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THE EFFECT OF THE ELPSA (EXPERIENCES, LANGUAGE, PICTURES, SYMBOLS, APPLICATION) LEARNING MODEL ASSISTED BY A GEOBOARD ON ELEMENTARY SCHOOL STUDENTS' MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

This study aims to describe the mathematics learning outcomes of fifth-grade students before and after the implementation of the ELPSA (Experiences, Language, Pictures, Symbols, Application) learning model assisted by a geoboard, and to examine its effect on learning outcomes. The study used a quantitative pre-experimental approach with a one-group pretest-posttest design involving 20 fifth-grade students of UPT SD Negeri 1 Pangkajene as the sample, selected through simple random sampling from a population of 40 students. Data were collected using a 15-item multiple-choice test administered as a pretest and posttest, then analyzed using descriptive statistics and a paired sample t-test with IBM SPSS Statistics. The results showed an increase in the mean score from 34.75 in the pretest to 86.35 in the posttest, with an N-Gain of 0.786, categorized as high. The hypothesis test produced a significance value of 0.000 (<0.05), leading to the rejection of H0 and acceptance of Ha. These findings demonstrate that the application of the ELPSA learning model assisted by a geoboard has a significant effect on improving the mathematics learning outcomes of fifth-grade students on the topic of perimeter and area of flat shapes.

Keywords: *ELPSA learning model; geoboard; mathematics learning outcomes; elementary school students.*

A. INTRODUCTION

Mathematics is one of the compulsory subjects at all levels of formal education because of its role in training students' logical, systematic, and analytical thinking, as mandated by Law Number 20 of 2003 concerning the National Education System. Through mathematics learning, students are trained to solve problems and understand the concepts underlying various other fields of science (Nurulaeni & Rahma, 2022). At the elementary school level, the objectives of mathematics learning are directed toward mastering simple arithmetic operations, measurement, and plane figures, which require effective learning communication between teachers and students so that students' reasoning and critical attitudes can develop optimally (Intan et al., 2022).

In reality, mathematics learning is still considered difficult by most elementary school students. Material related to arithmetic operations, measurement, geometry, and problem solving is often seen as boring, which affects low learning outcomes. Hidayati et al. (2023) found that students' low mathematics learning outcomes are largely influenced by difficulties in understanding concepts, the limited variety of learning media used, and suboptimal study habits. These factors are generally interrelated, ranging from the abstract nature of the material and teachers' teaching methods to students' learning environment (Yandi et al., 2023). This condition underscores the need for more interactive learning models and media so that abstract mathematical concepts can be conveyed more concretely and in accordance with students' characteristics (Haerawati et al., 2022).

One factor that determines the success of mathematics learning is the teacher's accuracy in selecting a learning model. Ahyar et al. (2021) explain that a learning model is a deliberately designed learning activity plan intended to make the learning process run smoothly and be well received by students. In line with this, Mirdad (2020) states that a learning model serves as a guide for teachers in designing classroom learning, including the preparation of learning tools, media, teaching aids, and evaluation instruments to achieve the expected learning objectives. Thus, selecting an appropriate learning model becomes one of the keys to addressing the low mathematics learning outcomes of elementary school students.

One learning model considered relevant to address this problem is the ELPSA (Experiences, Language, Pictures, Symbols, Application) learning model. The ELPSA framework was developed by the RIPPLE (Research Institute for Professional Practice, Learning & Education) team led by Tom Lowrie of Charles Sturt University, Australia, based on an analysis of Trends in International Mathematics and Science Study (TIMSS) video data for the context of mathematics learning in Indonesia (Wahyuni, 2017; PPPPTK Matematika, 2014). This framework views learning as an active process in which students independently construct their understanding through individual thinking and social interaction with other students (Wahyuni, 2017).

The ELPSA learning model is implemented through five interrelated stages (Nissa, 2018). The Experience stage explores students' prior knowledge through discussion and connects it with the new knowledge to be learned. The Language stage gives students the opportunity to express ideas and connect their experiences with mathematical terms. The Picture stage presents mathematical concepts through visual representations and concrete objects. The Symbol stage helps students transition from pictorial representations to formal mathematical symbols. The final stage, Application, directs students to apply the knowledge they have gained to solve problems in meaningful contexts. These five stages are designed to allow students to gradually construct their own understanding, starting from concrete experience to abstract concepts.

