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Multisensory Learning and Learning Readiness in an Autistic Child with Hyperactive Characteristics

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Abstract

Classroom readiness is challenging for autistic children when attention, communication, and behavioral regulation affect participation. This study examined multisensory learning for one six-year-old child with autism spectrum disorder and hyperactive characteristics at an inclusive kindergarten in East Bekasi, Indonesia. This qualitative single-case study explored planning, implementation, monitoring, and evaluation. Data came from one teacher, one principal, and one parent through observations, semi-structured interviews, and learning documents. Data were analyzed through data reduction, data display, and conclusion drawing and verification. Activities integrated visual, auditory, tactile, and kinesthetic experiences with individualized goals in the Individual Learning Plan. Findings indicated emerging progress across six readiness domains: attention, following instructions, communication, social interaction, behavioral regulation, and learning engagement. The child followed instructions with less assistance and stayed engaged longer in classroom activities. The study synthesizes a six-stage pedagogical cycle from this case, offering practical guidance for inclusive early childhood education. These descriptive findings do not establish causal effectiveness.

INTRODUCTION

Learning readiness in early childhood is broader than the acquisition of pre-academic knowledge. For young children to benefit from classroom experiences, they must be able to orient to activities, understand and respond to instructions, communicate needs, regulate behavior, participate socially, and remain engaged long enough to complete meaningful tasks. These capacities are particularly important for children on the autism spectrum because differences in social communication, behavioral flexibility, attention, and sensory reactivity may shape how readily they can enter and sustain classroom participation. Reviews of school readiness in autism have emphasized that readiness is multidimensional and that important research gaps remain regarding how early educational settings can support these domains in everyday practice (Izuno-Garcia et al., 2022; Mukkiri et al., 2022). Work on executive function and attention likewise shows that attention-related processes are closely associated with language and social communication in young autistic children, suggesting that readiness domains

should not be treated as isolated skills (Howard et al., 2023). Longitudinal evidence also indicates that prekindergarten experience can contribute to later cognitive development in autistic children, reinforcing the developmental importance of high-quality early learning opportunities (Kim, 2025).

The classroom environment can either reduce or amplify the barriers that autistic children encounter. Sensory reactivity is relevant because classroom behavior is partly shaped by how children register and respond to stimulation; direct observational research has linked sensory reactivity differences with behaviors that can facilitate or impede learning (Marcham & Tavassoli, 2024). At the same time, sensory support should not be interpreted as simply increasing the number or intensity of stimuli. Evidence-informed guidance recommends that educators identify the individual sensory need, select a support linked to that need, observe the child's response, and evaluate whether participation improves (Dynia et al., 2023). Recent studies of multisensory environments similarly emphasize the heterogeneity of autistic pupils' experiences, with some sensory features experienced as supportive and others as uncomfortable or distracting (Dyer et al., 2026). From an environmental design perspective, inclusive early childhood spaces therefore need sensory and interactive features that are adjustable rather than uniformly stimulating (Abdou & Younis, 2026).

Multisensory learning provides a pedagogical framework for organizing such adjustments. Here, it refers to teaching that combines visual, auditory, tactile, and kinesthetic modalities according to instructional purposes and the child's responses, rather than applying sensory stimulation indiscriminately. Visual supports, concrete materials, demonstrations, object manipulation, movement, and brief verbal prompts offer ways to understand classroom expectations. Bateman et al. (2023) found that visual communication supports can increase autistic preschoolers' engagement during routines. Indonesian studies on adaptive learning media and movement-oriented guidance highlight the value of concrete, embodied instruction for autistic learners (Julianingsih & Huda, 2022; Kurniawan et al., 2022). Research on multisensory multimedia instruction in a special-school context suggests that multimodal presentation can support learning when aligned with educational objectives (Asril et al., 2025). Together, these studies suggest that multisensory pedagogy may be useful not because it provides more stimulation, but because it aligns instructional tasks and modalities with learning needs.

