Pijar :
Jurnal Penelitian Bidang Pendidikan dan Pembelajaran
2026, 6(1), 16-27
https://doi.org/10.56393/pijar.v6i1.3136

Enhancing Mathematics Learning Outcomes on the Volume of Three-Dimensional Shapes through the Peer Tutoring Method

Lilin Ruswanti [1], Wiputra Cendana [2*], Sean Patrick Kang [3]
[1] Universitas Terbuka, Indonesia
[2] Universitas Pelita Harapan, Indonesia
[3] National Sun Yat-sen University, Taiwan
* Author Correspondence

Article History
Received: 23 May 2026;
Revised : 27 June 2026;
Accepted: 25 November 2026.

Keywords
Mathematics Learning Outcomes;
Classroom Action Research;
Primary School;
Peer Tutoring;
Volume of Three-Dimensional Shapes.

Abstract
Mathematics is a fundamental subject that develops students' logical thinking, analytical abilities, and systematic reasoning from an early age. However, students often experience difficulties in understanding three-dimensional geometry, particularly the concepts of cube and cuboid volumes, due to limited instructional media and insufficient active engagement in learning. This study aims to examine the implementation of the peer tutoring method and its effectiveness in improving fourth-grade students' learning outcomes on cube and cuboid volumes. This Classroom Action Research (CAR) employed the Kemmis and McTaggart model and involved 26 fourth-grade students at SD Inpres Timika IV. The research was conducted in two cycles, each comprising planning, action, observation, and reflection. Data were collected through classroom observations, teacher reflection journals, and learning achievement tests. Data were analyzed using descriptive quantitative techniques, complemented by qualitative data triangulation. The findings revealed an improvement in students' learning outcomes across the two cycles. In Cycle I, 16 students (61.5%) achieved the minimum mastery criterion. Following improvements in lesson planning, student worksheets (LKS), and interactive learning activities, the number increased to 22 students (84.6%) in Cycle II, representing a 23.1-percentage-point increase and an N-gain of 0.60. These findings demonstrate that peer tutoring can improve mathematics learning outcomes while fostering collaborative learning. Its successful implementation requires adequate tutor preparation, concrete instructional media, and continuous teacher guidance to strengthen students' conceptual understanding of three-dimensional geometry.

Contact : Corresponding author e-mail: wiputra.cendana@uph.edu

How to Cite : Ruswanti, L., Cendana, W., & Kang, S. P. (2026). Enhancing Mathematics Learning Outcomes on the Volume of Three-Dimensional Shapes through the Peer Tutoring Method. *Pijar : Jurnal Penelitian Bidang Pendidikan Dan Pembelajaran*, *6*(1), 16–27. https://doi.org/10.56393/pijar.v6i1.3136

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Introduction

Mathematics learning is one of the essential subjects in the primary education curriculum, as it plays a role in training students' logical, systematic, and analytical thinking abilities. These abilities are necessary because mathematics learning encompasses the understanding of patterns, space, and relationships with changes that occur in everyday real life (NCTM, 2014). The results of the international assessment from the Programme for International Student Assessment (PISA) indicate the urgency of mathematics achievement in many countries, particularly Indonesia, so that the mathematics learning process needs to be designed to be more meaningful in accordance with students' needs (OECD, 2023). One of the materials considered quite challenging for primary school students is three-dimensional shapes, particularly the concept of the volume of cubes and cuboids. This difficulty arises from several factors, including the limitations of visual learning media, less varied teaching methods, and low student interest in learning.

Mahsup et al. (2020) also revealed that geometry concepts are often difficult for students to understand due to the dominance of teacher-centered learning methods and the lack of interaction among students. Students experience learning difficulties in geometry materials because of their inability to imagine imaginary three-dimensional forms from two-dimensional representations or their conceptual misunderstanding of the volume formulas of three-dimensional shapes (Fauzi & Arisetyawan, 2020). In addition, the difficulties experienced by primary school students occur when understanding mathematical information from word problems to imagine the form of three-dimensional shapes and determine the formula, which causes difficulties in performing arithmetic operations (Putri & Pujiastuti, 2021). Widiastuti et al. (2023) found the importance of using three-dimensional shape models to overcome difficulties in mathematics learning, where there is a tendency for students to merely memorize mathematical formulas without understanding the basic concepts of their use. Therefore, a more interactive learning approach to the volume of three-dimensional shapes is needed, along with assistance that invites students to be actively involved in learning.