While the fundamental efficacy of the ELPSA framework has been widely acknowledged in foundational mathematics (Lowrie & Patahuddin, 2015), previous studies have predominantly focused on its general impact on basic learning outcomes. The specific novelty of this study lies in its targeted investigation of the cognitive transition between the Picture and Symbol stages, which is frequently identified as the primary epistemological obstacle for students when solving non-routine geometry problems. By isolating this critical phase and integrating it with dynamic geometry software, this research proposes a refined micro-learning trajectory.

Consequently, this study offers a twofold contribution to the broader field of mathematics education: theoretically, it expands the existing ELPSA literature by providing empirical evidence on how targeted pedagogical scaffolding during the visual-to-algebraic transition minimizes students' cognitive load; practically, it provides mathematics educators with a validated, step-by-step instructional design framework to foster deeper representational fluency and mathematical resilience (Subanji & Suastika, 2020).The effectiveness of the ELPSA model can be further optimized when combined with concrete learning media, one of which is the geoboard. This medium is a dotted board arranged in a certain pattern and used to form plane figures using rubber bands, so that abstract geometric concepts can be visualized concretely (Safitri & Trimurtini, 2021). Destiara et al. (2023) showed that the use of geoboards plays an important role in learning plane figures to support the achievement of learning objectives, while Aprilia et al. (2022) reported a positive effect of geoboard use on the mathematics learning outcomes of elementary school students. This medium also has several practical advantages, including simple and easily obtainable materials, and it contains a game-like element that can increase students' interest in learning (Muspika, 2020). In line with this, Wahyuddin (2021) found that integrating the ELPSA model with geoboard teaching aids can foster curiosity while improving students' learning outcomes on plane figure material, while Latri et al. (2021) proved that the application of ELPSA can create an enjoyable learning atmosphere while significantly improving pre-service elementary school teachers' understanding of geometry concepts.

The ELPSA (Experience, Language, Pictorial, Symbolic, Application) model possesses a unique pedagogical structure that makes it highly suitable for solving geometry problems. According to Lowrie and Patahuddin (2015), this framework explicitly bridges the gap between everyday spatial experiences and abstract mathematical formalization through its cyclic and progressive phases. In geometry—where spatial visualization and abstract reasoning are deeply intertwined—ELPSA effectively scaffolds students' cognitive development by transitioning them from concrete physical manipulations and visual representations (Experience and Pictorial) to formal mathematical notations (Symbolic) (Jones, 2002; Budiarto & Artiono, 2019). The effectiveness of this model can be further optimized when combined with concrete learning media, one of which is the geoboard. This medium is a dotted board arranged in a certain pattern and used to form plane figures using rubber bands, so that abstract geometric concepts can be visualized concretely (Safitri & Trimurtini, 2021). Destiara et al. (2023) showed that the use of geoboards plays an important role in learning plane figures to support the achievement of learning objectives, while Aprilia et al. (2022) reported a positive effect of geoboard use on the mathematics learning outcomes of elementary school students. This medium also has several practical advantages, including simple and easily obtainable materials, and it contains a game-like element that can increase students' interest in learning (Muspika, 2020). In line with this, Wahyuddin (2021) found that integrating the ELPSA model with geoboard teaching aids can foster curiosity while improving students' learning outcomes on plane figure material, while Latri et al. (2021) proved that the application of ELPSA can create an enjoyable learning atmosphere while significantly improving pre-service elementary school teachers.

