

Research Article

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Evaluating the Influence of Inclusive Teachers' Pedagogical Competence within Adaptive Educational Frameworks

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Abstract

Background/purpose. Within the framework of adaptive education, teachers are expected not only to possess strong subject matter expertise but also to adapt instructional strategies to address the diverse needs of learners, including students with special educational needs. In this regard, the pedagogical competence of inclusive teachers emerges as a pivotal factor in fostering a responsive and equitable learning environment. This study seeks to investigate the extent to which inclusive teachers' pedagogical competence affects the implementation of adaptive education in public primary schools in Semarang.

Materials/methods. A qualitative methodology with a case study design was adopted in this research. Data collection involved in-depth interviews with inclusive teachers, classroom observations, and the examination of relevant documents. To ensure the credibility and validity of the findings, triangulation techniques were employed.

Results. The study reveals that the pedagogical competence of inclusive teachers is instrumental in tailoring instructional design to student characteristics, formulating flexible evaluation strategies, and cultivating an inclusive classroom environment. Teachers who recognize and respond to individual student differences tend to adopt more personalized and adaptive pedagogical approaches. However, several challenges remain, notably the lack of ongoing professional training and inadequate support from school administrations.

Conclusion. Robust pedagogical competence has proven essential for the effective implementation of adaptive education. Accordingly, there is a pressing need for systematic initiatives to enhance teacher training and institutional support, with the aim of advancing inclusive education at the elementary school level.

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1. Introduction

The development of inclusive education in Indonesia has driven a paradigm shift in the national education system, from a uniform approach toward one that is adaptive and centered on the individual characteristics of each learner (Prasadi et al., 2020; Suharini & Baharsyah, 2020). Inclusive education underscores the importance of access and participation for all children, including those with special needs, within a unified educational system (Alm et al., 2021; Masters, 2013; Tolman, 2019; Zong, 2022). In such settings, teachers are required to possess pedagogical competence that goes beyond basic teaching skills (Anwar et al., 2020; Arif Purnomo, Ferani Mulianingsih, 2025; Guardia et al., 2019; Hamzah et al., 2022; Mulianingsih et al., 2023; Perrotta, 2021; Rawat et al., 2021). Inclusive teachers must be able to tailor instructional approaches to accommodate the cognitive, social, emotional, and physical diversity of their students. The development of inclusive education in Indonesia has driven a paradigm shift within the national education system, moving from a uniform approach toward an adaptive model that aligns with the individual characteristics of learners. Within this framework, inclusive education not only emphasizes access for students with special needs but also promotes their active participation in the teaching and learning process alongside regular students.

Pedagogical competence, as outlined in Law No. 14 of 2005 concerning Teachers and Lecturers, encompasses four key dimensions: understanding learners' characteristics, designing instruction, delivering educational learning experiences, and conducting assessments. In the context of inclusive education, these four components are critical to the successful integration of students with special needs into regular classrooms (Bower, 2017; Hubbard & Odebiyi, 2021; Lestari & Mulianingsih, 2020; Nisi Suchi & Costa, 2020). However, field challenges indicate that not all teachers are adequately prepared pedagogically to fulfill this role effectively.

This condition is evident in several public elementary schools in Ngaliyan District, Semarang City. Based on preliminary observation data, SD Negeri A accommodates six students with special needs, yet only one teacher has received formal training in inclusive education. At SD Negeri B, there are five students with special needs, but adaptive facilities and learning media remain highly limited. Meanwhile, at SD Negeri C, teachers reported difficulties in designing formative assessments aligned with the learning profiles of students with special needs. These three schools illustrate concrete challenges in implementing the ideals of adaptive education within inclusive settings.

This study aims to explore the influence of inclusive teachers' pedagogical competence on the successful implementation of adaptive education in public elementary schools in Semarang City, specifically at SD Negeri A, SD Negeri B, and SD Negeri C. In addition, the study seeks to identify systemic, institutional, and personal barriers encountered by teachers in the practice of inclusive teaching. The focus of the study is directed toward three elementary schools officially designated as inclusive schools, taking into account the complexity of the local context and the involvement of key stakeholders such as school principals and students' parents.

