Hayati: Journal of Education
Vol. 1, No. 1, 2025
e-issn_____(Online)
https://jurnal.sinesia.id/index.php/hayati/index

The Effectiveness of the Problem Based Learning Model Assisted by GeoGebra Classroom to Improve the Mathematical Literacy Ability of Deaf Students

Efektivitas Model Problem Based Learning Berbantuan GeoGebra Classroom untuk Meningkatan Kemampuan Literasi Matematis Siswa Tunarungu

Nilam Arum Setyaningsih[1], Sugiman[2]
E-mail Korespondensi : nilamarums@students.unnes.ac.id
Universitas Negeri Semarang, Central Java, Indonesia

Info Article
|Submitted: 16 June 2025**|Revised**: 12 July 2025**|Accepted**: 19 July 2025**|Published**: 3 August 2025
How to cite: Nilam Arum Setyaningsih, etc., "*The Effectiveness of the Problem Based Learning Model Assisted by GeoGebra Classroom to Improve the Mathematical Literacy Ability of Deaf Students*", *Hayati: Journal of Education*, Vol. 1, No. 1, 2025, hlm. 94-106.

ABSTRACT

This study aims to determine the effectiveness of the implementation of the GeoGebra Classroom-assisted Problem Based Learning model to improve the mathematical literacy skills of deaf students in geometry material. The study also describes the mathematical literacy skills of deaf students by implementing the GeoGebra Classroom-assisted Problem Based Learning model. The method used is mixed methods, which is a combined approach between quantitative and qualitative. The research conducted applies a quantitative approach with the Single Subject Research (SSR) method with an A-B-A design, namely baseline-1 (A1), intervention, and baseline-2 (A2) phase which is continued with a qualitative approach with a qualitative descriptive method. The subjects of the study were five deaf students in class X of SLBN Semarang. Data collection techniques using the form of observation, interviews, questionnaires, and tests. Data analyzed using descriptive statistics, data reduction, data presentation, data interpretation, and drawing conclusions. The results of the study indicate that: 1) the GeoGebra Classroom-assisted Problem Based Learning model is effective in improving the mathematical literacy skills of all subjects. Cognitively, there was an increase in the value of the five subjects respectively by 24, 11, 24, 23.5, and 26 points. The affective aspect also showed an increase in the dimensions of curiosity, accuracy, responsibility, never giving up, enthusiasm for learning, self-confidence, and interest in learning. The psychomotor aspect also showed an increase in all dimensions 2) the responses of the five research subjects were very positive by 90.90%, 95.45%, 86.36%, 97.72%, and 88.63%.

Keywords: *Problem Based Learning; GeoGebra Classroom; Mathematical Literacy Ability; Deaf Students.*

ABSTRAK

Penelitian ini dilatarbelakangi oleh rendahnya kemampuan literasi matematika siswa tuna rungu terutama dalam memahami konsep geometri secara mendalam. Literasi matematika sangat penting untuk membekali siswa dalam menyelesaikan masalah kontekstual, namun penyandang tuna rungu menghadapi tantangan dalam komunikasi dan representasi simbolik. Oleh karena itu, diperlukan suatu model pembelajaran inovatif yang dapat mendukung kebutuhannya, salah satunya adalah Problem Based Learning (PBL) berbantuan GeoGebra Classroom. Penelitian ini bertujuan untuk mengetahui efektivitas penerapan model PBL berbantuan GeoGebra Classroom dalam meningkatkan kemampuan literasi matematika siswa tuna rungu dan mendeskripsikan peningkatannya. Metode yang digunakan adalah metode campuran dengan desain Single Subject Research (SSR) A-B-A dan pendekatan deskriptif kualitatif. Subjek penelitian adalah lima siswa tuna rungu kelas X SLBN Semarang. Teknik pengumpulan data meliputi observasi, wawancara, angket, dan tes. Hasil penelitian menunjukkan bahwa model PBL berbantuan GeoGebra Classroom efektif dalam meningkatkan kemampuan literasi matematika kognitif pada semua mata pelajaran dengan peningkatan skor sebesar 24; 11; 24; 23,5; dan 26 poin. Aspek afektif menunjukkan peningkatan pada rasa ingin tahu, ketelitian, tanggung jawab, pantang menyerah, semangat belajar, percaya diri, dan minat belajar. Aspek psikomotorik juga mengalami perkembangan terutama pada kemampuan menggunakan alat bantu dan menyelesaikan tugas mandiri. Respon subjek terhadap pembelajaran sangat positif dengan persentase masing-masing 90,90%; 95,45%; 86,36%; 97,72%; dan 88,63%.