Inclusive early childhood education requires pedagogical adaptation involving teachers, school organization, and family collaboration. Indonesian studies show that inclusive preschool practices are shaped by institutional culture, leadership, teacher capacity, flexible pedagogy, and available support (Jusni et al., 2023; Yasin et al., 2023). Research also highlights teacher competence, infrastructure, and curricular flexibility as essential for school readiness for inclusion (Vitriana et al., 2024). International evidence similarly identifies collaboration, classroom organization, autism knowledge, and professional support as key facilitators of inclusion (Muñoz-Martínez et al., 2023; Tan & Abdullah, 2024; Kim et al., 2026; Olsson & Slewa, 2025). In naturalistic preschool settings, teachers promote engagement through combined classroom adaptations and individualized support rather than relying on a single technique (Taşdemir & Yazici, 2025).

For autistic children, individualized planning is essential because responses to the same materials or activities may vary across children and over time. Selliawati et al. (2025) reported that realia media within an individual learning program supported social learning when instructional goals, teacher competence, child needs, and family cooperation were considered together. Yolandha et al. (2025) highlighted teachers' roles as facilitators, motivators, mentors, and evaluators in supporting autistic children's social interaction through structured classroom guidance. More broadly, classroom participation depends not only on child characteristics but also on learning opportunities and responsive adult language and instruction (Sparapani et al., 2023). This aligns with efforts to integrate evidence-based autism intervention principles into inclusive early childhood education through responsive relationships, natural learning environments, motivation, and active engagement (Siller et al., 2024).

Despite growing literature, three gaps remain in early childhood practice. First, studies on sensory and autism interventions often examine specific strategies, clinical services, or program outcomes rather than the complete pedagogical cycle of identifying needs, planning activities, observing responses, and adjusting instruction. Second, school-readiness research identifies important developmental domains but provides limited insight into how these are monitored during inclusive

classroom routines, particularly for children with hyperactive characteristics. Third, Indonesian inclusive-education research has documented institutional readiness and teacher challenges, but limited evidence explains how multisensory teaching, Individual Learning Plans, teacher scaffolding, and school-family communication interact in naturalistic settings. Although Datta et al. (2023), examined a comprehensive school-readiness program in India, the organization of multisensory learning in Indonesian kindergartens still requires context-specific investigation.

The six readiness domains used in this case, attention, following instructions, communication, social interaction, behavior regulation, and learning engagement reflect interrelated prerequisites for taking part in early classroom routines and are understood in relation to teacher support, learning tasks, and environmental accessibility rather than as fixed deficits or a uniform developmental profile. In this context, multisensory learning is considered an instructional approach, distinct from sensory integration therapy or the indiscriminate addition of stimuli. The child's hyperactive characteristics were relevant to attention, movement needs, and sustained participation, making concrete and movement-based tasks important options for accessing learning goals. The school's initial assessment documented frequent distraction, difficulty following instructions without guidance, a preference for gestures, limited sustained participation, and discomfort with sticky materials such as glue. These challenges represented practical concerns for a classroom teacher working without a dedicated special education assistant or routine on-site therapy, explaining why a flexible approach to ordinary classroom activities was examined.

The present study addresses these gaps through an in-depth case of a six-year-old child, referred to as Child A, with Autism Spectrum Disorder (ASD) and hyperactive characteristics at Aeera Cendikia Kindergarten, Padurenan, East Bekasi. The school is an inclusive early childhood setting in which classroom learning constitutes a major source of developmental stimulation because a special education assistant and routine professional therapy are not provided on site. The novelty of the study lies in documenting multisensory learning as a recursive pedagogical process rather than as a fixed package of sensory activities. The case is analyzed from initial identification and individualized planning through implementation, monitoring, evaluation, and subsequent adjustment, culminating in a conceptual-practical prototype derived from the observed process. The prototype is not presented as an effectiveness-tested model or as a procedure that can be generalized to all autistic children. The contribution is a close description of how such decisions were made and revised within an Indonesian inclusive classroom with limited specialist support.

Accordingly, the study was guided by four research questions: (1) how was multisensory learning planned to support Child A's learning readiness; (2) how were visual, auditory, tactile, and kinesthetic modalities implemented in daily classroom activities; (3) how were readiness changes monitored and evaluated during implementation; and (4) what factors supported or constrained implementation? The study aimed to explain these processes in a naturalistic inclusive kindergarten and to synthesize the recurring pattern into a case-derived framework that may inform reflective practice in comparable early childhood settings.