Preliminary findings indicate that teachers with strong pedagogical competence are more capable of implementing flexible and responsive teaching strategies that address student diversity. Competencies in designing differentiated instruction, managing inclusive classrooms, and conducting fair assessments are closely associated with the creation of a more supportive learning environment for all students. Nevertheless, several challenges persist, including limited access to professional training, the lack of technical guidelines for inclusive teaching, and suboptimal managerial support from school leadership. These issues underscore the need for systemic interventions to strengthen teachers' pedagogical capacity as a foundational element in the success of inclusive education. Accordingly, this study is expected to provide both empirical and conceptual contributions to

strengthening inclusive education policies and practices at the elementary school level, as well as to bridge the gap between national regulations and the realities of implementation in the field.

2. Literature Review

2.1. The Concept of Inclusive Education and Implementation Challenges

Inclusive education is an approach that places all learners, regardless of physical, intellectual, social, emotional, or other differences, within the same learning environment. Its core principle is to ensure equal access and learning opportunities for all children, including those with special needs (Ainscow & Miles, 2009). The implementation of inclusive education serves as a critical indicator of equitable and socially just educational practices.

However, field observations reveal that inclusion does not always proceed smoothly in practice. In the city of Semarang, particularly in the Ngaliyan District, three public elementary schools, SD Negeri A, SD Negeri B, and SD Negeri C, have been designated as inclusive schools. Despite local policy support from the Department of Education, successful implementation remains heavily dependent on teacher capacity. Many teachers report difficulties in adapting instructional approaches to the diverse needs of students with disabilities due to limited training and relevant experience.

2.2. Teachers' Pedagogical Competence in the Context of Inclusion

Pedagogical competence is a fundamental dimension of the teaching profession, as stipulated in Law No. 14 of 2005 on Teachers and Lecturers. It encompasses the understanding of student characteristics, planning and implementation of instruction, and effective evaluation of learning outcomes. In inclusive settings, pedagogical competence becomes increasingly complex, requiring teachers to design instructional strategies that are responsive to student heterogeneity (Chen et al., 2012; McParker, 2023; Rymarz, 2019).

Studies by Supena et al. (2020) and Hattie (2009) confirm that high pedagogical competence significantly contributes to the creation of inclusive, supportive, and adaptive learning environments. However, at SD Negeri Ngaliyan 01, only one of the six teachers involved in inclusive education has received specialized training. This gap presents a major challenge in developing differentiated instruction aligned with students' unique needs.

2.3. School Organizational Culture as a Supporting Factor for Inclusion

Organizational culture in schools refers to the shared values, norms, and collective practices that shape school environments. An inclusive school culture is characterized by a commitment to diversity, collaboration among educators, and openness to instructional innovation (Hansen et al., 2021; Narenji Thani et al., 2022; Rorimpandey et al., 2022; Suprpto et al., 2024; Wonglimpiyarat, 2024). According to Deal & Peterson, a positive school culture enhances teacher capacity and fosters professional dedication (Ferani Mulianingsih, 2022; HUANG, 2022; Mulianingsih et al., 2025; Purnomo et al., 2022, 2024; Rico, 2019).

Nevertheless, interviews at SD Negeri B indicate that structural support from the school principal remains limited. Teachers have yet to receive sufficient collaborative space to co-develop inclusive strategies. Emphasize that school leadership plays a critical role in fostering a culture conducive to inclusive teaching and learning (Brockett & Hiemstra, 2020; Champion et al., 2020; Lei et al., 2024; "Problem-Based Learning: Benefits and Areas of Weakness," 2024; Skulmowski, 2024).

2.4. Teacher Self-Efficacy as a Mediating Variable

Self-efficacy, as defined by Bandura (Bandura, 1985; Toygar et al., 2022), refers to an individual's belief in their ability to accomplish tasks or overcome challenges. In inclusive classrooms, teachers

with high self-efficacy are more likely to manage diverse student needs effectively, demonstrate resilience in the face of barriers, and remain committed to inclusive principles.

At SD Negeri C, several teachers expressed a lack of confidence when working with students with special needs, largely due to limited hands-on experience and inadequate mentoring. Teacher self-efficacy is a key predictor of successful pedagogical interventions in inclusive settings (Bacal Roi, 2018; Masood & Haque, 2021; Tolman, 2019).

2.5. The Role of Spiritual Intelligence in Teacher Resilience

Spiritual intelligence (SQ) refers to an individual's ability to find meaning in life, manage emotions, and act according to noble values in diverse situations (Ismiyanti et al., 2024; Kestenbaum et al., 2018). Within the educational context, SQ equips teachers with patience, empathy, and resilience in navigating the emotional and social complexities of inclusive classrooms.

