental and control groups at both pretest and posttest. The experimental group showed an increase from 65.57 (pretest) to 84.17 (posttest), while the control group increased from 55.30 to 71.13. The improvement in the experimental group was higher than in the control group. To determine the appropriate statistical tests for further analysis, the Shapiro-Wilk normality test was conducted (due to the sample size < 50). Data were considered normally distributed if $p > 0.05$.

Table 2. Tests of normality– learning outcomes

Learning outcomes	Shapiro-Wilk		
	Statistic	df	Sig.
Experiment pretest	.940	23	.181
Experiment posttest	.925	23	.087
Control pretest	.920	23	.068
Control posttest	.900	23	.025

Based on Table 2, the results of the normality test indicate that the data are not normally distributed. Therefore, nonparametric tests, namely the Wilcoxon Signed Ranks Test and the Mann-Whitney U Test, were employed for further analysis. The Wilcoxon Signed Ranks Test was used to assess the significance of changes within each group (experimental and control) from pretest to posttest, with significance determined at $p < 0.05$. The Mann-Whitney U Test was applied to examine whether there was a significant difference in posttest scores between the experimental and control groups as a result of the different learning models. A difference between groups was considered significant if $p < 0.05$.

Table 3. Wilcoxon signed ranks test–learning outcomes

	Experiment posttest - Experiment pretest	Control posttest - Control pretest
Z	-4.231b	-4.025b
Asymp. Sig.(2-tailed)	.000	.000

Table 4. Mann-Whitney test– learning outcomes

	Learning Outcome
Mann-Whitney U	133.500
Wilcoxon W	409.500
Z	-2.899
Asymp. Sig. (2-tailed)	.004

Based on Table 3 and 4, Results indicate significant improvements within both groups ($p < 0.001$) and significant differences between groups ($p = 0.004$). To measure the magnitude of the effect of the jigsaw-type cooperative learning model integrated with the mind mapping technique compared to the interactive lecture method, the effect size was calculated using r. The result of the calculation was $r = 0.42$, indicating a medium effect size.

Motivation Analysis

Descriptive statistics of the pretest and post-test learning motivation in the experimental and control groups are presented in Table 5.

Table 5. Descriptive statistics-motivation

	N	Minimum	Maximum	Mean	Std. Deviation
Experiment pretest	23	58	77	68.09	6.067
Experiment posttest	23	73	80	76.70	2.265
Control pretest	23	56	75	66.04	5.514
Control posttest	23	65	80	73.87	3.152

The descriptive statistical analysis revealed differences in mean scores between the experimental and control groups at both pretest and post-test. The experimental group showed an increase from 68.09 (pretest) to 76.70 (posttest), while the control group increased from 66.04 to 73.87. The improvement in the experimental group was higher than in the control group. Subsequently, a normality test was conducted, and the results indicated that the data were normally distributed, as evidenced by p-values greater than 0.05. The results are presented in Table 6.

Table 6. Tests of normality-motivation

Learning Outcomes	Shapiro-Wilk		
	Statistic	df	Sig.
Experiment pretest	.935	23	.140
Experiment post-test	.937	23	.154
Control pretest	.952	23	.323
Control post-test	.943	23	.210

Since the data were normally distributed, a parametric test, specifically the Independent Samples Test, was conducted. This test was applied to determine whether there was a significant difference in post-test scores between the experimental and control groups as a result of the different learning models. A difference between groups was considered statistically significant if $p < 0.05$.

Table 7. T-test-motivation

	t	Sig. (2-tailed)
Equal variances assumed	3.492	.001
Equal variances not assumed	3.492	.001

Table 7 shows a significant difference in learning motivation between the experimental and control groups, as indicated by the Asymp. Sig. (2-tailed) value of less than 0.05. Furthermore, the effect size calculated using Cohen's d was 0.163, which falls within the small effect size category. This suggests that although there is a statistically significant difference between the two groups, the magnitude of the treatment effect on the experimental group is small.

The research findings demonstrate that the Jigsaw cooperative learning model integrated with Mind Mapping techniques significantly enhances both learning outcomes and motivation among fifth-grade students. The experimental group achieved superior results in both measures compared to the control group, supporting the effectiveness of this integrated approach.

The substantial improvement in learning outcomes aligns with findings from Blajvaz et al. (2022), who reported that the Jigsaw technique significantly enhanced students' achievement and motivation in physics among lower secondary education students. Similarly, Zhan et al. (2024) showed that Jigsaw-integrated learning led to significantly better performance in learning motivation and skills compared to general collaborative learning approaches.

Wu et al. (2023) found that the Jigsaw approach significantly increased student achievement by promoting effective peer interaction and active participation throughout the learning process. The competitive group dynamics inherent in the Jigsaw structure motivated students to engage more deeply with the material, resulting in improved academic performance for learners across different ability levels.