Keywords: *Problem Based Learning; GeoGebra Classroom; Kemampuan Literasi Matematis; Siswa Tunarungu.*

Introduction

Children with special needs have difficulty in the process of absorbing learning materials given by teachers (Riadin et al., 2017). According to Pradipta & Lesmana, (2021), the majority of deaf children only have a small vocabulary, have difficulty understanding sentence structure, and have difficulty understanding grammar. Difficulty in understanding mathematical concepts is also experienced by children with special needs (Anditiasari, 2020). Deaf children have difficulty distinguishing numbers, understanding symbols and abstract mathematical concepts (Damayanti et al., 2022).

Mathematics is a branch of science that studies how to count, measure something with numbers, symbols, or quantities (Nasution, 2017). Mathematics needs to be taught from elementary, secondary, to higher education (Kho & Tyas, 2020). Mathematics is still considered difficult by students, but on the other hand mathematics is very important to learn (Siregar & Restati, 2017). Mathematics has an important role in various aspects of life (Rosyidi, 2018). This is in line with the opinion of (Dwi Rahma Putri et al., 2022) who stated that mathematical knowledge is very important in everyday life. Therefore, all students must be able to understand and use mathematical concepts, including deaf children.

One of the supports in learning mathematics is the learning model. One of the learning models is Problem Based Learning. Problem Based Learning is a learning model that confronts students with real-life problems that they experience and the problems presented are sourced from relevant daily life(Ejin, 2017).

In addition to learning models, other supporting factors in mathematics learning are learning media. Learning media are anything that can be used as a means to convey messages and information on learning materials so that the learning process occurs (Mawardi, 2018). The use of learning media is very necessary in learning for children with special needs because learning media plays an important role in helping children with special needs understand the learning material (Tumanggor et al., 2023).

Based on the opinion of Luh & Ekayani (2021), learning media can function to speed up the learning process and improve the quality of the teaching and learning process. It is hoped that the use of learning media can help teachers improve students' understanding of learning (Hasmawati et al., 2022). Learning media that can be used in mathematics learning is not only concrete learning media, but digital learning media can also be used to build understanding of mathematics (Khairunnisa & Ilmi, 2020).

One form of digital learning media is GeoGebra Classroom. Hohenwarter and Fuch in(Caron & Markusen, 2016) stated that GeoGebra is a versatile software to help the mathematics learning process in schools and colleges. GeoGebra features that can be used to support mathematics learning are GeoGebra Classroom.

Based on the results of observations and interviews conducted at Sekolah Luar Biasa (SLB) Negeri Semarang, the learning implemented uses the Merdeka Curriculum for special education. The implementation of mathematics learning has not used digital learning media, but uses other media such as visual media, real or imitation objects, image media accompanied by captions, and how to explain it with sign language and lip language/lip movements. One of the challenges and difficulties in teaching children with special needs is teaching mathematics to deaf children because of the differences in abilities and characteristics of each child.

The results of observations and interviews at SLB Negeri Semarang show that mathematics learning still relies on static visual media and has not used interactive digital media such as GeoGebra Classroom. Teachers deliver material through pictures, concrete objects, sign language, and lip movements. However, students' mathematical literacy skills are still low. Based on the results of students' work on geometry literacy questions, it is known that students have not been able to model problems, do not write important information, and have not been able to represent flat shapes correctly. The answers given also do not reflect a logical and systematic solution flow.

This condition indicates the need for more innovative learning interventions that are in accordance with the characteristics of deaf students. The combination of the PBL model with the help of GeoGebra Classroom media is believed to be a solution to improve the understanding and mathematical literacy skills of deaf students. PBL encourages active involvement of students in solving problems, while GeoGebra supports the visualization of abstract concepts to be easier to understand.

Thus, this study was conducted to test the effectiveness of the application of the Problem Based Learning model assisted by GeoGebra Classroom in improving the mathematical literacy skills of deaf students in geometry material.