That teachers with high spiritual intelligence are better able to maintain motivation and self-efficacy in working with students with special needs (Cleary & Kitsantas, 2017; Ocak & Yamaç, 2013; Zimmerman & Moylan, 2009). Values such as sincerity, patience, and moral responsibility serve as internal strengths that foster humane and supportive teacher-student interactions.

2.6. Research Gaps and the Urgency of a Comprehensive Study

Although numerous studies have addressed either teachers' pedagogical competence or school organizational culture, few have examined the interrelation between pedagogical competence, organizational culture, self-efficacy, and spiritual intelligence in the context of inclusive education (Mills, G. E., & Gay, 2019; Morselli, 2024). Furthermore, limited research has explored the empirical realities of public elementary schools in suburban areas such as Ngaliyan, Semarang.

Hence, this study is urgently needed to fill this gap by constructing a conceptual model that explains the influence of pedagogical competence and school culture on adaptive inclusive education, with teacher self-efficacy as a mediating variable and spiritual intelligence as a supporting factor. Findings from the three elementary schools in Ngaliyan are expected to contribute both practically and theoretically to the strengthening of inclusive education policies and practices at the primary school level.

3. Methodology

3.1. Research Design and Approach

This study adopts a qualitative approach using an exploratory case study method (Creswell John W., 2018; Creswell & Creswell, 2018; Wan et al., 2021). This approach was selected to investigate in depth the phenomenon of inclusive adaptive education and how teachers' pedagogical competence influences its implementation. The case study focuses on three inclusive public elementary schools in Ngaliyan District, Semarang City, namely SD Negeri Ngaliyan 01, SD Negeri Wates 01, and SD Negeri Wonosari 02, selected purposively due to their high number of students with special needs and their active implementation of inclusive teaching models. This study employs a qualitative approach using an exploratory case study method to investigate in depth the influence of teachers' pedagogical competencies in inclusive adaptive education. The research sites were selected purposively, comprising three public inclusive elementary schools in the Ngaliyan District, Semarang City.

3.2. Research Subjects

The subjects were selected purposively and involve key actors in the implementation of inclusive education, including:

- Inclusive teachers (3 individuals): One from each school, each with over three years of teaching experience.
- School inclusion coordinators: Responsible for overseeing the inclusive education program at their respective schools.
- School principals: Serve as policy-makers and facilitators of an inclusive learning environment.
- Parents of students with special needs: Act as partners in the children's educational process.

The inclusion of these various stakeholders aims to obtain a comprehensive perspective on the implementation of adaptive education in the inclusive elementary school context.

The selection of inclusive teachers was based on the following criteria: (1) a minimum of three years' experience teaching students with special needs; (2) active involvement in adaptive lesson planning; and (3) recommendation by the school principal as representative of inclusive practices within the school. This study involved 3 inclusive teachers (one from each school), 3 principals, 3 inclusion coordinators, and 4 parents of students with special needs. Although the number of participants was limited, the data were considered to have reached saturation, as the themes and information obtained had become repetitive.

The interviewed teachers consisted of two females and one male, aged between 32 and 45 years, with educational backgrounds in a Bachelor's degree in Primary Teacher Education and a Master's degree in Special Education. The school principals and inclusion coordinators were aged between 40 and 55 years. The parents of students with special needs included three mothers and one father, with educational backgrounds ranging from junior high school to a bachelor's degree.

3.3. Data Collection Techniques

Data were collected using methodological triangulation, including:

- **In-depth interviews**

Conducted with teachers, principals, and inclusion coordinators to explore their perceptions, experiences, and challenges in implementing adaptive teaching in inclusive classrooms. Semi-structured interviews were used to allow informants the flexibility to elaborate on their personal contexts and experiences.

- **Classroom observations**

Conducted in all three schools during learning sessions. Observations focused on teaching strategies, participation of students with special needs, teacher-student interactions, and instructional adaptations employed.

- **Documentation**

Secondary data were gathered from official documents such as:

- Lesson Plans (RPP) indicating curriculum adaptations
- Student assessment records
- Teachers' reflective journals and learning evaluation reports

The primary instruments used in this study were semi-structured interview guides and classroom observation sheets. The interview questions covered topics such as instructional adaptation strategies, implementation challenges, and interactions with students with special needs. Observations focused on student participation, teacher strategies, and instructional interventions during the learning process. Observations were conducted twice at each school, with each session

lasting 90 minutes. All interviews were audio-recorded with participants' consent, and observations were documented using observation sheets and field notes.