This supports our findings, which indicate substantial improvements in cognitive learning outcomes among students taught using the integrated approach.

The positive effects on student motivation observed in our study are also consistent with Wang et al. (2023), who demonstrated that Jigsaw cooperative learning positively influenced academic motivation and self-efficacy among students. The consistent results observed in various educational contexts collectively strengthen the evidence that the Jigsaw model, particularly when enhanced with visual organization tools like Mind Mapping, creates an engaging learning environment that fosters both academic achievement and motivational engagement.

The effectiveness of this integration can be attributed to several complementary mechanisms. The Jigsaw model promotes active engagement through structured peer teaching, ensuring that students must thoroughly understand material to teach others effectively. This creates individual accountability within a collaborative framework, enhancing both comprehension and retention. Mind Mapping supports this process by providing visual organization tools that help students synthesize and present information more effectively during expert group discussions and peer teaching phases.

However, as noted by Drouet et al. (2023), the impact of Jigsaw can vary depending on factors such as sample characteristics and content type. This variability suggests the importance of careful adaptation to specific educational contexts and the potential value of supportive tools like Mind Mapping to enhance consistency of outcomes.

Conclusion

The results of data analysis show that the Jigsaw cooperative learning model combined with Mind Mapping techniques significantly enhances both fifth-grade students' motivation and learning outcomes in science education. Statistical analysis confirmed significant differences between the experimental and control groups in learning outcomes ($p = 0.004$, medium effect size $d = 0.29$) and motivation ($p = 0.001$, small effect size $d = 0.163$). The experimental group demonstrated an average gain of 18.6 points in learning outcomes (from 65.57 to 84.17), which was notably higher than the control group's average gain of 15.83 points (from 55.30 to 71.13). A similar pattern was observed in motivation scores, with the experimental group showing greater improvement. The Jigsaw model with Mind Mapping appears to create a learning environment that fosters active participation, peer teaching, and visual organization of information, contributing to improvements relevant to the initial problems identified at Kalisegoro Elementary School. This model offers educators a promising instructional strategy for creating engaging, student-centered learning environments in primary schools that encourage motivation and academic achievement. Future research should examine long-term effects, applications across different subject areas, and optimal implementation strategies for diverse educational contexts.

Acknowledgments

The author thanks Allah SWT for the health that enabled this research to be completed. I express my gratitude to my supervisor for guidance throughout the research process and writing of this article. I also thank Kalisegoro Elementary School and Ngijo 01 Elementary School for allowing me to conduct research with their fifth-grade classes. Finally, I appreciate the support and encouragement from my parents and colleagues.

Author Contributions

Conceptualization, F.N.M. and A.J.; methodology, formal analysis, investigation, data curation, writing—original draft preparation, and visualization, F.N.M.; validation, resources, writing—review and editing, and supervision, A.J. All authors have read and agreed to the published version of the manuscript.

Funding

The research was conducted using the author's own resources without any external funding.

Conflicts of Interest

The authors declare no conflict of interest.

References

Auva, A., Hambali, D., & Resnani, R. (2021). Pengaruh Model Pembelajaran Kooperatif Tipe Jigsaw Berbantuan Peta Pikiran Terhadap Hasil Belajar Tematik Siswa Kelas V SDN 01 Bengkulu Tengah. *JURIDIKDAS: Jurnal Riset Pendidikan Dasar*, *4*(2), 284–290. Retrieved from https://ejournal.unib.ac.id/index.php/juridikdasunib/article/view/11898

Blajvaz, B. K., Bogdanović, I. Z., Jovanović, T. S., Stanisavljević, J. D., & Pavkov-Hrvojević, M. V. (2022). The Jigsaw Technique in Lower Secondary Physics Education: Students Achievement, Metacognition and Motivation. *Journal of Baltic Science Education*, *21*, Continuous. https://doi.org/10.33225/jbse/22.21.545

Drouet, O. C., Lentillon-Kaestner, V., & Margas, N. (2023). Effects of the Jigsaw Method on Student Educational Outcomes: Systematic Review and Meta-Analyses. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1216437

Ekawati, N. M., & Kusumaningrum, D. (2020). Pengaruh Penerapan Metode Pembelajaran Mind Mapping Terhadap Hasil Belajar Siswa Kelas V Sekolah Dasar Negeri 2 Sumberrejo Tahun Pelajaran 2018/2019. *JPDI (Jurnal Pendidikan Dasar Indonesia)*, *5*(2), 31. https://doi.org/10.26737/jpdi.v5i2.2091

