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# Analysis Of Computational Thinking Ability Profile Of Students In Indonesia: A Systematic Literature Review

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***Abstract***

*In Indonesia, integration thinking is computationally getting attention from various researchers and is already being implemented in schools. However, there is currently no systematic mapping of students' computational thinking abilities in Indonesia that considers all relevant components. Research This aim. For known characteristics, a study about ability to think computationally, profile ability of students, and components that students think are the most dominant computationally and mastered by students in Indonesia, the instruments used for measuring computational ability in Indonesia, as well as research gaps and recommendations to study computational ability. Research methods: The study uses a systematic literature review based on PRISMA. Obtained results that characteristics study can see from level of ability participant education, methodology and design research used, as well as variables of psychological profile, ability, and thinking and computational Students in Indonesia exhibit diverse characteristics, which vary depending on the study conducted, such as those related to self-efficacy. The profile shows that decomposition is the most mastered component, while abstraction is the hardest. Recommendation for study: Additionally, implement interventions focused on developing computational thinking skills with the goal of enhancing students' abilities to recognize patterns, understand abstractions, and apply algorithms.*

**Keywords:** *Computational Thinking, Indonesian Students , Systematic Literature Review*

**Abstrak**

Di indonesia, integrasi berpikir komputasional sudah mendapat perhatian dari berbagai peneliti dan sudah mulai diterapkan di sekolah. Namun, Belum terdapat pemetaan yang sistematis terhadap kemampuan berpikir komputasional siswa di indonesia berdasarkan setiap komponennya. Penelitian ini bertujuan untuk mengetahui karakteristik penelitian mengenai kemampuan berpikir komputasional, profil kemampuan siswa, komponen berpikir komputasional yang paling dominan dan dikuasai oleh siswa indonesia, instrumen, serta research gap dan rekomendasi penelitian berpikir komputasional. Metode penelitian ini menggunakan systematic literature review dengan berpedoman pada PRISMA. Diperoleh hasil bahwa karakteristik penelitian dapat dilihat dari tingkat kemampuan peserta didik, metodelogi dan desain penelitian yang digunakan, serta variabel psikologis. Profil kemampuan berpikir komputasional siswa di Indonesia beragam dan bervariasi tergantung berdasarkan kajian yang digunakan seperti self efficacy. Berdasarkan profil berpikir komputasional diketahui bahwa dekomposisi merupakan komponen yang paling dominan dikuasai dan yang paling sulit adalah abstraksi. Rekomendasi untuk penelitian selanjutnya yaitu melakukan intervensi dalam pengembangan pembelajaran berbasis berpikir komputasional.

**Kata Kunci:** *Berpikir Komputasional, Siswa Indonesia, Systematic Literature Review*

## INTRODUCTION

Changes in technology and information have brought significant changes to education. This shift has led to significant changes in student skill development, such as the 4Cs. In addition to the 4Cs, computational thinking is considered essential in the 21st century (Juldial & Haryadi, 2024; Widiyatmoko & Wulandari, 2025). Computational thinking is not only related to programming and technical skills but also critical and creative thinking in the context of technology (Alifah & Widodo, 2024). Computational thinking applies systematic and structured thinking to solving problems that not only seek solutions but also consider efficient solutions and use appropriate steps (Cahdriyana & Richardo, 2020; Faradillah et al., 2025). Computational thinking skills are believed to be useful in the world of work and are able to predict future environments (Juldial, 2024). Computational thinking skills have several benefits, such as (1) helping solve complex and large problems in an effective and efficient way, (2) training logical, structured, creative and systematic thinking, (3) making it easier to observe and find solutions that can be directed at solving problems, (4) working more efficiently and professionally and being sensitive to problems, and (5) creating innovations and systems that are more practical in solving problems (Siregar, 2022).