3.4. Data Analysis Technique

Data analysis followed the interactive model by Miles and Huberman (Huberman, 2005), which consists of three core stages:

- Data reduction: The process of selecting, focusing, simplifying, and transforming raw data derived from field notes and documentation.
- Data display: The reduced data are presented in the form of narratives, matrices, or thematic diagrams to facilitate interpretation and conclusion drawing.
- Conclusion drawing and verification: Conclusions are iteratively drawn and verified through comparison with theoretical frameworks, as well as data from interviews and observations.

To ensure the validity of the findings, source and technique triangulation were applied by comparing data across different informants and using various methods (interviews, observations, and documentation). Additionally, member checking was conducted by reconfirming the findings with the informants to ensure the accuracy and credibility of the data.

4. Results

This study explores the implementation of adaptive, inclusion-based education in three public elementary schools in Ngaliyan District, Semarang City, with a specific focus on the role of teachers' pedagogical competence in accommodating the needs of students with special needs (SEN). The findings are drawn from in-depth interviews, classroom observations, and document analysis.

4.1. SD Negeri A

This school employs six teachers involved in inclusive education; however, only one has received formal training in inclusive pedagogy. Observations reveal that most teachers still rely on conventional teaching methods without significant modifications to address the diverse needs of SEN students. The majority of lesson plans (RPP) are generic and do not yet reflect the integration of differentiated instruction principles or adaptive formative assessments. Although the school has established a documentation system for student progress reporting, it remains largely disconnected from individualized, needs-based assessments. The lack of professional training and experience has led teachers to depend on general instructional patterns that are less responsive to inclusive dynamics.

4.2. SD Negeri B

This school has five inclusive education teachers, none of whom have formal training in inclusive education. Learning facilities that support adaptive teaching, such as visual aids, communication tools, and dedicated support spaces, are severely limited. Interviews reveal that the absence of policy direction from the school principal hinders the development of a collaborative teaching culture. Observations indicate a lack of interdisciplinary planning, with teachers tending to work in isolation when addressing the needs of SEN students. Consequently, there is minimal innovation in the use of teaching methods and media, particularly for students with mild cognitive impairments, attention difficulties, or developmental delays.

4.3. SD Negeri C

This school has four inclusive education teachers, none of whom have prior professional experience with SEN students. Focus group discussions revealed that teachers often feel insecure and hesitant when working with students who have specific communication needs or exhibit

challenging behaviors. The school lacks a mentoring system or ongoing professional development programs, resulting in teachers relying solely on personal experience and intuition to navigate classroom challenges. The absence of professional discussion forums or opportunities for collective reflection further weakens the effectiveness of inclusive teaching practices, rendering the implementation of inclusive policies more administrative than transformative.

Overall, the study reveals that while there is a strong willingness to implement inclusive education across all three schools, significant challenges persist particularly regarding teachers' pedagogical competencies. Three primary obstacles emerged:

- **Training and Competency Gaps:** Most teachers have not received formal training in inclusive education and thus lack adequate pedagogical strategies for differentiated instruction.
- **Lack of Supportive Infrastructure:** Limited access to assistive tools, adaptive learning media, and specialized facilities hinders the implementation of effective differentiated learning.
- **Weak Professional Collaboration and Reflection Culture:** The absence of teacher mentoring structures and discussion forums stifles pedagogical innovation and team-based approaches to addressing SEN.

Despite these barriers, some teachers exhibit strong personal commitment to fostering inclusive learning environments, although such efforts remain largely unsupported by institutional systems. These findings underscore the urgent need for policy interventions and capacity-building initiatives to ensure that adaptive education can be implemented equitably and sustainably across public elementary schools.

In this study, data analysis was conducted using the interactive model of Miles and Huberman, which consists of three main stages: data reduction, data display, and drawing and verifying conclusions. This process was carried out in a cyclical and dynamic manner, allowing the researcher to continuously reflect on and verify findings throughout the research process.

Coding was conducted manually on data derived from in-depth interview transcripts, classroom observation notes, and school documents. Open coding was initially employed to capture categories that naturally emerged from the field data. Each unit of meaning was assigned a preliminary label representing elements of inclusive teachers' pedagogical competencies.