A step that can be taken is the peer tutoring method, which is one of the cooperative learning strategies that can be used to address these problems. In this approach, students who have understood the material act as tutors for their peers who are still experiencing learning difficulties (Ramadhan et al., 2019). Thus, a more familiar and equal interaction occurs, enabling students to learn in a comfortable and conducive environment. The implementation of the peer tutoring method is also supported by Sujiati (2020), who stated that peer-based learning is able to increase students' motivation and involvement in learning activities. Topping (2005) emphasized the position of the tutor as a bridge between the teacher's role and the needs of students

who experience difficulties in obtaining explanations to receive learning assistance in a language that is easy to understand or appropriate to the student's ability level. Peer tutoring in mathematics learning provides significant academic support for students at both primary and secondary education levels because of the tutor's role in guiding students with clear instructions and structure. In the Indonesian context, the peer tutoring method has an impact on increasing student activity and learning outcomes (Aprianti et al., 2024; Arrahim & Ratnasari, 2023). Therefore, this study was conducted to examine how the implementation of the peer tutoring method can improve students' understanding of the volume of three-dimensional shapes in fourth grade at SD Inpres Timika IV. This is in line with the statement by Kurniawan et al. (2023) that collaborative learning also enhances interaction among students so that students' social skills also improve.

The peer tutoring method, in its theoretical foundation, aligns with social constructivism theory, which positions social interaction in the learning process as a primary part of students' cognitive development. Vygotsky (1978) explained that higher learning achievement is attained by students when they receive guidance from a more capable party (a peer or more knowledgeable other) within the context of the zone of proximal development. Cooperative learning emphasizes positive interaction aspects that align with interpersonal skills, the responsibility of both students and tutors, and face-to-face interaction to achieve learning objectives (Johnson & Johnson, 2009; Slavin, 1995). This indicates another positive impact of the peer tutoring method: in addition to improving learning outcomes, students also develop agency in asking questions, answering, and taking responsibility for the learning process that occurs. Thus, the success of the peer tutoring method depends on the teacher's instructional design, the selection and training of tutors, and the quality of interpersonal interaction among learning groups.

The effectiveness of implementing the peer tutoring method is supported by a number of previous studies. Mahsup et al. (2020) showed that learning complemented by peer tutoring fosters productive social interaction and improves learning outcomes. Furthermore, the implementation of peer tutoring can increase student learning activity, motivation, and mathematics learning mastery in accordance with learning objectives (Munaisah, 2022; Rosda, 2022; Razzaq & Ambo Tuo, 2022; Sopingi, 2021; Sunarto, 2022). Students with low self-confidence are greatly assisted in their learning progress through discussion and question-and-answer activities with tutors who are their peers (Rifa'i et al., 2022; Rohmah, 2019). In relation to cooperative learning, the peer tutoring strategy approach can support the process of conceptual understanding, particularly in complex mathematics materials, and enhance proactive participation in the learning process (Sanjata et al., 2022; Sujiati, 2020; Mertayasa, 2020; Ramadhan et al., 2019). However, the above studies mostly emphasize the improvement of student

scores in general. Therefore, this study emphasizes the analysis of tutor-student interaction in the learning process, the learning constraints of students who have not achieved mastery, and the local context of primary schools in Papua, which is still limited in its scientific discussion.

Based on the theories from previous research articles and books, the researchers intended to apply the peer tutoring method in mathematics learning at SD Inpres Timika. The students at SD Inpres Timika, especially in fourth grade, experienced a decline in examination scores, where the average score of fourth-grade students was only 68–70, which did not meet the passing standard in accordance with the Minimum Mastery Criteria (KKM). According to Munaisah (2022), who has implemented the peer tutoring method, this method is highly effective in improving students' understanding of abstract concepts by making them concrete. This study bridges the learning gap by implementing structured peer tutoring in accordance with the material on the volume of cubes and cuboids in fourth grade at SD Inpres Timika IV, with a focus on the dynamics of student participation, not merely learning mastery. The important contribution of this study lies in the Papuan context, which is relatively rare in publications using the Classroom Action Research (CAR) method in primary school mathematics subjects.

