International Journal Of Humanities Education And Social Sciences ***(IJHESS)*** *E-ISSN:* **2808-1765**
Volume 5, Number 3, December 2025, *Page. 1441 – 1451*
Email : editorijhess@gmail.com

Designing Individualized Learning Programs for Mathematics Addition Operations in SPPI: A Case Study of Fourth-Grade Students with Mild Intellectual Disabilities

Indah Hayati [1)]*, Eka Yuli Astuti [2)]
[1, 2)]Univerasitas Islam Nusantara Bandung, Indonesia

***Corresponding Author**
Email**: Indah.s.hum@gmail.com**

Abstract

This study aims to develop and implement an Individualized Learning Program focused on addition operations in mathematics for fourth-grade students with mild intellectual disabilities in an inclusive school (SPPI). The background of the study stems from the limited availability of subject-specific PPIs and the ongoing challenges faced by teachers in designing appropriate instructional strategies for students with cognitive impairments. Using a qualitative case study design, data were collected through interviews, observations, and document analysis at SDN Karawaci 5, Kota Tangerang. The findings reveal that effective PPI implementation requires comprehensive diagnostic assessment, clear and measurable learning goals, adaptive instructional methods, personalized learning media, continuous formative evaluation, and strong collaboration with parents and specialists. The study concludes that a well-structured and contextually grounded PPI significantly enhances mathematical learning outcomes and supports inclusive education practices. This research contributes to both practical and theoretical advancements in individualized instruction for students with intellectual disabilities in inclusive classroom settings.

Keywords: Individualized Learning Program, Mathematics Instruction, Mild Intellectual Disability, Inclusive Education, Addition Skills

INTRODUCTION

Education is a fundamental right enshrined in Indonesia's constitution, guaranteeing equal access to quality learning for all children, including those with disabilities. As part of its inclusive education policy, the government mandates the integration of children with special needs into mainstream schools, ensuring they learn alongside their peers in the same academic and social environment. However, this vision often collides with the reality of classrooms that are unprepared to accommodate diverse learning needs, particularly in core academic subjects like mathematics(Amka, 2020; Bouck, 2010).

Mathematics poses significant challenges for students with mild intellectual disabilities. The subject requires abstract thinking, symbolic understanding, and sequential logic skills that many children in this group find difficult due to cognitive processing limitations. Without adapted instructional strategies, these students frequently fall behind, experience frustration, and may ultimately disengage from learning(Overton, 2016). Inclusive classrooms, therefore, must adopt differentiated approaches that align with individual learning profiles to ensure these students can access and benefit from the curriculum(Browder & Spooner, F., 2011).

In this context, the development of an Individualized Learning Program (*Program Pembelajaran Individual*/PPI) becomes not only relevant but essential. A PPI serves as a personalized instructional plan tailored to the cognitive, emotional, and behavioral characteristics of each student. It bridges the gap between the national curriculum and the unique needs of students with intellectual disabilities. In SPPI (Sekolah Penyelenggara Pendidikan Inklusi) environments, the effectiveness of inclusive education relies heavily on the quality and implementation of such programs (Disabilities, 2010; Irdamurni, 2020).

Legally, the right to a tailored education is supported by Law No. 20 of 2003 on the National Education System and Law No. 8 of 2016 concerning Persons with Disabilities, both of which emphasize the obligation to provide education based on individual needs. Theoretically, this principle is reinforced by Gardner's Multiple Intelligences theory, which argues for

pedagogical approaches that recognize varied cognitive strengths, and by the framework of differentiated instruction that promotes flexible teaching methods. Together, these foundations advocate for instructional designs that respect individual differences rather than forcing uniformity(Hallahan Kauffman, J. M., & Pullen, P. C., 2015).

Prior research has provided empirical support for the effectiveness of PPIs, particularly in the field of mathematics. Studies by (Browder & Spooner, F., 2011) and (Brooks et al., 2020) demonstrated that individualized, skill-specific instructional strategies can significantly improve math achievement among students with intellectual disabilities. Moreover, visual, kinesthetic, and hands-on methods have been shown to be especially beneficial in supporting the understanding of mathematical operations such as addition and subtraction(Saputri Ningsih, B., & Widyawati, C., 2017).