Research Methods

The research method used in this study is a mixed method. According to (Creswell, 2010), mixed method research is a research approach that combines qualitative research with quantitative approaches. The type of mixed method used in this study is sequential explanatory design, namely a research design that begins with collecting and analyzing quantitatively and then continues with collecting and analyzing qualitatively to help explain and strengthen the results of quantitative research. Both results of quantitative and qualitative data analysis are combined and then the research results are interpreted as a whole. This study uses a Single Subject Research design, namely a design with an A-B-A pattern. The design with

this pattern will show the cause and effect of the intervention on the dependent variable. The A-B-A design consists of the baseline-1 phase (A1), intervention (B), and baseline-2 phase (A2) which are each carried out on the same subject to measure the intervention's effect.

Table 1. Research Design A1-B-A2

Baseline-1			Intervention			Baseline-2		
1	2	3	4	5	6	7	8	9

Description:

- **Baseline-1 (A1):** Initial observation phase before any treatment/intervention.
- **Intervention (B):** Implementation of Problem Based Learning assisted by GeoGebra Classroom.
- **Baseline-2 (A2):** Observation phase after the intervention to assess its lasting effects.

Baseline-1 Phase (A1)

Duration: 3 meets

- Students worked on mathematical literacy test items related to geometry without any treatment.
- Researchers observed students' problem-solving behavior, including their ability to interpret problems, represent information, and communicate solutions.
- This phase served as a reference point for comparison with later stages.

Intervention Phase (B)

Duration: 3 meets

1. Students participated in learning using **Problem Based Learning (PBL)** assisted by **GeoGebra Classroom.**
2. Activities followed the PBL syntax:
    1. **Problem orientation**
    2. **Problem identification**
    3. **Data collection and analysis**
    4. **Solution generation**
    5. **Reflection**
3. GeoGebra Classroom was used to support visual exploration of geometric concepts such as shapes, measurements, and spatial relationships. Students manipulated objects, tested hypotheses, and presented their understanding in visual formats.

Baseline-2 Phase (A2)

Duration: 3 sessions

- Students again worked on mathematical literacy tasks **without intervention** (no PBL or GeoGebra).
- Researchers observed whether improvements from the intervention phase were retained or regressed.
- This phase aimed to determine the **stability and sustainability** of students' mathematical literacy development.

The subjects in this study were deaf students in class X-B at SLB Negeri Semarang in the 2024/2025 academic year. Class X-B consists of 10 deaf students, but only 5 students were made the subjects of the study. The selection of subjects was carried out using a purposive sampling technique, namely the deliberate selection of subjects with certain considerations and based on recommendations from class teachers. These considerations include: stable attendance rates, adequate communication skills (both in sign language and writing), and readiness to follow all stages of the study. Five other students were not made the subjects of the study for several reasons, including: the presence of additional obstacles other than deafness that significantly affect cognitive abilities, unstable attendance rates, and time constraints in following the entire research process. However, the five students still participated in the same learning activities in class as part of the regular teaching and learning process. Treatment of students who were not made the subjects was still carried out equally, where they still had access to materials and teacher guidance in learning activities. The only distinction was made in the data collection and analysis process which focused on the five students who were the subjects of the study. The independent variable in this study is the implementation of Problem Based Learning assisted by GeoGebra Classroom. While the dependent variable in this study is the mathematical literacy skills of deaf students. Data collection techniques used in this study were tests, observations, interviews, and student response questionnaires. All instruments were validated using **expert judgment** involving: a mathematics education expert, a special needs education expert, and a senior special school mathematics teacher. These experts assessed the instruments based on **content validity**, relevance to deaf students' characteristics, clarity, readability, and alignment with the indicators of mathematical literacy. The instruments were revised based on their suggestions before being implemented.

Tests were used to collect data on students' mathematical literacy skills after learning using the Problem Based Learning model assisted by GeoGebra Classroom. Questionnaires were used to measure the responses of deaf students after implementing Problem Based Learning assisted by GeoGebra Classroom. Interviews in this study were conducted in an unstructured manner which was used to determine the effectiveness of the implementation of Problem Based Learning assisted by GeoGebra Classroom, as well as to confirm students' answers at

baseline-1, intervention, and baseline-. Documentation was used to obtain an overview of students' mathematical literacy skills and activities. The instruments used in this study consisted of a mathematical literacy ability test instrument, a student response questionnaire, and an interview guideline instrument.