Considering the context and theoretical foundation above, this study aims to explore the implementation of the peer tutoring method and analyze the improvement in the learning outcomes of fourth-grade students on the volume of cubes and cuboids. The research questions underlying this CAR are as follows: (1) how is the peer tutoring strategy implemented in mathematics learning about the volume of cubes and cuboids?; (2) how do student learning outcomes improve after the classroom action conducted in two cycles? The CAR hypothesis in this study is that the implementation of the peer tutoring strategy, accompanied by the selection and training of tutors, the use of concrete learning media, and reflection on cycle implementation, can improve student learning outcomes in mathematics on the volume of three-dimensional shapes. This study is expected, theoretically, in the context of mathematics learning in primary schools, to enrich the study of cooperative learning and peer tutoring. Practically, this study can serve as an alternative strategy for teachers at all school levels to strengthen conceptual understanding through interaction with peers. The focus of this study's results encompasses learning mastery, increased participation, and the quality of interaction among students during the learning process.

Method

This study employed a qualitative approach with a Classroom Action Research (CAR) design. This approach was chosen because it is suitable for addressing learning problems contextually and directly in the classroom. The action model used refers to

the concept developed by Kemmis and McTaggart (1988, 2014), which consists of four cyclical stages, namely: planning, action implementation, observation, and reflection. These four stages are carried out repeatedly and aim to improve the learning process gradually and continuously. This study is collaborative in nature, meaning that the researchers worked actively with the classroom teacher as a peer partner in designing, implementing, and evaluating the learning actions carried out to resolve the learning problems faced by fourth-grade students. The subjects of this study were all fourth-grade students at SD Inpres Timika IV in the 2024/2025 academic year, totaling 26 students. The subjects were selected because they demonstrated a need for improved understanding of the volume of three-dimensional shapes. The research location was at SD Inpres Timika IV, located in Mimika Regency, Central Papua Province. The location was selected purposively based on the actual conditions in the field, which indicated learning problems that needed to be addressed through classroom action. This study was conducted in two action cycles, where each cycle included the following stages: planning, action implementation, observation, reflection. Data were analyzed descriptively and qualitatively, focusing attention on the changes that occurred during and after the action through data reduction, data display, and conclusion drawing (Miles et al., 2014). Observation data were analyzed to describe the development of student learning activities, the quality of interaction within groups, and the active role of students in the learning process. Meanwhile, learning outcome test data were analyzed quantitatively to determine the increase in learning mastery from Cycle I to Cycle II through the percentage of learning mastery and mastery gain (Hake, 1998). The percentage of learning mastery was calculated using the formula: Learning Mastery (%) = (Number of students achieving mastery / Total number of students) x 100%. This analysis provides a comprehensive picture of the effectiveness of the peer tutoring method in improving student learning outcomes.

Results and Discussion

Results

Instruction in Cycle I was executed in accordance with the initial lesson plan, utilizing structured worksheets and formative assessment instruments. Students were organized into small collaborative groups, with one high-achieving student designated as the peer tutor in each group. Results from the Cycle I formative assessment indicated that out of 26 students, 16 students (61.5%) achieved scores ≥ 70 (meeting the KKM), whereas 10 students (38.5%) remained below the mastery threshold (Table 1).

Table 1. Student Learning Outcomes in Cycle I

Achievement Category	Number of Students	Percentage (%)
Mastery (≥ 70)	16	61.5%
Non-Mastery (< 70)	10	38.5%
Total	26	100.0%

These findings indicate that although initial peer-tutoring implementation stimulated greater student participation, a substantial proportion of the class continued to struggle with spatial visualization and volume computation. Post-cycle reflection revealed three critical areas requiring refinement: (1) peer tutors tended to provide direct answers rather than scaffolding their peers' reasoning; (2) abstract two-dimensional illustrations were insufficient for struggling learners; and (3) teacher monitoring needed to be more proactive during group work.

To address these limitations, Cycle II incorporated targeted pedagogical modifications, including revised lesson plans, physical three-dimensional models of cubes and cuboids, structured worksheets with guiding prompts, and dedicated pre-lesson coaching for peer tutors on how to facilitate inquiry without divulging final answers. Following the Cycle II intervention, formative assessment results demonstrated substantial academic progress: 22 students (84.6%) attained mastery (≥ 70), leaving only 4 students (15.4%) below the KKM (Table 2).