Despite this, the implementation of PPI remains inconsistent in many Indonesian SPPI schools. Teachers often lack the training, resources, and structured frameworks needed to design effective, subject-specific PPIs. Most available programs are general in nature and do not address the particular cognitive demands of mathematics. This disconnect leaves a critical gap in how students with intellectual disabilities are taught fundamental numeracy skills—skills essential not only for academic success but for daily life(Kirk Gallagher, J., & Coleman, M. R., 2015; Kirk & Gallagher, 1986).

At SDN Karawaci 5 Kota Tangerang, one of the designated SPPI institutions, several fourth-grade students with mild intellectual disabilities have shown difficulty in mastering basic addition operations. Diagnostic assessments revealed challenges in number recognition, symbol identification, and sequencing—skills typically expected at this grade level. Teachers also reported that without structured PPIs, it was difficult to track progress, adapt instruction, or develop meaningful interventions.

These classroom realities underscore a pressing need for research-based models of mathematics-focused PPI design. Existing PPIs are often not aligned with the operational and cognitive characteristics of mathematics learning, leading to ineffective teaching strategies (Spooner et al., 2010; Xin & Jitendra, 1999). What is needed is a model that integrates concrete learning tools, step-by-step scaffolding, and individualized evaluation systems that can be implemented by teachers in inclusive settings (Bruner, 1986; Tomlinson, 2017; Vygotsky, 1978).

This study aims to fill that gap by exploring how a PPI for addition operations in mathematics can be effectively developed and applied in an SPPI environment. By focusing on a case study in SDN Karawaci 5, the research investigates current practices, identifies challenges faced by teachers, and formulates practical strategies that can be adopted more broadly. Through qualitative methods, the study seeks to provide grounded insights that are directly applicable to classroom settings.

The significance of this research lies in both its academic and practical contributions. Academically, it addresses a rarely studied intersection—subject-specific PPI development within inclusive education in Indonesia. Practically, it offers a model that can guide teachers, school administrators, and policymakers in enhancing the quality of mathematics instruction for students with mild intellectual disabilities. In doing so, the study supports the broader goal of building inclusive classrooms that work not just in theory, but in everyday practice.

RESEARCH METHODS

This study employed a qualitative approach using a case study design. The qualitative approach was selected to enable a deep and contextual understanding of the phenomenon under investigation, particularly in capturing the subjective experiences of individuals within their natural and social environments (Creswell & Clark, 2017). A case study design was deemed

appropriate as it allows for an in-depth exploration of a particular system or phenomenon in a real-life setting, especially when the boundaries between the phenomenon and its context are not clearly defined (Adrias & Ruswandi, 2025; Yin, 2017).

The research was conducted at SDN Karawaci 5 Kota Tangerang, a Sekolah Penyelenggara Pendidikan Inklusi (SPPI), which was selected purposively due to the presence of fourth-grade students with mild intellectual disabilities and the relevance of the school's inclusive practices to the research objectives. The research subjects consisted of classroom teachers, special education teachers (GPK), and school administrators actively involved in the development and implementation of Individualized Learning Programs (PPI) for students with special needs.

Data collection was carried out through method triangulation, comprising in-depth interviews, participant observation, and document analysis. The interviews aimed to capture detailed narratives from teachers and staff regarding their experiences in designing and applying PPIs. Participant observation allowed the researcher to observe classroom interactions and instructional strategies in real time. Document analysis was conducted on existing PPI plans, curriculum adaptations, and student learning records (Patton, 2014; Shenton, 2004; Tashakkori & Creswell, 2007).

In line with the qualitative paradigm, the researcher served as the primary research instrument (human instrument), engaging directly with the field context and participants. This human interaction is considered integral to the data generation process (Lincoln & Guba, 1985; Tisdell et al., 2025). Supporting instruments such as interview guides, observation sheets, data coding matrices, and documentation checklists were developed to maintain systematic and consistent data collection.

To ensure data trustworthiness, the study applied Lincoln and Guba's four criteria: credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985; Miles et al., 2014). Credibility was enhanced through data triangulation and member checking. Transferability was supported by providing rich, thick descriptions of the school and classroom context. Dependability and confirmability were reinforced by maintaining a clear audit trail and systematic documentation of the data analysis process (Shenton, 2004).

Data analysis followed the interactive model of Miles, Huberman, and Saldaña (Miles et al., 2014), which consists of three stages: (1) data reduction – selecting, simplifying, and transforming raw data; (2) data display – organizing information into narrative descriptions, matrices, and visual formats; and (3) conclusion drawing and verification – interpreting patterns and themes through iterative cycles to ensure accuracy and consistency. Analysis was conducted concurrently with data collection, allowing for responsive adjustments based on emergent field dynamics.