Subsequently, axial coding was applied, in which initial codes were grouped into broader categories based on their conceptual relationships. This process enabled the researcher to understand the interconnections between dimensions of pedagogical competence, such as lesson planning, strategy adaptation, and differentiated assessment, and the context of inclusive schooling.

The coding process revealed three main themes representing the challenges and potentials in the implementation of inclusive adaptive learning:

1. Adaptive Learning Strategies encompass material differentiation, individualized approaches, and the use of instructional media tailored to students' needs.
2. Structural Barriers, including limited supporting facilities, insufficient teacher training, and weak managerial support.
3. Teacher Resilience and Personal Initiative, related to teachers' independent efforts to adapt and innovate despite the absence of formal support.

To ensure data validity, this study applied source and method triangulation. Data were collected from multiple key actors, namely inclusive teachers, school principals, and inclusion coordinators, and through various techniques, including semi-structured interviews, direct classroom observations, and document analysis, such as lesson plans (RPP) and student assessment records.

A member checking process was also conducted, in which preliminary interpretations were presented to the main informants for clarification and confirmation. Additionally, the researcher's direct involvement in field observations enabled the use of prolonged engagement techniques, allowing for a deeper understanding of the context and phenomena under study.

Key Findings by School

1. SD Negeri A: Despite demonstrating a commitment to inclusion, teachers continued to apply a uniform instructional approach. Lesson plans did not reflect curriculum or assessment adaptations.
2. SD Negeri B: There was no reflective forum among teachers. Instruction was carried out in an individualistic manner, lacking cross-subject coordination, and with minimal facility support.
3. SD Negeri C: Teachers exhibited significant hesitation in working with students with special needs. There was no structured mentoring system or evaluation mechanism for inclusive teaching practices.

5. Discussion

There are substantial structural and philosophical differences between mainstream schools (including public schools) and inclusive schools designed to accommodate students with special educational needs (SEN). Mainstream schools typically adhere to conventional pedagogical approaches characterized by standardized curricula that prioritize uniformity over differentiation (HUANG, 2022; Kintoko & Mulianingsih, 2022; Purnomo & Mulianingsih, 2021; Rico, 2019). This model often lacks responsiveness to the diverse characteristics of students, particularly those with disabilities or specific learning needs. As a result, many students with SEN do not receive the adequate support necessary to thrive in general classroom settings.

In contrast, inclusive schools are founded on the principle that all children, regardless of physical, intellectual, social, or emotional differences, have equal rights to learn within a shared educational environment. The philosophy of inclusion demands systemic change in how schools function, including instructional design, classroom management, and patterns of interaction among school actors. This approach emphasizes access, participation, and learning success for all students, alongside the provision of additional support for those who require it. The input–process–outcome model in inclusive education is illustrated in the following diagram:



Figure 1. Input–Process–Outcome Model for Inclusion Indicators in Education

The Input–Process–Outcome framework serves as a powerful analytical tool to understand the complexities of inclusive education implementation:

5.1. Inputs

This stage encompasses the structural foundations critical to the success of inclusive education, including:

- Educational policies that explicitly support inclusive practices.
- Material and financial resources to provide accessible facilities, learning aids, and teacher training.
- A flexible curriculum that allows for adaptation according to student needs.
- Teacher education and professional development, especially training in differentiated instruction and inclusive classroom management.
- Visionary school leadership committed to equitable and just educational practices.

5.2. Processes

This stage focuses on the dynamics of interaction within the school environment:

- A positive school climate that encourages active participation from all students.
- Adaptive pedagogical strategies, including collaborative learning, co-teaching, and project-based learning.
- Collaboration among teachers and support staff, including special education teachers, psychologists, and instructional aides.
- Personalized student support through individual assessments, Individualized Education Plans (IEPs), and counseling services.

5.3. Outcomes

The outcomes of inclusive education extend beyond academic achievement and include:

- Academic performance, reflected in students' curricular attainments.
- Psychosocial well-being encompasses feelings of acceptance, self-esteem, and social engagement.
- Career readiness and economic contribution are indicators of education's long-term impact on student empowerment.

Within this framework, teacher performance is a key determinant of successful inclusion (Baier et al., 2019; Ismail et al., 2019; Reichert et al., 2020; Retnawati et al., 2018). Teacher effectiveness is strongly influenced by self-efficacy, confidence in one's ability to manage diverse classrooms and adapt instruction. Teachers with training and experience in inclusive education tend to display more positive attitudes and greater competence in applying responsive teaching strategies.