Computational thinking is divided into four components, namely decomposition, recognition, patterns, abstraction, and algorithms (Wu et al., 2024). Computational thinking not only supports 21st-century learning but can also be applied to all subjects (Arsitha et al., 2024). The application of computational thinking has been implemented in various countries, including Indonesia (Widiyatmoko & Wulandari, 2025). In Indonesia, the integration of computational thinking has received attention from various researchers and has begun to be implemented in schools (Arsitha et al., 2024; Rosyana et al., 2026). Each student's computational thinking ability varies according to the factors that influence it. (Chongo et al., 2020) states that each student shows different levels of critical thinking (CT) abilities based on region, gender, and achievement in mathematics.

This conclusion is also supported by previous studies such as (Waruwu et al., 2026), who conducted an analysis of computational thinking skills based on students' cognitive styles and found that there were differences in results between field-dependent (FD) students and field-independent (FI) students in fulfilling computational thinking

components; (Putri & Setianingsih, 2025), who found differences in computational thinking skills between students with medium, and high logical-mathematical intelligence; and (Mukhibin et al., 2024), who analyzed computational thinking skills based on self-efficacy levels and found differences in the results of mastery of computational thinking indicators at each level. Based on previous studies, it can be seen that the results of research on computational thinking skills are still scattered and do not provide a comprehensive picture. There has not been a systematic mapping of Indonesian computational thinking skills based on each component. The research results have not been systematically synthesized based on the four components of computational thinking and are also scattered in various contexts. In addition, it remains unclear which CT components Indonesian students tend to master more and which components pose the greatest challenges. which CT components tend to be more mastered and which components are the main difficulties for Indonesian students.

Based on the description, this study aims to analyze the profile of students' computational thinking abilities in Indonesia based on four main components, namely decomposition, pattern recognition, abstraction, and algorithmic thinking. Through the systematic literature review approach, this study aims to determine the characteristics of research on computational thinking abilities, student ability profiles in each component of computational thinking, the most dominant and mastered components of computational thinking by Indonesian students, instruments used to measure computational thinking in Indonesia, research gaps and recommendations for computational thinking research.

## METHOD

This study uses the Systematic Literature Review (SLR) method following the PRISMA guidelines. SLR is a systematic research method used to collect, evaluate, integrate, and present findings from various research studies to answer questions or topics of interest (Sari et al., 2023). The purpose of this study is to analyze the profiles of the computational thinking skills of students in Indonesia based on four components of computational thinking. The literature search was conducted using the Google Scholar database and the Publish or Perish (PoP) software, with the keywords "analysis, profile, computational thinking, students, Indonesia, computational thinking components" on July 22, 2026. The selected articles met inclusive criteria such as (1) research published between 2016 and 2026, (2) empirical research on students' computational thinking skills, (3) research subjects were

students in Indonesia, (4) articles discussed at least one component of computational thinking, (5) published in Indonesian or English, and (6) available in full text. The search followed the PRISMA method as seen in Figure 1.