Fani, A. F., Mardiana, T., Suryawan, A., & Kurniawati, A. (2024). Upaya Meningkatkatkan Hasil Belajar IPAS Melalui Model Pembelajaran Jigsaw Berbantuan Media "PATEMBAGAN." *Jurnal Pendidikan: Riset dan Konseptual*, *8*(1), 158–165. https://doi.org/10.28926/riset_konseptual.v8i1.897

Hanipah, A. D., Amalia, T. N., & Setiabudi, D. I. (2022). Urgensi Lingkungan Belajar yang Kondusif dalam Mendorong Siswa Belajar Aktif. *Jurnal Sosial Humaniora dan Pendidikan*, *2*(3), 41–51. https://doi.org/10.51903/education.v2i1.148

Hasmawati, H., Junaidi, I. A., & Ayu, I. R. (2024). Pengaruh Metode Mind Mapping Terhadap Hasil Belajar IPA Siswa Sekolah Dasar. *Social Science Academic*, 2(2), 9–18. https://doi.org/10.37680/ssa.v2i1.5177

Hugerat, M., Kortam, N., Kassom, F., Algamal, S., & Asli, S. (2021). Improving the Motivation and the Classroom Climate of Secondary School Biology Students Using Problem-Based – Jigsaw Discussion (PBL-JD) Learning. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(12). https://doi.org/10.29333/ejmste/11304

Indria, I. (2023). Upaya Peningkatan Hasil Belajar Biologi dengan Metode Pembelajaran Penyelidikan (Inquiry) dan Penemuan (Discovery) pada Siswa Kelas X. *STRATEGY: Jurnal Inovasi Strategi dan Model Pembelajaran*, *3*(4), 325–331.

Irawati, I., Kasdianto, D. Y., Wardana, L. A., & Sriwijayanti, R. P. (2024). Implementasi Model Pembelajaran Cooperative Learning Tipe Jigsaw Berbantuan Media Mock Up untuk Meningkatkan Motivasi dan Hasil Belajar Siswa pada Materi Ekosistem Kelas V SDN Jati 01 Probolinggo. *INNOVATIVE: Journal Of Social Science Research*, *4*(2), 4931–4940. https://doi.org/10.31004/innovative.v4i2.9434

Lahabu, Y. D., Sumarni, S., & Abroto, A. (2024). Tantangan dan Strategi Implementasi Kurikulum Merdeka pada Pendidikan Dasar. *AL-Banin: Jurnal Ilmiah Pendidikan Dasar*, *1*(1), 56–67.

Lathifa, N. N., Anisa, K., Handayani, S., & Gusmaneli, G. (2024). Strategi Pembelajaran Kooperatif dalam Meningkatkan Motivasi Belajar Siswa. *CENDEKIA: Jurnal Ilmu Sosial, Bahasa dan Pendidikan*, *4*(2), 69–81. https://doi.org/10.55606/cendikia.v4i2.2869

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. https://doi.org/10.31849/lectura.v12i1.5813

Nurjanah, S., Sadiah, A., & Aisyah, I. (2024). Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Berbantuan Media Mind Mapping dalam Meningkatkan Hasil Belajar Peserta Didik. *Jurnal Sains Student Research*, *2*(5), 10–19. https://doi.org/10.61722/jssr.v2i5.2403

Rosvadiana, L., Fadhilah, F. A., Faisal, R. A. A., & Suryanda, A. (2023). Peranan Pembelajaran Jigsaw dalam Membangun Kemampuan Abad 21 Peserta Didik. *Jurnal Pendidikan*, *24*(1), 21–31. https://doi.org/10.52850/jpn.v24i1.8119

Sugiyono, S. (2013). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.

Swadarma, D. (2013). *Penerapan Mind Mapping dalam Kurikulum Pembelajaran* (I. Hnifah (ed.)). Jakarta: PT Alex Media Komputido.

Wang, M., Alavi, M., & Izadpanah, S. (2023). The Impact of Jigsaw Cooperative Learning on Academic Motivation, Academic Hardiness, and Self-Efficacy of English Foreign Language Learners. *Learning and Motivation*, *84*, 101940. https://doi.org/10.1016/j.lmot.2023.101940

Wu, T.-T., Sari, N. A. R. M., & Huang, Y.-M. (2023). Flipped Jigsaw II Versus Conventional Flipped Classroom: Which Approach Better Improves Learning Outcomes in the International Marketing Management Course? *The International Journal of Management Education*, *21*(3), 100855. https://doi.org/10.1016/j.ijme.2023.100855

Zhan, Z., Li, T., & Ye, Y. (2024). Effect of Jigsaw-Integrated Task-Driven Learning on Students' Motivation, Computational Thinking, Collaborative Skills, and Programming Performance in a High-School Programming Course. *Computer Applications in Engineering Education*, *32*(6), e22793. https://doi.org/10.1002/cae.22793