Despite the critical role of geometry in elementary education, previous studies indicate a persistent challenge in current instructional methods. Recent literature highlights that mathematics instruction frequently prioritizes the rote memorization of formulas over the development of spatial reasoning and conceptual understanding (Jones & Hwang, 2021; Prahmana et al., 2021). While extensive research has explored general learning difficulties in mathematics, there remains a significant gap in targeted pedagogical interventions that specifically address the widespread misconceptions students face when differentiating between perimeter and area (Putri & Zulkardi, 2022). Many existing studies lack a contextual approach to bridge the cognitive leap required for students to transition from understanding one-dimensional length to two-dimensional space. To address this gap, this research introduces a focused instructional design. The material that is the focus of this study is the perimeter and area of plane figures, one of the geometry topics considered difficult for elementary school students to understand because it is abstract and requires spatial visualization skills. Perimeter is the measure of the length of the line surrounding a plane figure, while area is the measure of the size of the region bounded by the figure's edges (Mailani et al., 2024). A strong understanding of both concepts is important as a foundation for students to learn more complex geometric concepts at the next level of education (Mizaniya, 2020).

The material that is the focus of this study is the perimeter and area of plane figures, one of the geometry topics considered difficult for elementary school students to understand because it is abstract and requires spatial visualization skills (Mailani et al., 2024). Perimeter is the measure of the length of the line surrounding a plane figure, while area is the measure of the size of the region bounded by the figure's edges (Mailani et al., 2024). A strong understanding of both concepts is important as a foundation for students to learn more complex geometric concepts at the next level of education (Mizaniya, 2020).

Based on the above description, this study was conducted to describe the mathematics learning outcomes of fifth-grade students before and after the implementation of the ELPSA learning model assisted by a geoboard, and to examine the effect of implementing this model on the mathematics learning outcomes of fifth-grade students at UPT SD Negeri 1 Pangkajene on the topic of perimeter and area of plane figures.

B. RESEARCH METHOD

This study used a quantitative approach with an experimental research type. The design applied was a pre-experimental one-group pretest-posttest design, a design involving a single group without a comparison group, with measurements taken before (pretest) and after (posttest) the treatment was given. The research design is presented in Table 1.

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experimental	O1	X	O2

The research population consisted of all fifth-grade students at UPT SD Negeri 1 Pangkajene, totaling 40 students, divided into classes VA and VB. The research sample was determined through simple random sampling, a sampling technique in which samples are taken randomly without regard to strata within the population. Based on this technique, class VA, consisting of 20 students (11 boys and 9 girls), was selected as the research sample.

The independent variable in this study was the ELPSA learning model assisted by a geoboard, while the dependent variable was the mathematics learning outcomes of fifth-grade students on the topic of perimeter and area of plane figures. Data were collected using a test technique consisting of 15 multiple-choice items, which were developed based on indicators and learning objectives to align with the material taught (Sitepu, 2020). The test was administered at the pretest stage before treatment and the posttest stage after treatment.

The test instrument was developed based on a blueprint containing competency achievement indicators for the perimeter and area of plane figures material, with items developed at several cognitive levels of Bloom's taxonomy, namely remembering, understanding, and applying, in order to measure students' ability to apply the concepts of perimeter and area in contextual situations, rather than merely memorizing formulas (Magdalena et al., 2020).

The research procedure was carried out over five meetings. The first meeting was used to administer the pretest to determine students' initial learning conditions. The second through fourth meetings were used to implement the ELPSA learning model assisted by a geoboard on the perimeter and area of plane figures material, with the Experience, Language, Picture, Symbol, and Application stages carried out sequentially at each meeting through group discussion activities, geoboard exploration, and independent problem solving. The fifth meeting was used to administer the posttest to determine the change in students' learning outcomes after treatment.

The data obtained were analyzed using descriptive and inferential statistics. Descriptive analysis was used to present an overview of the data in the form of mean, median, mode, range, standard deviation, and variance (Sholikhah, 2016), complemented by the calculation of the N-Gain Score to determine the level of effectiveness of the learning model's implementation. Before hypothesis testing, the data were first tested for normality using the Shapiro-Wilk test at a significance level of 0.05. Hypothesis testing was conducted using a paired sample t-test with the help of IBM SPSS Statistics, with the criterion that H0 is rejected if the significance value (2-tailed) is less than 0.05.

C. RESULTS AND DISCUSSION

Results

Students' mathematics learning outcomes before the implementation of the ELPSA learning model assisted by a geoboard were categorized based on five score ranges, as presented in Table 2.