The research was carried out between February and April 2025, encompassing preparation, field data collection, and data analysis, culminating in the compilation of findings and the final research report. Through this approach, the study seeks to offer meaningful insights and evidence-based recommendations for improving mathematics instruction for students with mild intellectual disabilities within SPPI environments.

RESULT AND DISCUSSION

Result

Initial Assessment of Students' Mathematical Abilities

The first major finding of this study relates to the implementation of comprehensive initial assessments, which served as the foundation for developing the Individualized Learning Program (PPI) in mathematics. Teachers at SDN Karawaci 5 demonstrated an awareness of the importance

of understanding each student's learning profile before designing instructional strategies. In this context, the Special Education Teacher (Guru Pembimbing Khusus/GPK) conducted diagnostic assessments focused on fundamental mathematical competencies, particularly addition operations.

The assessment process was conducted individually and adapted to the cognitive and motoric characteristics of each student. The competencies evaluated included number recognition (0–20), quantity comparison, one-to-one correspondence, basic addition using concrete objects, and fine motor skills in writing numerals. Teachers used manipulative tools such as colored counters, number cards, counting beads, and visual worksheets to facilitate engagement and comprehension.

The assessment followed the principles of special education assessment, namely: (a) comprehensiveness, covering cognitive, academic, and motoric aspects; (b) continuity, with assessments conducted regularly to monitor progress; (c) collaboration, involving input from teachers, parents, and school personnel; and (d) strength-based orientation, focusing not only on students' deficits but also on their learning strengths and potential for development.

Findings revealed varying levels of competence among the four identified students with mild intellectual disabilities. For instance, one student, Bian (BN), demonstrated relatively high levels of independence in basic literacy and numeracy tasks, while others such as Mikaila (MK) and Anis (AN) required full instructional support, particularly in reading comprehension and foundational math skills. These profiles were critical in shaping personalized learning objectives in the PPI.

Furthermore, teachers reported difficulties in measuring students' abilities accurately without adapted tools or formal PPI structures. Prior to this study, the school lacked standardized instruments for assessing mathematical readiness specific to students with intellectual disabilities. As a result, assessments were often informal and inconsistent across classrooms.

This gap underscores the importance of establishing structured, multi-dimensional assessment protocols as a prerequisite for effective PPI development. The findings also highlight the need for teacher training in conducting functional assessments and interpreting the results to inform instructional planning.

Formulation of Individualized Learning Objectives

The second key finding of this research pertains to the formulation of individualized learning objectives within the PPI framework. After conducting comprehensive initial assessments, teachers proceeded to define learning goals that were specific, measurable, and aligned with each student's cognitive capacity and developmental needs.

The objectives were structured hierarchically, beginning with the most basic skills such as number recognition and gradually progressing toward simple addition with the aid of concrete objects. For example, one target objective was for a student to "accurately add two numbers between 1 and 5 using counting blocks with 80% accuracy over three sessions." These objectives were not only academic in nature but also functional, aiming to improve students' ability to apply mathematical concepts in everyday contexts.

Teachers emphasized that the clarity and realism of each learning objective were crucial to ensuring successful implementation. Goals were set to be achievable within short instructional cycles and were continuously reviewed based on formative evaluations. This approach helped prevent both under-challenging and overloading students with tasks beyond their current abilities.

The process of goal setting followed established criteria in special education, including: (1) Specificity – clearly defining the expected behavior; (2) Measurability – setting indicators for success; (3) Achievability – ensuring alignment with the student's assessed level; (4) Relevance – focusing on skills that support broader functional independence; and (5) Time-boundedness – targeting mastery within a defined instructional period.

Collaboration between classroom teachers and GPKs was central in this phase. Teachers noted that having access to each other's observations and insights made the goal-setting process more accurate and holistic. Moreover, goals were often co-constructed with input from parents during regular coordination meetings, reinforcing the principle that PPI is a shared responsibility.

However, the study also revealed several constraints. Some teachers admitted difficulty in translating assessment results into actionable objectives due to limited training in special education planning. In many cases, objectives were initially too broad or not clearly linked to assessment data, requiring multiple revisions. This finding indicates a need for professional development focused on individualized instructional design, particularly in formulating competency-based and behaviorally observable goals.