METHOD

Research Design and Setting

This study employed a qualitative single-case study design to examine multisensory learning in its natural classroom context. The approach was chosen to explore how planning, teaching, monitoring, and adjustment unfolded over time for one focal learner rather than to estimate population effects. The study was conducted from April to June 2026 at Aeera Cendikia Kindergarten in Padurenan, East Bekasi, Indonesia, an inclusive early childhood education institution. As the school had neither a dedicated special education assistant nor routine on-site professional therapy, daily teaching activities and teacher adaptations were central to the educational support examined.

Participant and Case Selection

Child A was a six-year-old boy in Kindergarten B who had attended the school for

approximately three years. He was selected purposively because the initial assessment recorded barriers in attention, following instructions, communication, social interaction, behavior regulation, and task engagement, alongside positive responses to concrete materials and direct experience. The school's assessment and individual learning records described him as having ASD; no independent clinical diagnosis was made for this study. "Hyperactive characteristics" refers to classroom and family descriptions of frequent movement, difficulty staying seated, and rapid disengagement, rather than a separate diagnosis established by the researchers. The educational analysis focused on learning needs and classroom responses. Three informants were selected for their direct involvement: one classroom teacher (n = 1), one principal (n = 1), and one parent (n = 1). The child is identified only as Child A.

Data Sources and Instruments

Data were generated through three complementary techniques: observation, semi-structured interviews, and documentation. Classroom observations focused on both multisensory implementation and learning-readiness behavior. The observation guide comprised 15 indicators covering attention, following instructions, behavior regulation, emotion regulation, social interaction, eye contact, verbal communication, activity transition, repetitive behavior, learning engagement, responses to visual, auditory, tactile, and kinesthetic input, and sensory regulation. The indicators provided a structured lens while allowing narrative field notes to capture contextual information, teacher assistance, and changes in the child's response. Ten monitoring dates were documented between 15 April and 24 June 2026, approximately weekly; five of these sessions were described in more detailed field notes. Observations took place during regular classroom activities, which followed lesson plans allocating 60 minutes to a session; exact observer contact time was not separately timed. The first author participated in the initial assessment with the teacher and carried out direct classroom observation using the same 15-indicator guide. The grouping used for analysis is summarized in Table 1.

Table 1

Observation-indicator grouping for the six readiness domains

Readiness domain	***Indicators in the observation guide***
Attention	Attention; response to visual input; response to auditory input
Following instructions	Following instructions; activity transition
Communication	Verbal communication; eye contact (recorded only as contextual information)
Social interaction	Social interaction (response to teacher and peers)
Behavior regulation	Behavior regulation; emotion regulation; repetitive behavior; sensory regulation
Learning engagement	Learning engagement; response to tactile input; response to kinesthetic input

The four sensory-response indicators describe how tasks were accessed, while eye contact was retained only as contextual information rather than a requirement for social engagement or learning success. Semi-structured interviews were conducted with the classroom teacher, school principal, and parent to explore the child's initial needs, planning through the Individual Learning Plan (locally termed *Rencana Pembelajaran Individual* or RPI), choices of media and activities, teacher prompting and adaptation, monitoring procedures, observed development, collaboration between school and home, and perceived supporting and inhibiting factors. Documentary evidence included the initial assessment, RPI, daily lesson plans, developmental notes, monitoring and evaluation records, the child's learning portfolio, and available photo/video documentation. Photographs are not reproduced in this article because the journal template recommends including activity photographs only when they constitute primary analyzed data; instead, the analyzed patterns are presented in tables and two research figures.