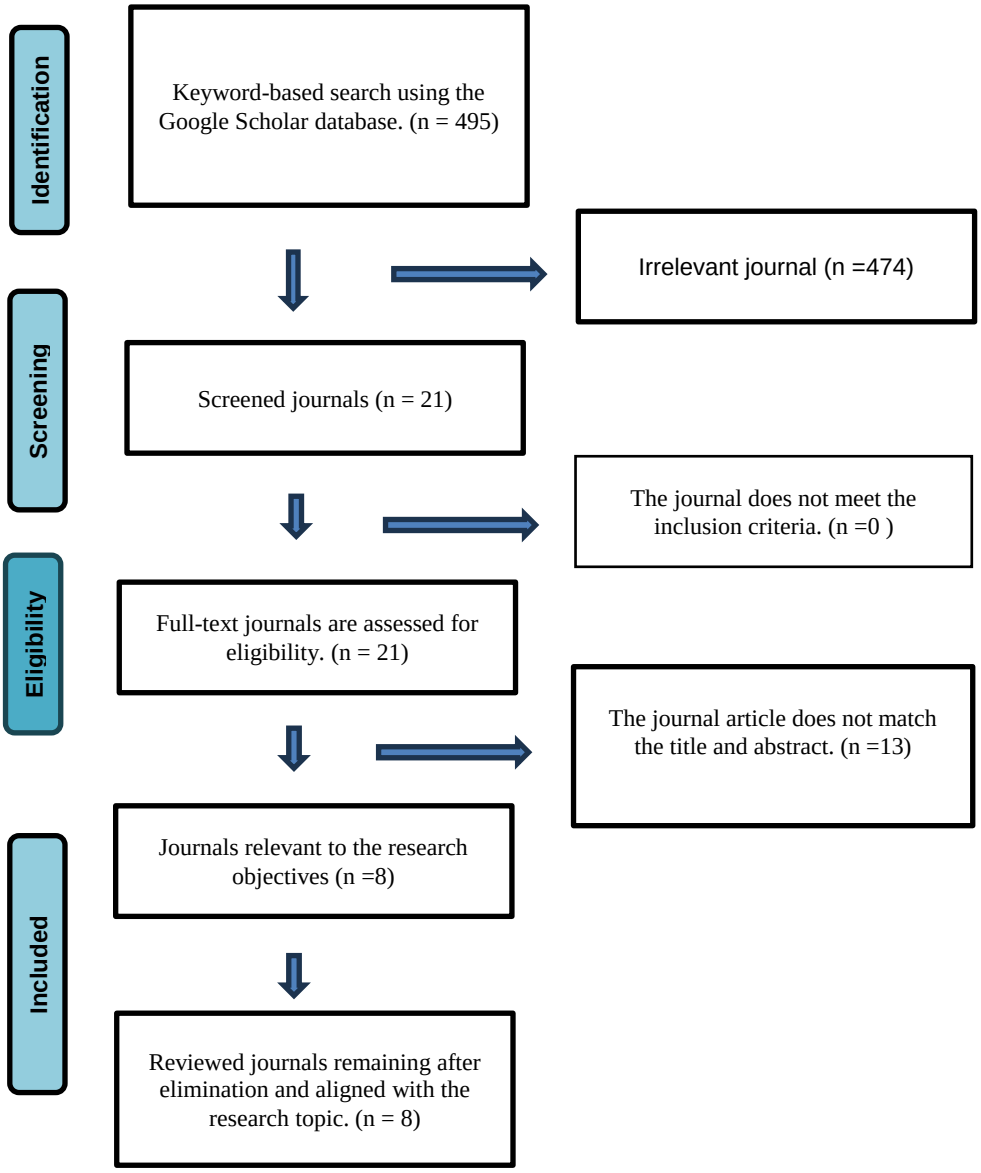



**Figure 1. PRISMA Method Flowchart in Determining the Number of Articles Analyzed**

## RESULTS AND DISCUSSION

### Characteristics Study About Ability Think Computational Students In Indonesia

The characteristics of research related to the computational thinking abilities of Indonesian students can be seen from the level of student ability, the methodology and research design used, and psychological variables.

**a. Ability Level Student**

Based on the PISA international assessment, Indonesian students' abilities are ranked 73rd out of 78 countries and are classified as low (Lestari & Roesdiana, 2023). This conclusion is also supported by the results of previous studies, such as (Denada et al., 2026), who found that students' abilities in understanding mathematical concepts are still low, especially in reasoning and statistical literacy abilities, and (Farida & Rahaju, 2025), who found that students' understanding of measurement and geometry content is categorized as low due to different solution representations and diverse student thinking styles. In addition, students' low computational thinking abilities and a lack of analytical skills and conceptual understanding for systematic thinking contribute to their low computational thinking skills (Junaedi et al., 2024). (Latifah et al., 2024) stated that there are several factors causing low computational thinking abilities originating from students themselves, such as perception and anxiety before facing a given mathematical problem. Students' abilities The study's findings indicate that abstraction possesses more intricate characteristics than merely recognizing or dissecting a problem. students' computational thinking abilities are still not optimal (Faradillah & Supiarmo, 2026), especially in the decomposition component, even though they are able to make steps to solve it (Difani et al., 2025).