Overall, the formulation of individualized objectives emerged as a critical component in the development of effective PPI documents. When done systematically, this process provided a clear instructional roadmap tailored to each student's potential, thus enhancing both teaching focus and student engagement.

Selection of Teaching Strategies and Instructional Methods

The third major finding highlights the critical role of selecting appropriate teaching strategies and instructional methods in delivering effective mathematics instruction to students with mild intellectual disabilities. Based on the individualized learning objectives set in the PPI, teachers at SDN Karawaci 5 applied differentiated instructional approaches tailored to students' cognitive and sensory preferences.

The dominant strategy adopted was the concrete-to-abstract progression, in which learning began with physical manipulatives and gradually transitioned toward more symbolic representations. For instance, students first used objects like counters, beads, or bottle caps to perform addition tasks before being introduced to number cards or visual diagrams, and eventually to simple written equations. This scaffolding approach allowed students to build conceptual understanding at their own pace.

Teachers also employed multisensory instructional methods, engaging students visually, auditorily, and kinesthetically. For example, counting aloud while placing counters, tracing numerals with fingers, and clapping to represent quantities were regularly used to reinforce number concepts. This aligned with Gardner's theory of Multiple Intelligences, which emphasizes the value of addressing diverse modalities in learning.

Drill and repetition were also emphasized, particularly for students who required multiple exposures to internalize mathematical procedures. Teachers incorporated repetitive exercises in varied forms—games, verbal questions, and hands-on activities—to avoid monotony while reinforcing key concepts. For students with lower levels of verbal ability, teachers utilized visual schedules, pictorial cues, and task cards to communicate instructions and expected outcomes clearly.

Notably, teachers demonstrated flexibility in adapting their methods to match each student's response and engagement level. For instance, when a student showed resistance to paper-based tasks, teachers shifted to manipulatives or turned the activity into a game. This responsiveness was seen as essential for maintaining motivation and attention during learning sessions.

Despite these efforts, the research also identified challenges. Some teachers lacked access to structured pedagogical models or evidence-based strategies specifically designed for students with intellectual disabilities. In some cases, instructional methods were chosen by trial and error, without sufficient data-driven planning. Furthermore, limited classroom resources and large student-teacher ratios made individualized attention difficult to sustain over longer periods.

These findings suggest the need for formal training in adaptive pedagogy and access to curated instructional toolkits for inclusive classrooms. Teachers expressed the desire for workshops, peer

mentoring, and resource-sharing platforms to enhance their capacity to deliver differentiated instruction more effectively.

In conclusion, the thoughtful selection and adaptive use of instructional strategies were central to the success of the PPI in mathematics. When teaching methods were aligned with students' cognitive profiles and learning preferences, students showed increased engagement, reduced frustration, and improved performance in basic addition tasks.

Development of Instructional Materials and Learning Media

The fourth key finding concerns the design and adaptation of instructional materials and media used to support the Individualized Learning Program (PPI) for mathematics, specifically in teaching addition to students with mild intellectual disabilities. Teachers at SDN Karawaci 5 demonstrated creativity and contextual sensitivity in developing learning resources that aligned with each student's level of understanding and sensory preferences.

Instructional materials were simplified and sequenced based on difficulty, allowing students to gradually progress from concrete to more abstract representations. For instance, instead of introducing symbolic equations immediately, teachers began with story-based math problems involving real-life scenarios (e.g., sharing candies or counting pencils) to contextualize addition in familiar settings. These real-world applications aimed to increase relevance and meaning for the learners.

Teachers also created customized visual aids, including large, colorful number cards, magnetic boards, and laminated task sheets with step-by-step instructions. These tools were designed to capture attention, support memory retention, and reduce cognitive overload. For students with limited literacy skills, icon-based instructions were used, featuring simple images representing actions such as counting, adding, and writing.

Concrete learning media were central to instruction. Manipulatives such as Cuisenaire rods, counting beads, buttons, and colored blocks were widely used. These materials allowed students to physically manipulate items as they worked through problems, reinforcing one-to-one correspondence and improving numerical reasoning. Teachers noted that many students responded better when lessons incorporated tactile experiences, supporting kinesthetic learning styles.

In addition to cognitive considerations, teachers also addressed students' sensory sensitivities and emotional needs. For example, students who became overwhelmed by noise or clutter were provided with structured workstations and low-distraction materials. Teachers minimized visual clutter on worksheets and used predictable color coding to signal different math operations.