Table 2. Student Learning Outcomes in Cycle II

Achievement Category	Number of Students	Percentage (%)
Mastery (≥ 70)	22	84.6%
Non-Mastery (< 70)	4	15.4%
Total	26	100.0%

Between Cycle I and Cycle II, overall learning mastery increased by 23.1 percentage points, rising from 61.5% to 84.6% and exceeding the predetermined success criterion of 75% for classroom action research. Furthermore, the normalized gain (N-gain), calculated based on the ratio of the actual improvement in learning mastery to the maximum possible improvement, reached 0.60, indicating a moderate level of learning improvement. These results demonstrate that the implementation of peer tutoring, supported by concrete learning media and structured tutor preparation, contributed positively to improving students' understanding of mathematical concepts, particularly the volume of cubes and cuboids.

In addition to the quantitative improvements, qualitative observations revealed positive changes in classroom interactions, student engagement, and the overall learning process. Students demonstrated greater confidence in explaining mathematical reasoning, increased willingness to ask questions for clarification, and more active participation in collaborative learning activities. These developments also reflected improvements in the classroom learning environment, particularly in terms of peer interaction, mutual support, and student involvement in problem-solving activities.

Overall, the findings suggest that peer tutoring not only improves students' learning outcomes but also fosters a more interactive, participatory, and collaborative mathematics learning environment in primary education. Table 3 presents a summary of the observed behavioral developments across the two research cycles.

Table 3. Summary of Classroom Observation Findings on Peer Tutoring Dynamics

Observation Aspect	Cycle I	Cycle II
Role of Peer Tutors	Tutors tended to give direct answers without explaining underlying steps.	Tutors provided structured hints, asked guiding questions, and offered constructive feedback.
Tutee Engagement	Several tutees remained passive, waiting passively for instructions or answers.	Tutees actively posed clarifying questions and articulated step-by-step problem-solving procedures.
Group Interaction	Group discussions were uneven and dominated by a few vocal members.	Group discourse was focused, equitable, and actively involved nearly all group members.

Observational data underscore a qualitative shift in instructional scaffolding: peer tutors evolved from mere answer-providers in Cycle I into effective cognitive coaches in Cycle II, prompting tutees to verbalize and justify their mathematical steps. Concurrently, tutees transitioned from passive recipients into active participants who felt comfortable seeking clarification from their peers.

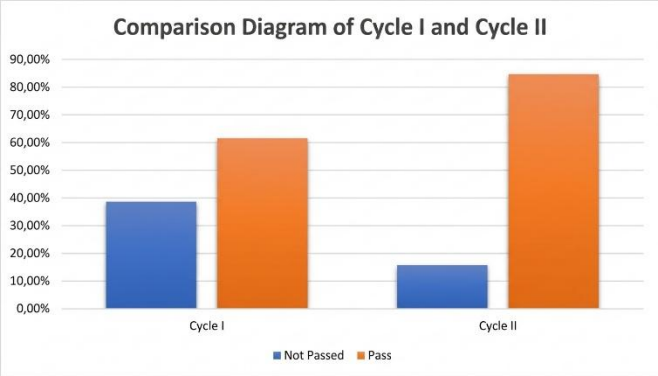

Figure 1. Comparison Diagram of Cycel I and II

The progression in learning mastery from 61.5% to 84.6% substantiates the efficacy of collaborative learning frameworks in cultivating participatory and meaningful mathematics instruction. These empirical findings align closely with Vygotsky's (1978) social constructivist theory, demonstrating that learners internalize complex concepts more effectively when scaffolded within their Zone of Proximal Development by capable peers. The results also corroborate prior studies (Mahsup et al., 2020; Munaisah, 2022;

Razzaq & Ambo Tuo, 2022; Rosda, 2022), which established that peer-mediated collaboration fosters active engagement and deepens conceptual understanding through social discourse. Crucially, however, this study extends existing literature by demonstrating that peer grouping alone is insufficient; optimal learning gains occur when peer tutoring is paired with explicit tutor coaching and concrete instructional media.