**b. Methodology and Design Studies**

The approaches frequently employed in research regarding the analysis of computational thinking skills in Indonesia are the qualitative approach (Farida & Rahaju, 2025) and the descriptive-qualitative approach (Denada et al., 2026; Junaedi et al., 2024; Latifah et al., 2024; Lestari & Roesdiana, 2023; Mukhibin et al., 2024), while the designs utilized include the case study design (Farida & Rahaju, 2025; Junaedi et al., 2024). In addition to the previously mentioned approaches and designs, the grounded theory perspective is also employed in this research (Dewi & Nurjaman, 2025).

**c. Study Based On Variables Psychological**

Several previous studies that analyzed computational thinking, skills also linked their thinking processes to psychological variables, such as (Difani et al., 2025), who analyzed computational thinking skills in solving statistical problems and reviewed students' divergent and convergent thinking patterns; (Farida & Rahaju, 2025), who

analyzed students' computational thinking processes in solving numeracy problems in geometry content and studied their cognitive styles; (Latifah et al., 2024), who conducted a case study on computational thinking skills and studied mathematics learning anxiety; and (Mukhibin et al., 2024), who analyzed students' computational thinking skills and studied self-efficacy online and angle material. In addition to psychological variables, this study also examined demographic factors such as gender (Faradillah & Supiarmo, 2026) and differentiated learning approaches (Junaedi et al., 2024).

**Profile Ability Students In The Components Think Computational**

**Tabel 1. Summary of Selected Research Findings**

| Researchers | Research result |
|---|---|
| (Denada et al., 2026) | Components think the most difficult computational task is decomposition and abstraction, and that is enough. The introduction of patterns and algorithms is beneficial. |
| (Difani et al., 2025) | The convergent mindset excels in indicator decomposition and algorithms, while the divergent mindset is more creative and flexible in indicator abstraction and pattern introduction. |
| (Faradillah & Supiarmo, 2026) | Female students tend to be more systematic in decomposition and algorithms, while male students tend to be faster at recognizing patterns, particularly in abstraction and algorithms. |
| (Farida & Rahaju, 2025) | Field-independent students tend to stand out on the components decomposition and introduction pattern; students dependent tend to be weak on components decomposition, introduction patterns and algorithms. |
| (Junaedi et al., 2024) | Students in the "tall capable" category believe that computational (decomposition, introduction) patterns, abstractions, and algorithms can only fulfill 3 indicators (decomposition, introduction, and abstraction), while those with low capability can only fulfill 2 indicators (decomposition and introduction). |
| (Latifah et al., 2024) | The student who experiences anxiety in mathematics reported that low anxiety levels can fulfill all indicators, medium anxiety levels only meet 2 indicators (algorithm and abstraction), and high |

| | |
|---|---|
| | anxiety levels do not fulfill any indicators. Not all indicators were fulfilled. |
| (Lestari & Roesdiana, 2023) | Based on the thinking of computational students, they were divided into five categories:<br>1. The "Very Good" category is capable of fulfilling all indicators.<br>2. Category: Satisfactory fulfillment of all indicators, but indicator abstraction is not perfect enough.<br>3. The category sufficiently fulfills the decomposition and introduction pattern.<br>4. Category: Low and very low Not all indicators were fulfilled. |
| (Mukhibin et al., 2024) | Ability to think computationally reviewed based on self-efficacy shared to 3<br>1. Low only fulfills 2 indicators (decomposition, abstraction)<br>2. Currently fulfilling 3 indicators (decomposition, introduction, and abstraction)<br>3. Height meets all indicators |

Profile ability think computational Students in Indonesia are diverse and varied depends based on the study used like self-efficacy, gender, anxiety, and patterns think. So must Be careful in interesting conclusion in general on which indicators can be filled by students.