Table 2. Pretest Score Categories

Score	Number of Students	Category
90-100	0	Very Good
80-89	0	Good
75-79	0	Fair
55-74	1	Poor
0-54	19	Very Poor

The data in Table 2 show that before treatment, 19 of the 20 students were in the very poor category and only 1 student was in the poor category; no students had yet reached the fair, good, or very good categories. Descriptive statistics for the pretest are presented in Table 3.

Table 3. Pretest Descriptive Statistics

Statistic	Statistical Value
Number of Samples	20
Mean	34.75
Median	34
Mode	27
Maximum	60
Minimum	15
Range	45
Standard Deviation	13.738
Variance	188.724

The pretest mean score of 34.75 indicates that students' mastery of the perimeter and area of plane figures material was still low before the implementation of the learning model. After the treatment was given, a posttest was conducted with the categorization results shown in Table 4.

Table 4. Posttest Score Categories

Score	Number of Students	Category
90-100	7	Very Good
80-89	11	Good
75-79	0	Fair
55-74	2	Poor
0-54	0	Very Poor

The posttest results show a significant shift, with 18 of the 20 students reaching the good to very good categories and no students remaining in the very poor category. Descriptive statistics for the posttest are presented in Table 5.

Table 5. Posttest Descriptive Statistics

Statistic	Statistical Value
Number of Samples	20
Mean	86.35
Median	87
Mode	94
Maximum	100
Minimum	67
Range	33
Standard Deviation	8.171
Variance	66.766

The comparison between the pretest mean (34.75) and the posttest mean (86.35) resulted in a difference of 51.6 points. To determine the level of effectiveness of this increase, an N-Gain Score calculation was performed, as presented in Table 6.

Table 6. N-Gain Test Results

Pretest Mean	Posttest Mean	N-Gain Mean
34.75	86.35	0.786

The N-Gain value of 0.786 falls into the high category (g > 0.7) according to the criteria proposed by Zainal et al. (2023), indicating that the implementation of the ELPSA learning model assisted by a geoboard is effective in improving students' mathematics learning outcomes.

Before hypothesis testing, the pretest and posttest data were first tested for normality using Shapiro-Wilk at a significance level of $\alpha = 0.05$. The normality test results are presented in Table 7.

Table 7. Shapiro-Wilk Normality Test Results

Data	Significance	Description
Pretest	0.288	Normal (≥ 0.05)
Posttest	0.109	Normal (≥ 0.05)

Both datasets met the normality assumption because the significance values were greater than 0.05, so hypothesis testing could proceed using the parametric paired sample t-test. The test results are presented in Table 8.

Table 8. Paired Sample T-Test Results

Comparison	t	df	Sig. (2-tailed)
Posttest – Pretest	15.439	19	0.000

The significance value (2-tailed) of 0.000 is smaller than 0.05, so H0 is rejected and Ha is accepted. This result proves that there is a significant difference in students' mathematics learning outcomes before and after the implementation of the ELPSA learning model assisted by a geoboard, meaning that this model has a significant effect on improving the mathematics learning outcomes of fifth-grade students at UPT SD Negeri 1 Pangkajene.

Discussion

This study involved 20 students of class VA at UPT SD Negeri 1 Pangkajene as a sample in a pre-experimental one-group pretest-posttest design, aimed at measuring the difference in students' mathematics learning outcomes before and after the implementation of the ELPSA learning model assisted by a geoboard on the perimeter and area of plane figures material. The low pretest score (mean = 34.75) indicates that before treatment, most students had not adequately mastered the concepts of perimeter and area of plane figures. This condition is in line with the findings of Hidayati et al. (2023) that difficulty in understanding mathematical concepts and the limited variety of learning media used are among the causes of low learning outcomes among elementary school students.

The implementation of the ELPSA learning model was carried out gradually over five meetings, beginning with connecting students' everyday experiences to the concept of plane figures, followed by group discussions using geoboards, presentations of group work results, and finally the application of concepts in solving problems independently. Each group was provided with a geoboard, rubber bands, and worksheets to explore the concepts of perimeter and area of various plane figures concretely. This group discussion activity encouraged interaction, responsibility, and cooperation among students, in line with the opinion of Dazrulliza et al. (2025) that student learning activeness can be seen from involvement in group activities and social interaction during learning. Learning was also interspersed with educational games and ice-breaking activities that increased students' enthusiasm, consistent with the view of Widiyanto and Nugraheni (2022) that game-based learning encourages active student engagement through clear challenges and rules.