Discussion

Integrating physical three-dimensional models proved vital in developing students' visual-spatial reasoning (Fauzi & Arisetyawan, 2020; Widiastuti et al., 2023), directly mitigating the visualization barriers identified by Putri and Pujiastuti (2021) when students interpret geometric word problems. Within a subject often perceived as abstract and intimidating, peer tutoring bridged cognitive gaps by translating formal mathematical terminology into accessible, peer-friendly language. This mirrors the findings of Topping (2005) and Alegre et al. (2020), who attributed the academic benefits of peer tutoring to immediate feedback, reciprocal explanation, and shared epistemic responsibility. Consequently, the synergy of trained peer tutors, tangible geometric models, structured worksheets, and guiding prompts enabled students to articulate their mathematical reasoning with clarity and confidence (Gultom, 2025).

From a cooperative learning perspective, the success of Cycle II was driven by the cultivation of positive interdependence and individual accountability within small groups. Once peer tutors were trained to scaffold rather than supply answers, group dynamics aligned closely with the core tenets of cooperative learning: promotive face-to-face interaction, interpersonal skill development, and mutual accountability (Johnson & Johnson, 2009; Slavin, 1995). Thus, peer tutoring functioned not merely as remedial academic assistance, but as a supportive social architecture that empowered hesitant learners to take intellectual risks and engage directly in mathematical problem-solving.

Furthermore, assuming the role of a peer tutor cultivated vital socio-emotional competencies alongside cognitive mastery, including empathy, active listening, leadership, and pedagogical creativity. By explaining concepts in multiple ways to ensure peer comprehension, tutors reinforced their own conceptual understanding while nurturing a mutually supportive classroom ecosystem, a finding consistent with Sanjata et al. (2022) and Mertayasa (2020). Collaborative peer discourse offers distinct advantages over traditional, unidirectional lecture methods by positioning students as active co-constructors of knowledge rather than passive recipients. This democratic classroom environment bolsters academic self-efficacy and fosters a collective commitment to shared educational success.

Pedagogically, these findings highlight the potential for primary educators to adopt peer tutoring as a humanizing instructional strategy that centers student agency and leverages social relationships to master rigorous academic content. As Aprianti et al. (2024) and Sunarto (2022) emphasized, the success of peer tutoring relies on selecting tutors who possess both academic competence and interpersonal sensitivity, ensuring interactions remain dialogic rather than transactional. Combined with iterative inter-cycle reflection as advocated by Kemmis et al. (2014), integrating trained peer tutors, concrete visual manipulatives, and structured teacher monitoring provides a robust model for enhancing primary geometry instruction and cultivating a participatory classroom culture.

Conclusion

Based on the two-cycle Classroom Action Research conducted with fourth-grade students at SD Inpres Timika IV, implementing the peer tutoring method substantially improved student learning outcomes on the volume of three-dimensional shapes. Specifically, learning mastery increased by 23.1 percentage points, rising from 61.5% in Cycle I to 84.6% in Cycle II, with a normalized mastery gain of 0.60. These outcomes directly address the research objectives, demonstrating that structured peer explanations, collaborative group discourse, and opportunities for tutees to re-articulate mathematical procedures effectively deepen primary students' conceptual understanding of cube and cuboid volume. Furthermore, this study contributes valuable empirical evidence regarding the applicability of peer tutoring in heterogeneous primary classrooms in Central Papua, demonstrating its capacity to foster learner agency, collaborative spirit, and shared academic accountability alongside measurable cognitive gains. In light of these findings, several practical and methodological recommendations are proposed: the first, for primary school teachers, educators implementing peer tutoring should systematically select tutors based on both academic proficiency and interpersonal communication skills. Crucially, teachers must provide brief, targeted pre-lesson training to equip tutors with scaffolding techniques, such as offering hints, posing guiding questions, and checking for understanding, so they facilitate independent reasoning rather than simply providing direct answers. The second, schools should invest in and provide concrete instructional manipulatives, particularly physical three-dimensional geometric models, enabling students to connect abstract volume formulas with tangible visual representations and overcome spatial visualization barriers. For future researchers, subsequent investigations are encouraged to employ quasi-experimental or randomized controlled designs across larger, multi-class samples, incorporating both descriptive and inferential statistical analyses to further validate the generalizability and longitudinal impact of structured peer tutoring in primary mathematics education.