Teacher attitudes themselves are a critical factor in shaping classroom culture. Educators who embrace diversity are more likely to foster supportive environments conducive to inclusive learning. Conversely, negative attitudes can lead to resistance and, in some cases, covert exclusion of students with SEN.

Instructional strategies are also vital. Approaches such as differentiated instruction, Universal Design for Learning (UDL), and collaborative learning facilitate active participation and optimal

outcomes for all students. Accordingly, teacher training must emphasize the practical application of these strategies within the real-world context of inclusive classrooms.

Finally, institutional support from schools and education authorities serves as an essential catalyst. Schools that cultivate a culture of collaboration and provide space for reflection and professional growth empower teachers to confidently fulfill their roles as agents of inclusion. Such environments not only enhance teacher capacity but also foster a more equitable, inclusive, and humane educational ecosystem for all learners.

This study highlights the realities of implementing inclusive, adaptive education in three public elementary schools in the Ngaliyan District, Semarang City. The primary focus is directed toward examining the extent to which inclusive teachers' pedagogical competence supports effective learning responses to the needs of students with special educational needs (SEN).

5.4. SD Negeri A

SD Negeri A has six inclusive teachers; however, only one has received formal training in inclusive education. This finding reflects a disparity in human resource preparedness. In-depth interviews revealed that most teachers struggle to develop Lesson Plans (RPP) that accommodate the individual needs of SEN students. Additionally, formative assessments conducted were found to be generic and not specifically designed to measure the learning progress of students with special needs.

Classroom observations indicated that the instructional approach remained uniform, with minimal adjustments for SEN learners. Teachers predominantly relied on lectures and written assignments, with little differentiation in content or process. Although the school maintains an academic reporting system, the reports are not yet supported by assessment instruments that accurately reflect each student's individual capabilities.

5.5. SD Negeri B

None of the five inclusive teachers at SD Negeri B have undergone professional training related to inclusive education. Supporting facilities such as assistive learning tools, interactive media, or dedicated learning spaces were also found to be severely lacking. These limitations have a direct impact on the quality of adaptive teaching implementation. Teachers encountered significant challenges in designing suitable methods and media for students with attention disorders or mild intellectual disabilities.

Observation data revealed the absence of coordination among teachers in designing cross-disciplinary learning strategies. No regular meetings or collaborative forums were available for educators to discuss teaching strategies for SEN students. This indicates a lack of structural support from school management, particularly in fostering a collaborative culture that supports inclusion.

5.6. SD Negeri C

This school has four inclusive teachers, none of whom have received training in handling SEN students. During a Focus Group Discussion (FGD), teachers expressed uncertainty and a lack of confidence when working with students exhibiting behavioral and communication disorders. Instructional strategies were often based on personal experience and intuition, rather than evidence-based pedagogical approaches.

The absence of mentoring or coaching programs has led to teachers working individually without sustained guidance. There is also no documentation system or reflective forum in place to support periodic evaluation of inclusive practices. As a result, the implementation of inclusive education in this school appears to be administrative in nature, limited to fulfilling formal requirements rather than applying comprehensive pedagogical strategies.

6. Conclusion

This study provides an in-depth exploration of how inclusive teachers' pedagogical competence influences the implementation of adaptive education in three public elementary schools in Semarang City: SD Negeri A, SD Negeri B, and SD Negeri C. The findings reveal that adequate pedagogical competence serves as a critical foundation for designing differentiated instruction, developing flexible assessment strategies, and fostering a classroom environment that upholds inclusive values. However, the application of such competence remains suboptimal across all three schools.

At SD Negeri A, only one out of six inclusive teachers has undergone formal training in inclusive education. As a result, most teachers demonstrate limited ability in developing adaptive lesson plans and implementing formative assessments that are responsive to the needs of students with special educational needs (SEN). In SD Negeri B, more complex challenges are present none of the inclusive teachers have received professional training, and the school lacks essential learning support facilities such as specialized teaching media and assistive tools. This situation is further exacerbated by weak leadership support, which has led to poor collaboration among educators in developing adaptive learning strategies.

At SD Negeri C, the main challenge lies in teachers' self-efficacy. Teachers express doubts and a lack of confidence in addressing the needs of SEN students, particularly those with behavioral and communication disorders. The absence of a mentoring system or collective reflective forums worsens the condition, leaving teachers without sustained professional guidance. Across all three schools, the implementation of inclusive adaptive education appears to be largely administrative in nature, rather than rooted in reflective and differentiated pedagogical approaches.