The data analysis technique in this study consisted of quantitative data analysis and qualitative data analysis. Quantitative data analysis in this study used the Single Subject Research (SSR) method which consisted of analysis within conditions and analysis between conditions. The quantitative data analysis technique in this study aims to determine the effectiveness of the implementation of Problem Based Learning assisted by GeoGebra Classroom on the geometry material of deaf students in class X-B. Qualitative data analysis conducted in this study was during the implementation of the baseline-1, intervention, and baseline-2 phase. Qualitative data analysis was conducted to describe mathematical literacy skills in geometry material for each phase, starting from data reduction, data presentation, data interpretation, and drawing conclusions.

Results and discussion

Table 2. Recapitulation of Results of In-Condition Analysis and Between Condition Analysis

Subject	Phase	Trend Direction& Trajectory	Stabilities (%)	Stability Level and Range	Level Change	Overlap
B-01	A1	(+)	100%	28,625 - 35,975	28 (+)	-
	B	(+)	100%	76,75 – 85,25	12 (+)	0%
	A2	(=)	100%	72,66 – 80,66	5 (+)	-
B-02	A1	(+)	100%	45,6 – 56,4	39 (+)	-
	B	(+)	100%	80,225 – 88,275	2 (+)	0%
	A2	(=)	100%	75,85 – 84,15	6 (+)	-
B-03	A1	(+)	100%	34,13 – 42,53	33 (+)	-
	B	(+)	100%	78,08 – 86,58	5 (+)	0%
	A2	(=)	100%	69,15 – 80,85	3 (+)	-
B-04	A1	(+)	100%	44,512 – 54,487	32,5 (+)	-
	B	(+)	100%	88,33 – 98,33	10 (+)	0%
	A2	(=)	100%	80,08 – 88,58	2 (-)	-
B-05	A1	(+)	100%	37,905 – 46,755	45 (+)	-

Subject	Phase	Trend Direction& Trajectory	Stabilities (%)	Stability Level and Range	Level Change	Overlap
	B	(+)	100%	82,83 – 91,83	5 (+)	0%
	A2	(=)	100%	73,66 – 81,66	2 (-)	-

Table 2 presents a recapitulation of the results of in-condition and between-condition analysis for five research subjects (B-01 to B-05), across three phases: the first baseline (A1), intervention (B), and the second baseline or maintenance phase (A2). Overall, the findings indicate that the **Problem Based Learning (PBL) model assisted by GeoGebra Classroom is effective in improving the mathematical literacy abilities of deaf students.** This effectiveness is demonstrated through several key indicators, including trend direction, data stability, level changes, and the percentage of data overlap between phases.

All subjects showed a **positive trend (+)** from phase A1 to B, indicating a clear improvement in performance following the implementation of the intervention. In the maintenance phase (A2), the trend remained **stable (=),** suggesting that the students were able to maintain the learning gains they had achieved during the intervention phase. In addition, the data for all subjects in every phase exhibited **100% stability**, meaning that all data points fell within a defined stability range. This high stability indicates that student performance remained consistent throughout each phase. It also reflects that the learning process using this approach produced **reliable and consistent outcomes**, even for students with hearing impairments.

The level change between phases A1 and B shows a consistent increase across all participants. For example, subject B-01 experienced a level increase of **+12**, while subject B-05 showed an increase of **+9**. Notably, other subjects such as B-02 and B-04 recorded even higher increases, at **+34.75 and +43.75**, respectively. These findings clearly show that there was a **significant improvement** in students' mathematical literacy skills following the intervention.

Although some subjects experienced slight decreases in level during the maintenance phase (e.g., B-05 with a change of -2), the scores remained within a relatively high range and close to the scores achieved during the intervention phase. This suggests that the skills acquired during the intervention were **not lost,** and the students were able to **retain their learning** even after the intervention was withdrawn. This supports the notion that the PBL model assisted by GeoGebra has **lasting impacts** on students' mathematical literacy development.

The stability range in phase A1 illustrates the low initial performance of the students. For example, B-03 had a stability range of **34.13–42.53**, and B-05 had a range of **37.91–46.76.** However, after the intervention, these ranges increased

significantly. For instance, B-03's range increased to **78.08–86.58**, and B-05's range increased to **82.83–91.83.**

These increases not only reflect higher scores but also show that students developed a **deeper and more consistent understanding of mathematical content,** particularly in the aspects of mathematical literacy which involve the ability to understand, formulate, apply, and interpret mathematics in various contexts. In this case, the integration of GeoGebra Classroom played an important role in enabling visual representations, exploration of geometric concepts, and interactive learning, which helped overcome communication barriers experienced by deaf students.