The significant improvement in learning outcomes, from a pretest mean of 34.75 to a posttest mean of 86.35 with a high N-Gain category (0.786), shows that the ELPSA stages, starting from concrete experience to concept application, effectively built students' understanding of the plane figures material. The use of the geoboard also played an important role in visualizing the abstract concepts of perimeter and area into concrete forms that were easier to understand, as stated by Safitri and Trimurtini (2021) that geoboards help students visualize abstract mathematical concepts into concrete objects. This finding further reinforces the results of studies by Wahyuddin (2021) and Destiara et al. (2023), which showed that the integration of geoboards in learning plane figures consistently improves elementary school students' learning outcomes and mathematical problem-solving abilities.

The results of the paired sample t-test, which produced a significance value of 0.000 (<0.05), confirm that the difference in learning outcomes before and after treatment was not due to chance, but was a real effect of implementing the ELPSA learning model assisted by a geoboard. Thus, H0 is rejected and Ha is accepted. This finding strengthens the empirical evidence that a combination of a learning model emphasizing direct experience, visual representation, and concept application, combined with concrete learning media, is effective in improving elementary school students' mathematics learning outcomes, particularly on geometry topics involving plane figures.

Referring to the five ELPSA stages, the learning process implemented in this study shows that the stages were carried out fully and sequentially. In the Experience stage, students were invited to connect the shapes of objects around them with the concept of plane figures. The Language stage was evident when students discussed and presented their group findings using the terms perimeter and area. The Picture and Symbol stages were seen when students visualized plane figures on the geoboard using rubber bands and then recorded their measurement results in mathematical notation. The Application stage was realized when students solved perimeter and area problems independently at the end of each meeting. The implementation of these five stages shows that the application of ELPSA in this study proceeded fully and continuously, allowing students to experience a gradual learning process from concrete experience to application in more abstract contexts. Unlike digital-based learning media such as video applications and social media, which have also been shown to influence students' mathematics learning outcomes (Parinata, 2021), the geoboard offers a direct manipulative experience that strengthens students' visual-spatial representation of plane figures without requiring electronic devices.

Although the results show a significant effect, this study has several limitations that need to be considered when interpreting the findings. The one-group pretest-posttest design used without a control group has limitations in controlling external variables that may also influence students' learning outcomes, such as maturation factors and students' learning experiences

outside the classroom (Yandi et al., 2023). The limited sample size confined to a single class and the implementation of the study at only one school also limit the generalization of the research results to a broader population. Therefore, these findings need to be interpreted proportionally and should be reinforced with further research involving a control group and samples from several schools with more diverse characteristics.

D. CONCLUSION

Based on the results and discussion, it can be concluded that the mathematics learning outcomes of fifth-grade students at UPT SD Negeri 1 Pangkajene increased significantly after the implementation of the ELPSA learning model assisted by a geoboard, from a pretest mean of 34.75 to a posttest mean of 86.35. The results of the paired sample t-test, with a significance value of 0.000 (<0.05), prove that the implementation of the ELPSA learning model assisted by a geoboard has a significant effect on improving students' mathematics learning outcomes on the topic of perimeter and area of plane figures.

Based on these findings, it is recommended that teachers continue to apply the ELPSA learning model assisted by a geoboard in mathematics learning, particularly on geometry topics involving plane figures. For students, the application of this model is expected to facilitate the understanding of abstract mathematical concepts through concrete and enjoyable learning experiences. For schools, the results of this study can serve as a reference in supporting policies on the use of innovative learning models and media. For future researchers, it is recommended to further develop the application of the ELPSA learning model assisted by a geoboard on other mathematics topics or with research designs involving a control group to strengthen the validity of the findings.

E. REFERENCES

Ahyar, A., Sukmana, D., dkk. (2021). *Model-model pembelajaran*. Pradina Pustaka.