Data Collection Procedure

Data collection followed four linked stages. First, the researcher reviewed initial assessment information and learning documents to establish the child's baseline learning-readiness profile and the

targets incorporated into the RPI. Second, classroom observations documented how the teacher used visual, auditory, tactile, and kinesthetic modalities during everyday activities and how the child responded. Third, interviews with the principal, teacher, and parent were used to clarify the rationale for planning decisions, compare school and home observations, and identify contextual supports and barriers. Fourth, documentation and developmental records were compared with observation and interview data as implementation progressed. Data collection and preliminary analysis were iterative, so emerging interpretations could be checked against subsequent observations and informant explanations.

Data Analysis and Trustworthiness

Data were analyzed using the interactive model of Miles and Huberman (1994), which comprises data collection, data reduction, data display, and conclusion drawing and verification. During data reduction, observation notes, interview data, and documents were coded and grouped into seven initial themes: multisensory planning, multisensory implementation, developmental monitoring, individual evaluation, school readiness, supporting factors, and inhibiting factors. The detailed observation indicators were then consolidated into six recurring readiness themes: attention, following instructions, communication, social interaction, behavior regulation, and learning engagement. Data were displayed in descriptive matrices comparing initial conditions, classroom strategies, observed responses, and follow-up decisions. Conclusions were developed iteratively and rechecked against the original data to ensure that interpretations remained grounded in the collected evidence.

Trustworthiness was strengthened through source, technique, and time triangulation, as well as member checking. Information from the teacher, principal, parent, and direct observation of Child A was compared across sources, while repeated observations during April–June were used to identify consistent patterns. The 29 April field note documenting Child A's brief contact with glue, subsequent hand cleaning, and refusal to continue was coded as tactile discomfort and examined alongside the teacher's account of gradual media adaptation and developmental records showing longer glue use. Similarly, reports of improved attention and calmer learning were cross-checked against observation notes, interview accounts, and documentary records. As the first author participated in the initial school assessment and observed classroom activities as a participant observer while the teacher delivered instruction, interpretations were reconfirmed with the teacher, principal, parent, and learning documents to reduce researcher bias; given the naturalistic single-case design, these procedures aimed to establish analytical credibility and contextual depth rather than statistical generalization.

Qualitative Readiness Visualization

For communication of the findings, the six readiness themes were summarized using the same three-category qualitative scale used in the research records: 1 = Not Yet Emerged, 2 = Emerging, and 3 = Consistently Demonstrated. The radar visualization in Figure 1 is therefore an ordinal display of qualitative categorization, not a psychometric score or an effect-size estimate. All six domains were categorized as Not Yet Emerged in the initial condition and as Emerging by the end of the observation period. No domain was classified as Consistently Demonstrated. The numeric labels are used solely to make the categorical pattern visible and must not be interpreted as equal-interval measurement or proof of causal effectiveness. The categories followed the observation form: Not Yet Emerged referred to behavior not observed or not functionally available without intensive support; Emerging to behavior present with prompts or guidance; and Consistently Demonstrated to behavior repeated independently in different classroom situations. The judgments were based on consistency and the level of assistance required across recorded activities, rather than on a numerical frequency threshold. For example, attention remained Emerging when the child stayed with selected tasks longer but still needed redirection.

Research Ethics

For confidentiality, the focal learner is identified as Child A, and no identifiable photographs or video recordings are reproduced. The documented learning activities took place within regular

classroom routines; when the child resisted a material, the teacher demonstrated its use and reduced demands rather than forcing participation. Data from observations, interviews, and classroom records were reported without identifying the child.

RESEARCH RESULTS

Individualized Planning Began With Readiness Needs

The planning process did not begin with the selection of attractive sensory materials; rather, it began by identifying Child A's current learning readiness needs. The initial assessment, classroom observations, information from the parent and teacher, and previous developmental records were used to determine which capacities were acting as immediate prerequisites for participation. Six core priorities were identified: sustaining attention, following simple instructions, functional communication, social interaction, behavior regulation, and remaining engaged in learning. A seventh observation concerned the child's learning characteristics: he responded more readily to concrete objects, play, direct experience, and movement than to extended verbal instruction.