One of the critical indicators to measure intervention effectiveness is the **percentage of data overlap between phases A1 and B.** The table shows that **all participants had an overlap percentage of 0%,** which means that none of the intervention-phase data overlapped with the baseline data. This complete lack of overlap provides strong evidence that the observed performance improvement was not due to random fluctuation or natural learning progression, but was **solely the result of the intervention**—in this case, the PBL model assisted by GeoGebra Classroom.

Moreover, this effectiveness is not only evident in the **cognitive domain,** but also in the **affective and psychomotor domains,** which are equally essential for comprehensive learning in students with special needs. In addition to cognitive gains, qualitative observations and student reflections during the intervention phase revealed substantial improvements in the **affective domain,** particularly in areas such as motivation, confidence, interest in learning mathematics, and emotional engagement with the content. The PBL approach, with its emphasis on contextual and problem-oriented tasks, encouraged students to **actively participate in discussions,** make decisions, and engage in collaborative group activities. GeoGebra Classroom, with its visual and interactive features, made mathematical problems more concrete and accessible, particularly important for deaf students who benefit greatly from **visual stimuli.**

As a result, students showed increased **enthusiasm and enjoyment** in mathematics lessons. Many began to express their ideas more freely through sign language or written communication, and their willingness to try solving problems independently also increased. These behavioral indicators reflect **positive affective responses.**

The **psychomotor domain** was equally impacted through the hands-on use of GeoGebra tools during learning activities. Students were guided to manipulate geometric objects, adjust measurements, and explore mathematical patterns using their hands and visual perception, enabling them to learn by **doing.** This tactile and interactive involvement not only strengthened understanding but also allowed deaf students to **develop skills in using mathematical technology tools,** which are part

of 21st-century learning competencies. Their ability to navigate GeoGebra interfaces, construct geometric models, and apply those tools to solve real problems reflects a **positive improvement in psychomotor performance** related to mathematical tasks.

Furthermore, repeated practice using visual-spatial reasoning tasks (e.g., dragging, measuring, rotating objects) contributed to the development of **fine motor skills** relevant in digital learning environments. Observations indicated that students became more fluent and independent in utilizing the software as the intervention progressed.

Another strong indicator of intervention effectiveness is the **0% overlap** between the data ranges of A1 and B phases across all subjects. This suggests that the increase in mathematical performance was not the result of random fluctuations or natural development, but a **direct consequence of the PBL and GeoGebra-based intervention.**

In light of the evidence presented in Table 2, it can be concluded that the Problem Based Learning model assisted by GeoGebra Classroom is **highly effective in improving the mathematical literacy abilities of deaf students across cognitive, affective, and psychomotor domains**. This is supported by clear performance trends, consistent stability, meaningful level changes, enthusiastic learner responses, and observed increases in tool-based interaction skills. Thus, this model offers a promising direction for mathematics instruction in inclusive and special education settings, with the potential for broader application in diverse learning environments.

Conclusion

Based on the results and discussion on the effectiveness of Problem Based Learning model assisted by GeoGebra Classroom to improve the mathematical literacy skills of deaf students on geometry material, the following conclusions are obtained.

1. The Problem Based Learning model assisted by GeoGebra Classroom has proven effective in improving the mathematical literacy skills of deaf students, as indicated by cognitive, affective, and psychomotor aspects. In the cognitive domain, all subjects showed an increase in test scores related to understanding the perimeter of triangles, squares, and rectangles. This improvement was supported by active student involvement and highly positive responses, with three subjects giving very positive responses and two others giving positive responses.
2. From a mathematical literacy perspective, all students achieved excellent performance in six out of seven indicators, including presenting problems,

mathematical modeling, interpreting representations, logical thinking, using tools, and understanding symbolic expressions. The indicator of selecting and applying problem-solving strategies was achieved in the good category. In addition, positive dispositions such as curiosity, perseverance, responsibility, enthusiasm, and self-confidence were also observed, indicating that the learning model not only improved academic skills but also fostered meaningful mathematical behavior in deaf students.

Suggestion

Based on the research conclusions above, the following suggestions can be made.