However, limitations were also reported. Teachers cited a lack of access to commercially available adaptive materials and limited funding for producing high-quality, durable resources. As a result, many relied on handmade tools or recycled materials, which, while innovative, often lacked consistency and scalability. Some teachers also expressed uncertainty about how to systematically align materials with learning objectives or cognitive developmental stages.

Despite these constraints, the development of context-sensitive, engaging, and functional learning media significantly enhanced student motivation and task performance. Students were more likely to complete tasks independently when materials were tailored to their abilities and presented in appealing formats. This suggests that the strategic design of instructional materials is not only supportive but essential in executing effective, individualized instruction in inclusive settings.

In summary, the success of the PPI was closely tied to the quality and relevance of the instructional materials used. The deliberate adaptation of learning media to students' needs contributed to more active participation, deeper comprehension, and greater confidence in engaging with mathematical content.

Evaluation and Monitoring of Student Learning Progress

The fifth major finding addresses the evaluation and monitoring mechanisms applied within the Individualized Learning Program (PPI) for mathematics. At SDN Karawaci 5, teachers implemented a continuous, formative assessment process to track students' progress in mastering addition operations. Rather than relying solely on end-of-unit tests, assessment was embedded into daily instructional activities and adjusted according to each student's performance and engagement.

Teachers employed authentic assessment techniques to observe students' ability to perform mathematical tasks in real-life and classroom contexts. These included performance-based evaluations such as counting real objects, using manipulatives to solve problems, and completing hands-on tasks. Observations were documented using anecdotal records and checklists aligned with individualized learning objectives.

In addition to observational data, teachers also used portfolios to compile student work over time, allowing them to analyze patterns of growth, persistence of errors, and improvements in problem-solving strategies. For instance, a student's portfolio might include dated samples of worksheets, photos of completed activities using concrete objects, and teacher notes on the student's level of independence in each task.

Daily formative assessments such as mini-quizzes, guided practice, and exit tickets were used to gauge immediate understanding and inform lesson adjustments. Teachers emphasized that traditional written tests were rarely effective for this group of learners, due to literacy limitations and test anxiety. Therefore, flexible and student-friendly evaluation formats were prioritized.

Importantly, the evaluation process was collaborative. Teachers held regular meetings with parents to discuss students' academic development and functional progress. Parents were encouraged to share observations from the home environment, particularly regarding the use of math skills in daily activities (e.g., counting money, setting the table). This two-way communication helped validate classroom assessments and provided a fuller picture of each child's capabilities.

One key finding was that even minor progress—such as moving from guided to semi-independent counting—was seen as a significant achievement and was celebrated as part of the motivation strategy. Teachers tracked micro-level gains and used positive reinforcement to sustain student effort and confidence.

However, some challenges emerged. Not all teachers had formal training in special education assessment techniques, and some expressed difficulty in translating qualitative observations into structured progress reports. Additionally, the absence of standardized evaluation tools tailored for students with intellectual disabilities made it hard to compare progress across students or classes.

Despite these limitations, the commitment to regular, individualized monitoring fostered a responsive teaching environment. Teachers could promptly identify when instructional strategies were ineffective and adjust their approach. This dynamic process of teach-assess-adjust was central to ensuring that students with mild intellectual disabilities experienced meaningful learning outcomes.

In conclusion, the evaluation and monitoring practices adopted in this study demonstrate that assessment, when individualized and embedded within instruction, serves not only to measure learning but also to shape it. This reinforces the view that in inclusive classrooms, assessment must be flexible, ongoing, and developmentally appropriate to support both instructional planning and student growth.

Collaboration with Parents and Specialists

The sixth finding emphasizes the essential role of collaboration between teachers, parents, and educational specialists in the successful implementation of Individualized Learning

Programs (PPI) for students with mild intellectual disabilities. At SDN Karawaci 5, collaborative practices were recognized not as supplementary efforts, but as core components of inclusive education that directly influenced the quality and consistency of student support.

Teachers maintained regular communication with parents through daily logbooks, phone calls, and scheduled meetings. These interactions served multiple purposes: to inform parents of classroom activities, share updates on student progress, and provide strategies for reinforcing learning at home. For instance, when students were learning to add numbers up to 10 using physical objects, parents were encouraged to practice similar activities using household items like snacks, coins, or utensils.