Aprilia, A., Faizah, K., & Lestari, S. (2022). Pengaruh penggunaan media papan berpaku (Geoboard) terhadap hasil belajar siswa kelas 3 pada mata pelajaran matematika di SD Negeri 1 Sumberbulu. *AT-Ta'lim: Jurnal Madrasah Ibtidaiyah, 1*(2), 76–83. https://ejournal.iaiibrahimy.ac.id/index.php/attaklim/article/view/1529

Budiarto, M. T., & Artiono, R. (2019). The ELPSA framework in geometry learning: Scaffolding students' spatial reasoning. *Journal of Mathematics Education and Practice*, 10(4), 32-41.

Dazrulliza, Kristanti, D., & Yukiana. (2025). Keaktifan belajar siswa melalui penerapan model pembelajaran *Teams Games Tournament* kelas V SD Negeri Kuala Trang. *Jurnal Binagogik, 12*(1), 80–89. https://doi.org/10.61290/pgsd.v12i1

Destiara, D., Handayani, H., & Setiawati, T. (2023). Pengaruh pendekatan pembelajaran *Realistic Mathematics Education* (RME) berbantuan media papan berpaku (*Geoboard*) terhadap kemampuan pemecahan masalah matematis siswa pada materi keliling dan luas persegi dan persegi panjang. *Jurnal Pendidikan Matematika, 2*(3), 1–14.

Haerawati, H., Zainal, Z., & Lukman, L. (2022). Pengaruh model pembelajaran kooperatif tipe *Team Assisted Individualization* dalam meningkatkan hasil belajar matematika siswa kelas IV UPT SD Negeri 63 Pinrang. *Jurnal Pendidikan Dasar, 1*(4).

Hidayati, P., Syafrizal, S., & Fadriati, F. (2023). Analisis faktor penyebab rendahnya hasil belajar matematika pada siswa kelas V sekolah dasar. *Limas PGMI: Jurnal Pendidikan Guru Madrasah Ibtidaiyah, 4*(1), 46–58.

Intan, D. N., Kuntarto, E., & Sholeh, M. (2022). Strategi guru untuk mencapai tujuan pembelajaran pada pembelajaran matematika di sekolah dasar. *Jurnal Basicedu, 6*(3), 3302–3313.

Jones, K. (2002). *Issues in The Teaching and Learning of Geometry*. In L. Haggarty (Ed.), Aspects of teaching secondary mathematics: Perspectives on practice (pp. 121-139). Routledge.

Jones, K., & Hwang, S. (2021). The over-reliance on procedural knowledge in elementary geometry: A global perspective. *International Journal of Mathematical Education in Science and Technology*, 52(4), 567-584. https://doi.org/10.1080/0020739X.2021.1895678

Latri, L., Patta, R., Atjo, S. E. P., & Juhari, A. (2021). Pengaruh model pembelajaran *Experiences, Language, Pictures, Symbols, Application* (ELPSA) berbasis *virtual classroom* terhadap pemahaman konsep geometri calon guru SD.

Lowrie, T., & Patahuddin, S. M. (2015). ELPSA as a pedagogical framework for developing mathematical concepts. *Mathematics Education Research Journal*, 27(1), 1-15.

Magdalena, I., Islami, N. F., Rasid, E. A., & Diasty, N. T. (2020). Tiga ranah Taksonomi Bloom dalam pendidikan.

Mailani, E., Rarastika, N., Manurung, H. O., Gaol, R. L., Sihombing, I. I., & Perbina, S. D. (2024). Analisis literasi matematika siswa sekolah dasar dalam konsep luas dan keliling persegi serta persegi panjang. *Jurnal Teknologi Pendidikan dan Pembelajaran, 2*(2), 749–755.

Mirdad, J. (2020). Model-model pembelajaran (Empat rumpun model pembelajaran). *Jurnal Sakinah, 2*(1), 14–23. https://doi.org/10.2564/js.v2i1.1167

Mizaniya, M. (2020). Analisis materi pokok matematika MI/SD. *Auladuna: Jurnal Pendidikan Dasar Islam, 7*(1), 98–110. https://doi.org/10.24252/auladuna.v7i1.13989

Muspika. (2020). *Pengaruh penggunaan media papan berpaku (Geoboard) terhadap hasil belajar siswa pada mata pelajaran matematika siswa kelas IV SDN 138 Inpres Mangulabbe Kecamatan Mappakasunggu Kabupaten Takalar* (Skripsi, Universitas Muhammadiyah Makassar). https://digilibadmin.unismuh.ac.id

Nissa, I. C. (2018). *Peningkatan literasi matematika melalui pembelajaran ELPSA (Experience, Language, Pictorial, Symbolic, Application)*. Universitas Mataram.