**Component Think of the most dominant and the lowest computationally mastered students based on research results in Indonesia.**

Based on research by (Denada et al., 2026; Difani et al., 2025; Faradillah & Supiarmo, 2026; Farida & Rahaju, 2025; Junaedi et al., 2024; Latifah et al., 2024; Lestari & Roesdiana, 2023; Mukhibin et al., 2024) regarding analysis ability, think computational results vary and must be careful in the interesting conclusion component or which indicators are dominant and which are the lowest. This conclusion is due to study analysis; computational thinking in Indonesia is studied with different variables like anxiety, self-efficacy, and gender.

Component decomposition tends to be one of the most dominant components. This phenomenon: Several research findings illustrate this phenomenon. in several research

findings. (Faradillah & Supiarmo, 2026) found that Female students tend to be more systematic in decomposition as well as algorithms. (Farida & Rahaju, 2025) shows that field-independent students tend to stand out on the components' decomposition and introduction pattern. (Junaedi et al., 2024) found that students with categories low, medium, and high are capable of fulfilling all indicator decompositions. Research by (Mukhibin et al., 2024) shows that students with high, medium, and low self-efficacy are welcome to fulfill the indicator decomposition. Consistent emergence decomposition in various categories of ability shows that decomposition is a foundational aspect of computational thinking. Students own a trend in understanding problems with methods that break complex issues into simpler ones.

Component abstraction tends to be the most difficult or the lowest. (Denada et al., 2026) explicitly finds that the most difficult component is decomposition and abstraction. However, when comparing all the results, abstraction consistently demonstrates greater weaknesses. (Lestari & Roesdiana, 2023) found that students in the Excellent category possess capable and fulfilling indicators; however, the abstraction indicator, while also capable and fulfilling, is not sufficiently perfect. (Difani et al., 2025) also shows that the ability to abstract is more pronounced in students who exhibit pattern thinking and divergent thinking. This finding means ability. This finding indicates that creativity and flexibility in problem representation significantly influence ability. This indicates that creativity and flexibility are important in finding representations of problems. Findings from the study The study's findings indicate that abstraction possesses more intricate characteristics than merely recognizing or dissecting a problem. abstraction has more complex characteristics compared to just recognizing or breaking a problem. Students are required to understand information, determine relevant details, ignore unnecessary information, identify general characteristics, and create simpler representations. Therefore, the ability to abstract requires a profound understanding of concepts and the capacity for high-level thinking.

**Instruments are used to measure the computational thinking abilities of students in Indonesia.**

**Table 2. Instruments Used In The Selected Studies**

| Researchers | Instrument Study |
|---|---|
| (Denada et al., 2026) | Test written in the form of question essay |
| (Difani et al., 2025) | The observation sheet includes activities for students and tests related to writing. |
| (Faradillah & Supiarmo, 2026) | Test thinking computationally |
| (Farida & Rahaju, 2025) | The GEFT (Group Embedded Figures Test), AKM numeracy questions focused on geometry and measurement, and the interview guidelines are included in the test. |
| (Junaedi et al., 2024) | The test written contains computational thinking indicators, differentiated learning teaching modules, interview guidelines, and documentation. |
| (Latifah et al., 2024) | Questionnaires, tests , interview guidelines |
| (Lestari & Roesdiana, 2023) | Test in the form of descriptive questions |
| (Mukhibin et al., 2024) | Tests, questionnaires , and interview guidelines |

Instruments used by researchers in Indonesia in the measure component are computationally diverse and yet standardized in a wide way. This diversity is due to the study used for measuring ability. Computational students in Indonesia are diverse and varied depending on the study used like self-efficacy, gender, anxiety, and patterns of thinking.