These findings were translated into the RPI. The teacher selected short, observable targets and paired them with learning media and support strategies that could be adjusted during daily activities. Attention targets were addressed through concrete materials and visually clear demonstrations. Instruction-following targets were supported by short verbal directions, modeling, repetition when required, and visual or object cues. Communication opportunities were embedded in requests, questions, naming, and simple exchanges. Social interaction targets were incorporated into teacher-child and small-group activity. Behavior regulation and learning endurance were addressed through predictable sequences, positive reinforcement, graded demands, and tasks that could be completed with gradually reduced assistance. Table 2 summarizes how the baseline evidence informed individual planning.

Table 2

Initial learning-readiness profile and individualized planning priorities

Domain	***Initial evidence***	***Individualized planning priority***
Attention	Easily distracted by sounds, objects, and surrounding activity; unable to sustain attention for long.	Use concrete focal materials and clear demonstrations; begin with short activities and extend duration gradually.
Following instructions	Inconsistent response; required examples, repetition, and direct guidance.	Use one-step/brief instructions paired with modeling and visual/object cues; fade prompts as responses emerge.
Communication	Functional verbal communication was limited; gestures were frequently used to express wants.	Embed simple questions, naming, requesting, and verbal-response opportunities within activities
Social interaction	Limited response to invitations from adults and peers; little independent participation in shared activities.	Build exchanges and simple shared activities with structured support, recognizing gestures, pointing, and turn-taking as participation.
Behavior regulation	Could leave activities, cry, or refuse when a task was difficult or undesired.	Use predictable sequences, positive reinforcement, graded demands, and movement when needed.
Learning engagement	Could not reliably remain in an activity until completion without assistance.	Select concrete/play-based tasks, scaffold completion, and gradually reduce assistance.

The principal's interview supported the same pattern: learning goals were expected to differ across children and to be based on identification of individual needs. The teacher described concrete materials, play, and direct experience as especially useful for Child A. The parent's account provided

complementary information about limited verbal communication, high activity level, difficulty maintaining attention, and the need for assistance in everyday activities. Taken together, these sources indicated that the RPI functioned as a working pedagogical guide rather than a purely administrative document.

Adaptive Integration of Visual, Auditory, Tactile, and Kinesthetic Modalities

Implementation involved all four multisensory modalities, but not necessarily all at the same time. Visual supports included whiteboard demonstrations, picture cards, visible examples, and concrete objects. Auditory support consisted primarily of brief and clear verbal instructions, repetition when needed, simple dialogue, and verbal praise. Tactile experience was provided through manipulable materials such as glue, straws, pom-poms, puzzles, and modeling compound. Kinesthetic activities included walking on a balance beam, transferring pom-poms with tongs, motor games, and other activities that required coordinated movement.

A consistent implementation principle was adaptation to response. If Child A was not attending to a spoken instruction, the teacher could shorten the sentence, demonstrate the action, or redirect attention to the object. If the child was highly active, a task could incorporate controlled movement rather than requiring prolonged stillness. If a tactile material produced discomfort, exposure was not forced at full intensity; the activity and degree of contact were adjusted while the teacher continued to monitor tolerance. Conversely, when the child became more capable, prompts were faded and expectations were increased gradually. Table 3 presents the modalities, examples, intended functions, and observed response patterns.

Table 3
Multisensory modalities and classroom implementation

Modality	***Examples***	***Instructional function***	***Observed response pattern***
Visual	Whiteboard, picture cards, demonstrations, concrete objects	Make expectations and task sequence perceptible beyond verbal language.	Attention and task understanding were stronger when visual/concrete references were available.
Auditory	Short clear instructions, repetition, simple dialogue, verbal praise	Direct action and reinforce response without lengthy verbal load.	Simple instructions were increasingly followed with less repetition and assistance.
Tactile	Glue, straws, pom-poms, puzzles, modeling compound	Support direct manipulation and concrete exploration.	Initial discomfort with sticky glue decreased; later the child used a wider range of media.
Kinesthetic	Balance beam, transferring pom-poms with tongs, motor games	Channel movement into purposeful participation and coordination.	Movement-based tasks offered structured participation when prolonged sitting was difficult.