This home-school continuity helped reinforce concepts learned in the classroom and promoted generalization of skills into real-life contexts. Teachers noted that students whose parents actively participated in this process often demonstrated faster progress and greater confidence in performing basic math tasks.

In cases where students exhibited more complex learning or behavioral challenges, teachers also engaged educational specialists such as school counselors, psychologists, and special education consultants. These professionals provided input during assessment, helped refine learning goals, and recommended behavior management techniques suited to the individual student. Although formal inter-professional collaboration was not institutionalized, informal consultations were common and often initiated by the teachers themselves.

Moreover, collaborative team discussions allowed for the integration of multiple perspectives in understanding each student's needs. This multidisciplinary input enriched the design of the PPI, ensuring that it addressed not only academic competencies but also emotional, behavioral, and social development goals. For example, if a student had difficulty focusing during math lessons, recommendations might include shortened task durations, movement breaks, or sensory adjustments.

Despite the overall positive attitude toward collaboration, several limitations were observed. Some parents were inconsistent in responding to communication efforts, often due to work schedules or lack of understanding about their child's learning needs. In such cases, teachers had to invest additional time in explaining the purpose and importance of the PPI and offering practical, non-technical ways to support learning at home.

Another challenge involved the limited availability of professional specialists within the school system. Teachers sometimes had to rely solely on their judgment due to the absence of expert guidance, which increased the risk of instructional mismatches or delayed interventions. This points to a systemic issue in inclusive education implementation, where collaborative structures are not yet fully institutionalized.

Nevertheless, the study found that when collaboration was effectively established, it significantly enhanced the personalization, consistency, and sustainability of instructional efforts. Students benefited from more coherent support systems, and teachers felt more empowered in navigating instructional decisions with shared responsibility.

In summary, effective collaboration among educators, parents, and specialists is not merely a supportive element but a fundamental driver of success in individualized education for students with intellectual disabilities. The findings support existing literature that inclusive education works best when all stakeholders are actively engaged in a coordinated effort toward shared educational goals.

Discussion

The findings of this study reinforce the critical importance of structured, individualized instruction for students with mild intellectual disabilities, particularly in mathematics learning within inclusive education settings. The implementation of the Program Pembelajaran Individual (PPI) at SDN Karawaci 5 demonstrated that when learning is tailored to students' cognitive

profiles, tangible progress in basic numeracy can be achieved—even in resource-limited contexts.

One of the central contributions of this study lies in demonstrating that comprehensive initial assessments are not just diagnostic tools, but also foundational mechanisms for crafting meaningful learning trajectories. This supports the views of Overton (2016) and Salvia et al. (2017), who argue that assessments in special education should serve both evaluative and formative functions. The use of developmentally appropriate and strength-based assessments in this study aligns with inclusive education best practices that prioritize a holistic understanding of learners over deficit-focused models.

Moreover, the goal-setting process embedded in the PPI followed special education standards that emphasize specificity, measurability, and realism (Hallahan et al., 2015). The success of this approach mirrors findings from Kirk & Gallagher (2015), who maintain that clear instructional targets are essential in guiding teaching, monitoring student progress, and maintaining instructional focus. In this study, goals became more than administrative documentation—they were actionable plans that allowed teachers to measure progress in real-time and adapt instruction as needed.

The study also illustrates that teaching strategies adapted to learning profiles significantly enhance student engagement and comprehension. The use of multisensory, concrete-to-abstract learning paths echoes the cognitive development principles of Bruner and the differentiated instruction model proposed by Tomlinson. These approaches recognize that learners with intellectual disabilities process information differently and require teaching methods that are experiential, repetitive, and flexible.

However, the data also highlight structural barriers. Teachers frequently navigated instructional decisions through trial and error due to limited access to formal training in adaptive pedagogy or specialized resources. This mirrors findings by Bouck (2010), who identified that despite policy support for inclusive education, implementation at the classroom level is often hindered by the lack of teacher preparation and insufficient instructional models. These gaps suggest the need for systemic investment in capacity-building and provision of context-specific instructional guides.

The study further underscores that instructional materials and media, when personalized and engaging, act as catalysts for deeper understanding and independent learning. Consistent with (Browder & Spooner, F., 2011), the strategic use of manipulatives, visuals, and simplified instructional content enabled students to access mathematical concepts that would otherwise remain abstract and inaccessible.