**The Research Gap and Recommendations Furthermore, There is a Need for Further Study on The Ability of Students in Indonesia to Think Computationally.**

The research methodology for students' computational thinking skills in Indonesia is dominated by descriptive qualitative methods with case study designs, a limited number of subjects, and various instruments used in research. Previous research has examined computational thinking skills according to psychological and demographic factors, but they are still fragmented and have not produced a broad mapping of abilities. The instruments

used in previous research have not been widely standardized for consistent measurement of the four components. Furthermore, existing research only describes students' abilities rather than testing effective learning interventions to improve these abilities, especially in the abstraction component, which is one of the components that students consider the most difficult. Recommendations for research on computational thinking skills with the most potential include mapping Indonesian students' computational thinking, developing standardized instruments and conducting validation based on the four components of computational thinking, and conducting intervention research in developing computational thinking-based learning with the aim of improving abstraction and decomposition abilities. These recommendations are relevant because previous research has shown weaknesses in both components and still requires empirical evidence regarding effective learning strategies to overcome them.

## CONCLUSION

Four main components—decomposition, introduction patterns, abstractions, and algorithms—form diverse profiles of students who are able to think computationally in Indonesia. These results indicate that mastery thinking is a computational skill. Still vary and are greatly influenced by many factors, including context learning, types of tasks, levels of education, and the learning strategies used. In addition, research conducted in Indonesia has not yet fully described all aspects of computational thinking. This is because research on computational thinking Researchers still conduct studies on computational thinking in various contexts and levels. Therefore, learning must be designed in a way that is clearer. To develop the fourth element, it should be integrated through problem-solving activities, introduction patterns, information simplification, preparation, and the evaluation algorithm. Recommendations For the study: furthermore, they should do measurement thinking computationally with consistent tools and indicators. In addition, research must investigate component contextual causes for more Indonesian students' easy or difficult control of certain parts.

## REFERENCES

Alifah, A. H., & Widodo, S. (2024). Membuka Kemampuan Computational Thinking Sebagai 21 Century Skills Disiplin STEM. *Faktor: Jurnal Ilmiah Kependidikan*, *XI*(1), 100–108.

Arsitha, E. D., Hartono, Y., & Nurkholipah, S. (2024). Integrasi Computational Thinking (CT) dalam Pembelajaran Sejarah Materi Masuknya Hindu Budha di Indonesia. *Seminar Nasional Sosial Sains, Pendidikan, Humaniora (SENASSDRA)*, *3*(2), 335–340.

Cahdriyana, R. A., & Richardo, R. (2020). Berpikir Komputasi Dalam Pembelajaran Matematika. *LITERASI*, *XI*(1), 50–56.

Chongo, S., Osman, K., & Nayan, N. A. (2020). Level of Computational Thinking Skills among Secondary Science Student: Variation across Gender and Mathematics Achievement. *Science Education International*, *31*(2), 159–163.

Denada, E., Laila, F. M., Nurpadila, & Meridina, R. (2026). Analisis Kemampuan Berpikir Komputasi Siswa Dalam Menyelesaikan Masalah Statistika Kelas 10 SMA. *Pedagogy*, *11*(2), 195–209.

Dewi, A. I. K., & Nurjaman, A. (2025). Kemampuan Berpikir Komputasi Siswa SMP Ditinjau Berdasarkan Adversity Quotient:Analisis Studi Kasus. *Jurnal Pembelajaran Matematika Inovatif*, *8*(4), 507–518. https://doi.org/10.22460/jpmi.v8i4.25817

Difani, A. F., Kurniawan, A. P., & Istiqomah, N. R. (2025). Analisis Kemampuan Berpikir Komputasi Siswa dalam Menyelesaikan Masalah statistika Berdasarkan Pola Pikir Divergen dan Konvergen. *Polinomial: Jurnal Pendidikan Matematika*, *4*(4), 1131–1140.

Faradillah, C., Sridana, N., & Supiarmo, M. G. (2025). Analisis Berpikir Komputasional Siswa Dalam Memecahkan Masalah Kontekstual Matematika. *Mandalika Mathematics and Educational Journal*, *7*(4), 2132–2148.