While some teachers demonstrate personal commitment to creating inclusive learning environments, this commitment remains unsupported by a robust institutional framework. Individual efforts alone are insufficient without structural reinforcement, such as regular training programs, progressive school policies, and community-based professional development. Based on the overall findings, it is concluded that the success of inclusive education hinges on several key factors: the enhancement of teachers' pedagogical competence through structured training, the provision of supportive learning facilities tailored to students' needs, the strengthening of collaborative school culture, and the development of teachers' self-efficacy and spiritual intelligence as psychological foundations for navigating the complexities of inclusive classrooms.

Thus, this study emphasizes that the advancement of inclusive education cannot rely solely on national policy mandates; it critically depends on the readiness of teachers as frontline implementers and the capacity of school ecosystems to sustain inclusive practices in a holistic and continuous manner.

7. Suggestion

Based on the research findings concerning the relationship between teachers' pedagogical competence and the implementation of adaptive education in inclusive settings, several strategic recommendations are proposed to enhance the effectiveness of inclusive education practices in public elementary schools, particularly in the Ngaliyan District, Semarang City.

First, there is an urgent need for regular and structured professional training for inclusive teachers. Such training should focus on the development of differentiated lesson plans, formative assessment strategies tailored to individual needs, and the application of collaborative teaching approaches. For instance, in SD Negeri A, only one out of six inclusive teachers has ever received formal training, highlighting a capacity gap that requires immediate attention.

Second, the strengthening of learning facilities and infrastructure is a pressing necessity. At SD Negeri B, the lack of assistive learning tools, student-friendly media for learners with special educational needs (SEN), and dedicated service rooms significantly hinders the delivery of adaptive instruction, especially for students with attention deficits and mild intellectual disabilities. Inclusive schools must therefore be prioritized in the provision of such resources.

Third, it is important to establish teacher collaboration forums and mentoring systems within each school. Findings from SD Negeri C reveal that the absence of reflective spaces and professional guidance leads to teachers working in isolation. These forums, ideally facilitated by an inclusion coordinator or principal, would provide platforms for exchanging best practices and co-developing responsive and innovative instructional strategies.

The role of school leadership must also be reinforced in fostering an inclusive culture that supports inter-teacher collaboration. Internal policies should promote cross-disciplinary instruction, conduct regular supervision, and monitor the consistent application of inclusive principles in classroom activities. Furthermore, teacher training should not only emphasize technical skills but also integrate elements of spiritual intelligence such as empathy, patience, and emotional resilience, which are crucial for the psychological readiness of teachers to handle inclusive classroom complexities.

Equally important is the development of technical guidelines for adaptive teaching, to be issued by the education office or professional bodies. These guidelines should offer concrete direction on student-centered instruction, need-based assessment, and appropriate approaches for teaching students with special needs. This addresses the challenges faced by teachers in SD Negeri A and SD Negeri C, who struggle to design inclusive lesson plans effectively.

Finally, the evaluation of inclusive education must involve multiple stakeholders, including parents of SEN students and local community members. Their feedback can inform policy development and help refine school-level implementation. Through the comprehensive and consistent application of these recommendations, inclusive education can move beyond a mere administrative obligation and become a meaningful practice that is equitable, empowering, and genuinely inclusive of all learners.

Declarations

Author Contributions. Vanda Estetika Siswandari: conceptualization of the study, literature review, instrument design, and data collection. Erni Suharini: academic supervision, data analysis, and methodological validation. Sungkowo Edy Mulyono: critical review of findings, contribution to the discussion of results, and final manuscript review. Titi Prihatin: drafting of the initial manuscript, rewriting of results and conclusion, and manuscript editing. All authors have read and approved the final version of this article for publication.

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Ethical Approval. This study received ethical approval from the Research Ethics Committee of the Graduate School at Universitas Negeri Semarang. All research procedures adhered to the principles of confidentiality, informed consent, and the rights of participants involved in this study.

Data Availability Statement. The data supporting the findings of this study are available from the corresponding author upon reasonable request. The dataset includes interview transcripts, classroom observation notes, and lesson plan documents (RPP) from the three participating schools: SDN Ngaliyan 01, SDN Wates 01, and SDN Wonosari 02, Semarang City.

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