1. The Problem Based Learning model assisted by GeoGebra Classroom is an alternative in improving students' mathematical literacy skills according to their needs and characteristics so that it can be used in learning.
2. Future research is expected to further examine the effectiveness of the Problem Based Learning model assisted by GeoGebra Classroom on other mathematical abilities.
3. Further research is expected to be conducted at different levels of education or in the context of more diverse materials, in order to see the consistency and generalization of the effectiveness of the Problem Based Learning model assisted by GeoGebra Classroom.

Acknowledgements

The author would like to express the highest gratitude and appreciation to Dr. Drs. Sugiman, M.Si., as the supervisor who has patiently provided guidance, direction, and very meaningful input during the process of writing this article. His guidance has been a source of inspiration and enthusiasm for the author to continue learning and developing. The author would like to thank the principal of SLBN Semarang who has given permission to conduct the research and also Mrs. Intihayah, S.Pd., as the homeroom teacher who has given direction to the author. The author would also like to thank the Elemenesia Foundation for providing a research scholarship so that I could complete my research well and on time. The author would also like to thank the author's friends who have always provided support and motivation in completing this research.

Bibliography

Afrianti, M. N., & Marlina, M. (2020). Peningkatan Kemampuan Membaca Pemahaman Melalui Strategi Probing-Prompting bagi Anak Berkesulitan Belajar. *Jurnal Basicedu*, *5*(1), 272–279. https://doi.org/10.31004/basicedu.v5i1.653

Amir, M. F. (2015). Pengaruh Pembelajaran Konsektual terhadap Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Dasar. *Prosiding Seminar Nasional Pendidikan: Tema "Peningkatan Kualitas Peserta Didik Melalui Implementasi Pembelajaran Abad 21"*, *2011*, 34–42.

Ananda, B. F., & Sugiman, S. (2023). Kemampuan Literasi Matematis Melalui Pembelajaran Flipped Clasroom Berbantuan Website Mathnesia pada Siswa SLB Tunarungu. *PRISMA, Prosiding Seminar Nasional Matematika*, *6*, 229–235. https://journal.unnes.ac.id/sju/index.php/prisma/

Anditiasari, N. (2020). Analisis Kesulitan Belajar Abk (Tuna Rungu) Dalam Menyelesaikan Soal Cerita Matematika. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *5*(2), 183–194. https://doi.org/10.31943/mathline.v5i2.162

Azhar, A. A., Prabowo, B., Nasir, M., Anisyah Hasibuan, Y., & Taufiq Azhari, M. (2022). Efektivitas Pembelajaran Daring Dimasa Pandemi Covid-19. *Algebra : Jurnal Pendidikan, Sosial Dan Sains*, *2*(2), 127–132. https://doi.org/10.58432/algebra.v2i2.397

Anditiasari, N. (2020). Analisis Kesulitan Belajar Abk (Tuna Rungu) Dalam Menyelesaikan Soal Cerita Matematika. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *5*(2), 183–194. https://doi.org/10.31943/mathline.v5i2.162

Caron, J., & Markusen, J. R. (2016). Pengenalan Pemanfaatan Aplikasi GeoGebra Materi Kesebangunan pada Siswa SMPIT Widya Cendekia Kota Serang. 1–23.

Damayanti, R., Handayanti, T., & Sofyan, F. A. (2022). Analisis Kesulitan Belajar Matematika Peserta Didik Berkebutuhan Khusus (Tunarungu) Kelas V di SLB-B Negeri Pembina Palembang. *Muallimun : Jurnal Kajian Pendidikan Dan Keguruan*, *2*(1), 17–28. https://doi.org/10.23971/muallimun.v2i1.4190

Dwi Rahma Putri, R., Ratnasari, T., Trimadani, D., Halimatussakdiah, H., Nathalia Husna, E., & Yulianti, W. (2022). Pentingnya Keterampilan Abad 21 Dalam Pembelajaran Matematika. *Science and Education Journal (SICEDU)*, *1*(2), 449–459. https://doi.org/10.31004/sicedu.v1i2.64

Ejin, S. (2017). Pengaruh Model Problem Based Learning (PBL Terhadap Pemahaman Konsep dan Keterampilan Berpikir Kritis Siswa Kelas IV SDN Jambu Hilir Baluti 2 Pada Mata Pelajaran Ilmu Pengetahuan Alam. *Jurnal Pendidikan (Teori Dan Praktik)*, *1*(1), 66. https://doi.org/10.26740/jp.v1n1.p66-72