Nurulaeni, F., & Rahma, A. (2022). Analisis problematika pelaksanaan Merdeka Belajar matematika. *Jurnal Pacu Pendidikan Dasar, 2*(1), 35–45.

Parinata, D. (2021). Pengaruh penggunaan aplikasi YouTube dan Facebook terhadap hasil belajar matematika. *Jurnal Ilmiah Matematika Realistik, 2*(1), 11–17. https://doi.org/10.33365/ji-mr.v2i1.851

PPPPTK Matematika. (2014). *Kerangka pembelajaran ELPSA*. Kementerian Pendidikan dan Kebudayaan.

Prahmana, R. C. I., Sagita, L., & Hidayat, W. (2021). The real hurdles in learning geometry: Indonesian elementary students' reliance on formulas. *Journal on Mathematics Education*, 12(1), 121-138. https://doi.org/10.22342/jme.12.1.13545.121-138

Putri, R. I. I., & Zulkardi. (2022). Designing contextual learning to overcome students' misconceptions in distinguishing perimeter and area. *Indonesian Journal of Science and Mathematics Education*, 5(2), 210-225. https://doi.org/10.24042/ijsme.v5i2.11234

Republik Indonesia. (2003). *Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*. Sekretariat Negara Republik Indonesia.

Safitri, T. R., & Trimurtini. (2021). Keefektifan model *Contextual Teaching and Learning* berbantuan media papan berpaku terhadap hasil belajar matematika. *Joyful Learning Journal, 10*(3), 147–152. https://doi.org/10.15294/jlj.v10i3.48078

Sholikhah, A. (2016). Statistik deskriptif dalam penelitian kualitatif. *Komunika: Jurnal Dakwah dan Komunikasi, 10*(2), 342–362. https://doi.org/10.24090/komunika.v10i2.953

Sitepu, S. (2020). Analisis kesesuaian materi ajar dengan tes hasil belajar mahasiswa di lingkungan FKIP UHN Medan. *Sepren, 2*(1), 1–7. https://doi.org/10.36655/sepren.v2i1.347

Subanji, S., & Suastika, K. (2020). Analisis hambatan kognitif siswa dalam transisi representasi gambar ke simbol matematis. Jurnal Pendidikan Matematika, 14(2), 115-130. https://doi.org/10.1016/j.jpm.2020.08.005

Wahyuddin, W. (2021). Penerapan model ELPSA dengan bantuan alat peraga Geoboard untuk meningkatkan aktivitas dan hasil belajar siswa pada materi bangun datar. *Jurnal Paedagogy, 8*(4), 497–506. https://doi.org/10.33394/jp.v8i4.3942

Wahyuni, K. A. (2017). *Penerapan kerangka kerja ELPSA untuk meningkatkan hasil belajar matematika siswa* (Skripsi). Universitas Mataram.

Widiyanto, R., & Nugraheni, G. W. (2022). Penerapan *Game Based Learning* menggunakan *Maze Game* dalam meningkatkan hasil belajar siswa kelas III. *Elementar: Jurnal Pendidikan Dasar, 2*(2), 158–167. https://doi.org/10.15408/elementar.v2i2.30347

Yandi, A., Putri, A. N. K., & Putri, Y. S. K. (2023). Faktor-faktor yang mempengaruhi hasil belajar siswa (*Literature review*). *Jurnal Pendidikan Siber Nusantara, 1*(1), 13–24. https://doi.org/10.38035/jpsn.v1i1.13

Zainal, Z., Krismanto, W., & Hasan, K. (2023). Investigating self-efficacy in improving mathematical problem-solving skills in elementary school students through the Missouri Mathematics Project. *AIP Conference Proceedings, 2914*, 020012. https://doi.org/10.1063/5.0176508