Faradillah, C., & Supiarmo, M. G. (2026). Kemampuan Computational Thinking Siswa Dalam Menyelesaikan Masalah Matematika Berbasis Budaya Ditinjau Dari Gender. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *9*(1), 68–73.

Farida, S., & Rahaju, E. B. (2025). Proses Berpikir Komputasi Siswa dalam Menyelesaikan Soal Numerasi Konten Geometri dan Pengukuran Ditinjau dari Gaya Kognitif. *MATHEdunesa*, *14*(3), 704–720. https://doi.org/10.26740/mathedunesa.v14n3.p704-720

Juldial, T. U. H., & Haryadi, R. (2024). Analisis Keterampilan Berpikir Komputasional dalam Proses Pembelajaran. *Jurnal Basicedu*, *8*(1), 136–144.

Junaedi, Y., Umami, M. R., Anwar, S., Juniawan, E. A., & Yulianto, D. (2024). Analisis Computational Thinking Skills Siswa SMA Melalui Pembelajaran Berdiferensiasi. *WILANGAN*, *5*(4), 306–314.

Latifah, A. G., Quini, I. F., & Aripin, U. (2024). Kemampuan Berpikir Komputasi Ditinjau dari Kecemasan Belajar Matematika. *Teorema*, *09*(2), 351–360.

Lestari, S., & Roesdiana, L. (2023). Analisis Kemampuan Berpikir Komputasional Matematis Siswa Pada Materi Program Linear. *RANGE:Jurnal Pendidikan Matematika*, *4*(2), 178–188.

Mukhibin, A., Herman, T., A, E. C. M., & Utomo, D. A. S. (2024). Kemampuan Computational Thinking Siswa Pada Materi Garis dan Sudut Ditinjau dari Sef Efficacy. *Jurnal Pembelajaran Matematika Inovatif*, *7*(1), 143–152. https://doi.org/10.22460/jpmi.v7i1.21239

Putri, K. D., & Setianingsih, R. (2025). Kemampuan Berpikir Komputasional Peserta Didik dengan Kecerdasan Logis Matematis Tinggi dan Sedang dalam Menyelesaikan Bebras Task. *MATHEdunesa*, *14*(1), 118–128. https://doi.org/10.26740/mathedunesa.v14n1.p118-128

Rosyana, T., Juniati, D., & Khabibah, S. (2026). Eksplorasi Berpikir Kreatif Siswa dalam Pemecahan Masalah Matematika Berbasis Computational Thinking. *Jurnal Pembelajaran Matematika Inovatif*, *9*(1), 75–84. https://doi.org/10.22460/jpmi.v9i1.30720

Sari, A. D. I., Herman, T., Sopandi, W., & Jupri, A. (2023). A Systematic Literature Review ( SLR ): Implementasi Audiobook pada Pembelajaran di Sekolah Dasar. *Jurnal Elementaria Edukasia*, *6*(2), 661–677. https://doi.org/10.31949/jee.v6i2.5238

Siregar, E. (2022). *Riset dan Seminar Sumber Daya Manusia*. Widina Media Utama.

Waruwu, M. N. J., Waruwu, A. P. D., Zebua, P. A. S., Harefa, R., Buulolo, K. P., & Mendrofa, N. K. (2026). Analisis Kemampuan Berpikir Komputasi Matematis Siswa Dalam Menyelesaikan Soal HOTS Pada Materi Persamaan Garis Lurus Ditinjau dari Gaya Kognitif. *CARTESIUS:Jurnal Pendidikan Matematika*, *9*(1), 50–66.

Widiyatmoko, A., & Wulandari, T. D. (2025). TREN PEMBELAJARAN BERBASIS COMPUTATIONAL THINKING 2020-2024 Dan Potensinya Dalam Pembelajaran Sains. *Proceeding Seminar Nasional IPA XV*, 612–623.

Wu, T., Asmara, A., & Huang, Y. (2024). Identification of Problem-Solving Techniques in Computational Thinking Studies : Systematic Literature Review. *Sage*, 1–20. https://doi.org/10.1177/21582440241249897