Perhaps most notably, the research affirms that evaluation in inclusive education must be continuous, flexible, and individualized. The authentic, formative, and participatory evaluation strategies used by teachers are aligned with contemporary views of assessment as a learning tool, not merely a performance measure (Miles et al., 2014). The emphasis on micro-progress and observable behaviors also reflects the importance of celebrating incremental achievement, which is often overlooked in standard assessment practices.

Finally, the findings highlight the indispensable role of collaboration. The consistent engagement between teachers, parents, and specialists not only improved the implementation of the PPI but also fostered a shared sense of responsibility for student success. This confirms the position of (Pullen & Hallahan, 2015), who assert that individualized education is most effective when it is supported by a collaborative, multidisciplinary framework. Nonetheless, the informal and often ad-hoc nature of collaboration in this case underscores a broader policy gap: the absence of institutionalized, cross-sector support systems for inclusive education implementation in Indonesia.

In sum, the study provides empirical support for the argument that effective PPI design and implementation requires a combination of accurate assessment, clear goal-setting, adaptive

teaching strategies, relevant learning media, continuous evaluation, and strong collaboration. While the local context of SDN Karawaci 5 presents unique challenges, the strategies employed here offer a scalable model for inclusive schools across Indonesia. The findings also call for stronger policy support, targeted professional development, and systemic collaboration to ensure that inclusive education is not only ideologically sound but pedagogically effective.

CONCLUSION

This study concludes that the structured development and implementation of Individualized Learning Programs (PPI) for students with mild intellectual disabilities—when grounded in comprehensive assessment, targeted learning objectives, adaptive strategies, relevant materials, continuous evaluation, and collaborative support—can significantly enhance students' mathematical learning outcomes in inclusive settings. The findings underscore that inclusive education must move beyond policy declarations to evidence-based, context-responsive classroom practices. For SPPI schools in Indonesia, this research offers a replicable model for designing subject-specific PPIs and highlights the urgent need for systemic professional development, resource allocation, and institutionalized collaboration among educators, parents, and specialists to ensure effective and equitable learning experiences for all students.

REFERENCES

Adrias, & Ruswandi, A. (2025). *Desain Penelitian Kuantitatif, Kualitatif, dan Mix Method*. Rajawali Pers.

Amka. (2020). *Program pembelajaran individual untuk anak berkebutuhan khusus*. Pustaka Pelajar.

Bouck, E. C. (2010). Technology and students with disabilities: Does it solve all the problems? *Current Issues in Education*, *13*(2), 1–8.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*, *395*(10227), 912–920.

Browder & Spooner, F., D. M. (2011). *Teaching students with moderate and severe disabilities*. Guilford Press.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.

Disabilities, A. A. on I. and D. (2010). *Intellectual disability: Definition, classification, and systems of supports (11th ed.)*. AAIDD.

Hallahan Kauffman, J. M., & Pullen, P. C., D. P. (2015). *Exceptional learners: An introduction to special education (13th ed.)*. Pearson.

Irdamurni. (2020). Pendidikan inklusif sebagai solusi pendidikan untuk semua. *Jurnal Pendidikan Khusus*, *7*(3), 23–35.

Kirk Gallagher, J., & Coleman, M. R., S. (2015). *Educating exceptional children (14th ed.)*. Cengage Learning.

Kirk, S. A., & Gallagher, J. J. (1986). *Educating Exceptional Children*. Houghton Mifflin Company.

Lincoln, Y., & Guba, B. (1985). *Naturalistic inquiry. Beverly Hills: Sage Pulications*. Inc.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (Third edit). SAGE Publications Inc.

Overton, T. (2016). *Assessing learners with special needs: An applied approach (8th ed.)*. Pearson.

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.

Pullen, P. C., & Hallahan, D. P. (2015). What is special education instruction? In *Enduring issues in special education* (pp. 36–50). Routledge.

Saputri Ningsih, B., & Widyawati, C., A. (2017). Analisis kesulitan anak tunagrahita dalam menyelesaikan soal operasi penjumlahan di SLB Harapan Ibu Metro. *Jurnal Pendidikan Matematika Khusus*, *4*(2), 78–92.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63–75.

Tashakkori, A., & Creswell, J. W. (2007). The new era of mixed methods. *Journal of Mixed Methods Research*, *1*(1), 3–7. https://doi.org/10.1177/2345678906293042

Tisdell, E. J., Merriam, S. B., & Stuckey-Peyrot, H. L. (2025). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Yin, R. K. (2017). *Case study research and applications*. SAGE Publications US.