Acknowledgments

The authors would like to express their sincere gratitude to the Primary School Teacher Education Program at Universitas Terbuka and Universitas Pelita Harapan, Indonesia, for their academic support and contributions throughout the research and manuscript preparation process. The authors also extend their appreciation to SD Inpres Timika IV, particularly the school principal, teachers, and fourth-grade students, for their cooperation, participation, and support during the implementation of this research. Their valuable contributions made this study possible.

Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

References

Alegre, F., Moliner, L., Maroto, A., & Lorenzo-Valentin, G. (2020). Academic achievement and peer tutoring in mathematics: A comparison between primary and secondary education. *Sage Open*, *10*(2). https://doi.org/10.1177/2158244020929295

Aprianti, A., Hamsiah, A., & Muhammadiah, M. (2024). Implementasi Metode Tutor Sebaya Terhadap Keaktifan dan Hasil Belajar Peserta Didik di Kota Makassar. Bosowa Journal of Education, 4(2), 227–231. https://doi.org/10.35965/bje.v4i2.4453

Arrahim, A., & Ratnasari, D. S. (2023). Analisis Penerapan Metode Tutor Sebaya (Peer Teaching) Terhadap Hasil Belajar Pada Mata Pelajaran Matematika Di Sekolah Dasar. *Pedagogik: Jurnal Pendidikan Guru Sekolah Dasar*, *11*(2), 92-99. https://doi.org/10.33558/pedagogik.v11i2.7179

Fauzi, I., & Arisetyawan, A. (2020). Analisis Kesulitan Belajar Siswa pada Materi Geometri Di Sekolah Dasar. *Kreano, Jurnal Matematika Kreatif-Inovatif, 11*(1), 27-35. https://doi.org/10.15294/kreano.v11i1.20726

Gultom, A. F. (2025). Revitalizing Pancasila as Living Philosophy: Socratic-Based Classroom Experimentation to Foster Critical Thinking Skills. *Paidea : Jurnal Pendidikan Dan Pembelajaran Indonesia*, 5(2), 78–91. https://doi.org/10.56393/paidea.v5i2.4174

Gultom, A. F. (2025). Toward a Transformative Multicultural Pedagogy: The Role of Cultural Empathy in University. *Didactica : Jurnal Kajian Pendidikan Dan Pembelajaran*, 5(2), 60–74. https://doi.org/10.56393/didactica.v5i2.4175

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American journal of Physics*, *66*(1), 64-74. https://doi.org/10.1119/1.18809.

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational researcher*, *38*(5), 365-379. https://doi.org/10.3102/0013189X09339057.

Kemmis, S., McTaggart, R., & Nixon, R. (2014). *The action research planner: Doing critical participatory action research* (Vol. 200). Singapore: Springer.

https://doi.org/10.1007/978-981-4560-67-2

Kurniawan, R., Hendracipta, N., & Pribadi, R. A. (2023). Penerapan Metode Tutor Sebaya Dalam Pembelajaran Matematika. Coopetition : Jurnal Ilmiah Manajemen, 14(1), 2023–2169. https://doi.org/10.32670/coopetition.v14i1.3156

Mahsup, M., Ibrahim, I., Muhardini, S., Nurjannah, N., & Fitriani, E. (2020). Peningkatan Hasil Belajar Mahasiswa Melalui Model Pembelajaran Tutor Sebaya. Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran, 6(3), 609. https://doi.org/10.33394/jk.v6i3.2673

Mertayasa, I. W. (2020). Aplikasi model pembelajaran kooperatif tipe Team Assisted Individualization (TAI) dengan tutor sebaya untuk meningkatkan prestasi belajar matematika siswa kelas VI SD Negeri 2 Tianyar Barat semester I tahun pelajaran 2019/2020. Penerbit Adab. https://henbuk.com/buku/detail/kk4ey2wwl

Mas P. Sanjata, A. R., Sardi, A., & Muchtar, J. (2022). Peningkatan Hasil Belajar Melalui Model Pembelajaran Tutor Sebaya Setting Kooperatif. Al-Irsyad: Journal of Education Science, 1(2), 117–124. https://doi.org/10.58917/aijes.v1i2.30

Munaisah. (2022). Peningkatan Aktivitas Dan Hasil Belajar Matematika Dengan Metode Tutor Sebaya. Devosi : Jurnal Teknologi Pembelajaran, 6(1), 1–16. https://doi.org/10.36456/devosi.v6i1.5881 Muchlisin, R. (2019). Metode pembelajaran tutor sebaya. Scribd. https://id.scribd.com/document/470522662/Metode-Pembelajaran-Tutor-Sebaya

National Council of Teachers of Mathematics. (2014). Principles to actions: Ensuring mathematical success for all. *NCTM*. https://www.nctm.org/uploadedFiles/Standards_and_Positions/Principles_to_Actions/Principles%20to%20Actions%20overview.pdf

OECD (2023), *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*, PISA, OECD Publishing, Paris. https://doi.org/10.1787/53f23881-en.