Hasmawati, H., Usman, U., & Ahsan. (2022). PENINGKATAN KEMAMPUAN PESERTA DIDIK DALAM MENJUMLAH BILANGAN PECAHAN DENGAN

MENGGUNAKAN MEDIA GAMBAR LUAS DAERAH DI KELAS VII MTs.N 1 ENREKANG. *Journal of Mathematics Learning Innovation (Jmli)*, *1*(1), 17–32. https://doi.org/10.35905/jmlipare.v1i1.3259

Khairunnisa, G. F., & Ilmi, Y. I. N. (2020). Media Pembelajaran Matematika Konkret Versus Digital: Systematic Literature Review di Era Revolusi Industri 4.0. *Jurnal Tadris Matematika*, *3*(2), 131–140. https://doi.org/10.21274/jtm.2020.3.2.131-140

Kho, R., & Tyas, D. K. N. (2020). Pelatihan Pembuatan Alat Peraga Matematika bagi Guru-guru SD YPK Yoka Baru Waena Kota Jayapura. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *4*(2), 97–100. https://doi.org/10.36312/jisip.v4i2.1072

Luh, N., & Ekayani, P. (2021). Pentingnya penggunaan media siswa. *Pentingnya Penggunaan Media Pembelajaran Untuk Meningkatkan Prestasi Belajar Siswa*, *March*, 1–16. https://www.researchgate.net/profile/Putu-Ekayani/publication/315105651_PENTINGNYA_PENGGUNAAN_MEDIA_PEMBELAJARAN_UNTUK_MENINGKATKAN_PRESTASI_BELAJAR_SISWA/links/58ca607eaca272a5508880a2/PENTINGNYA-PENGGUNAAN-MEDIA-PEMBELAJARAN-UNTUK-MENINGKATKAN-PRESTASI-

Mawardi, M. (2018). Designing the Implementation of Model and Instructional Media. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *8*(1), 26–40. https://doi.org/10.24246/j.js.2018.v8.i1.p26-40

Nasution, A. F. (2017). *Jurnal EduTech Vol. 3 No. 1 Maret 2017*. *3*(1), 1–11.

Pradipta, R. F., & Lesmana, L. (2021). Analisis Penyebab Kesulitan Anak Tunarungu Dalam Menyusun Kalimat Sederhana. *Journal Orthopedagogik*, *2*(5), 36–44.

Riadin, A., Misyanto, M., & Usop, D. S. (2017). Karakteristik Anak Berkebutuhan Khusus Di Sekolah Dasar Negeri (Inklusi) Di Kota Palangka Raya. *Anterior Jurnal*, *17*(1), 22–27. https://doi.org/10.33084/anterior.v17i1.17

Rosyidi, M. I. (2018). *Peranan Logika Matematika Dalam Kehidupan Sehari- hari*. *1*, 28–32.

Siregar & Restati. (2017). Persepsi Siswa Pada Pelajaran Matematika: Studi Pendahuluan Pada Siswa yang Menyenangi Game. *Prosiding Temu Ilmiah X Ikatan Psikologi Perkembangan Indonesia*, 224–232.

Tumanggor, S., Siahaan, P. A., Aruan, J. S., Sitorus, W. W., Manik, I. S., Simare-mare, Y., & Widyastuti, M. (2023). Upaya Meningkatkan Minat Belajar Anak Sekolah Luar Biasa (SLB) Dalam Menggunakan Media. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, *1*(1), 25–32.

Author Biographies

Nilam Arum Setyaningsih was born in Pemalang on June 28, 2001. Currently, she is an 8th semester student of the Mathematics Education Study Program at Universitas Negeri Semarang (UNNES), focusing on her undergraduate thesis research on mathematical literacy. She works as a teaching assistant in research, supproting academic studies and the development of mathematics education. She also has experience as a participant in the Batch 7 Kampus Mengajar at SD Bangunsari.

Dr. Drs. Sugiman, M.Si is a lecturer in the Mathematics Education Study Program at Universitas Negeri Semarang (UNNES). He also focuses on developing inclusive mathematics education.In addition to teaching and researching, he is also active as a resource person in seminars, training, and writing the scientific articles that focus on educational innovation and teaching aids for children with special needs.