Putri, L. S., & Pujiastuti, H. (2021). Analisis kesulitan siswa kelas v sekolah dasar dalam menyelesaikan soal cerita pada materi bangun ruang. *Terampil: Jurnal Pendidikan Dan Pembelajaran Dasar*, *8*(1), 65-74. https://doi.org/10.24042/terampil.v8i1.9200.

Ramadhan, R., Solehudin, A., & Sabri, S. (2019). Pengaruh Metode Pembelajaran Tutor Sebaya Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Teknologi Mekanik Di Smk. Journal of Mechanical Engineering Education, 5(2), 242. https://doi.org/10.17509/jmee.v5i2.15194

Razzaq, A., & Ambo Tuo, M. A. (2022). Peningkatan Hasil Belajar Matematika melalui Model Pembelajaran Tutor Sebaya. *Al-Irsyad Journal of Mathematics Education*, *1*(2), 96–105. https://doi.org/10.58917/ijme.v1i2.34

Rifa'i, S., Rahmawati, F. P., & Widodo, W. (2022). Peningkatan Motivasi Belajar FPB/KPK Melalui Metode Tutor Sebaya pada Siswa Kelas IV SDN Karangasem 1 Tahun 2021/2022. *Educatif Journal of Education Research*, *4*(3), 312-317. https://doi.org/10.36654/educatif.v4i3.244

Rohmah, Z. (2019). Penerapan pembelajaran matematika melalui model tutor sebaya dengan pendekatan saintifik sebagai upaya meningkatkan pemahaman konsep dan motivasi belajar siswa di kelas inklusif. *Suska Journal of Mathematics Education*, *5*(2), 149-158. https://doi.org/10.24014/sjme.v5i2.8171.

Rosda, E. (2022). Upaya Meningkatkan Hasil Belajar Matematika Menggunakan Metode Tutor Sebaya Siswa Kelas V DI UPT. SD NEGERI 22 Baringin. *Ekasakti Educational Journal*, *2*(2), 148–162. https://doi.org/10.31933/eej.v2i2.610

Slavin, R. E. (1995). *Cooperative learning: Theory, research, and practice*. Boston: Allyn & Bacon.

Sopingi, I. (2021). Upaya Meningkatkan Keaktifan Dan Prestasi Belajar Matematika Dengan Metode Tutor Sebaya . *SCIENCE : Jurnal Inovasi Pendidikan Matematika Dan IPA*, *1*(2), 155–163. https://doi.org/10.51878/science.v1i2.450

Sujiati, S. (2020). Pembelajaran Kooperatif Berbasis Tutor Sebaya Untuk Meningkatkan Hasil Belajar Ipa Materi Pesawat Sederhana Di Smpn 1 Kayangan. Jurnal Paedagogy, 7(1), 1–8. https://doi.org/10.33394/jp.v7i1.2508

Sunarto, S. P. (2022). Metode tutor sebaya meningkatkan hasil belajar matematika siswa. Penerbit P4I. https://books.google.com/books/about/Metode_Tutor_Sebaya_Meningkatkan_Hasil_B.html?id=MCSbEAAAQBAJ

Topping, K. J. (2005). Trends in Peer Learning. *Educational Psychology*, *25*(6), 631–645. https://doi.org/10.1080/01443410500345172

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Widiastuti, A., Nurkhalisa, M., Aprianti, M., & Komariah, K. (2023). Penggunaan Model Bangun Ruang dalam Mengatasi Kesulitan Belajar Siswa pada Materi Geometri. *JKPM (Jurnal Kajian Pendidikan Matematika)*, *8*(2), 309-318. http://dx.doi.org/10.30998/jkpm.v8i2.17610