The modality selected depended on the task at hand. A whiteboard demonstration in April attracted attention more readily than a worksheet, while pom-pom transfer with tongs (13 May) and a balance activity (20 May) offered purposeful movement. Pencil handling continued to require modeling and repeated practice through June. Across activities, the teacher observed the response and maintained, reduced, or changed assistance accordingly.

One illustrative pattern involved glue. Early in the study, Child A appeared uncomfortable touching sticky glue, used it only briefly, cleaned his hands, and stopped the activity. By later observations, he was able to use glue to attach pieces of straw and remain involved until the activity was completed. The significance of this change is not that tolerance of glue is, in itself, a learning-readiness outcome. Rather, it shows how sensory response, task persistence, and teacher adaptation interacted within an ordinary learning activity. The teacher did not treat the tactile modality as a standalone therapy; it was embedded within an educational task and adjusted according to the child's behavior.

Monitoring and Evaluation Showed Emerging Readiness Across Six Domains

Monitoring occurred during everyday activity through observation, developmental notes, review of RPI targets, documentation, and communication with the parent. The teacher used the child's response to decide whether an activity should be maintained, simplified, extended, or changed. When a target became more stable, the level of assistance was reduced or the instructional demand was increased. When performance fluctuated, the teacher revisited the media, wording of instructions, amount of prompting, or activity structure.

Across the April–June observation period, the six recurring readiness domains showed a common categorical shift from Not Yet Emerged to Emerging. Attention became more sustained during selected activities, although it remained vulnerable to distraction. Child A began to follow simple instructions with less assistance and showed more response to questions and teacher directions. Social responses to the teacher and peers appeared more frequently. Leaving an activity before completion decreased in observed tasks, and the child was able to remain involved for longer periods. These changes were developmental and context-dependent rather than uniform. Table 4 summarizes the comparison between the initial pattern and later observations.

Table 4

Qualitative changes in learning readiness and follow-up actions

Domain	*Initial condition*	*Strategy used*	*Later observation*	*Teacher support*	*Follow-up*
Attention	Easily distracted; brief focus (15 Apr)	Whiteboard demonstration, picture cards, puzzles	Longer focus; completed evaluation (10 Jun)	Frequent redirection → occasional guidance	Extend effective activities gradually
Following instructions	Needed repetition and modeling	Brief directions plus demonstration	One-step commands with help (22 Apr); less help later	Verbal prompts and modeling → minimal help	Increase complexity gradually
Communication	Primarily gestures and limited words	Pictures, choices, questions in activities	Simple verbal responses emerged	Modeling and prompting still needed	Offer communication across routines
Social interaction	Limited response to teacher and peers	Small-group play and shared activities	Participated with peers and responded to teacher (17 Jun)	Continued teacher guidance	Provide further supported group play
Behavior regulation	Left or refused challenging activities	Visual routines, reinforcement, graded demands	Leaving activities became less frequent	Reassurance and redirection	Maintain predictable, adaptable structure
Learning engagement	Did not finish without close support	Concrete, play-based tasks	Completed evaluation with occasional guidance (10 Jun)	Continuous → occasional support	Adjust goals to emerging independence

The observation notes illustrate differences in the level of support required. On 15 April, Child A was distracted by surrounding activity and needed help holding a marker and following the teacher's line. On 29 April, he briefly touched glue, cleaned his hands, and stopped. Subsequent developmental notes documented longer glue use and straw placement with minimal help; on 10 June he held a pencil more steadily and completed an evaluation with occasional guidance. In translated interview accounts,

the teacher noted that attention was sustained longer than at baseline, while the parent reported greater willingness to use learning materials and calmer participation. Progress was uneven: simple communication and shared activity still required adult support. Therefore, the later classifications remained Emerging rather than Consistently Demonstrated.

Figure 1 displays the categorical pattern across the six themes. At baseline, the data reduction placed each domain in category 1 (Not Yet Emerged) because the skill was not yet functionally apparent without intensive assistance. At the later stage, each domain was categorized as 2 (Emerging) because the relevant behaviors appeared but still required guidance or were not yet consistent across situations. No domain reached category 3 (Consistently Demonstrated). This restrained categorization is important: the figure visualizes the direction of the qualitative pattern but does not quantify the magnitude of change.

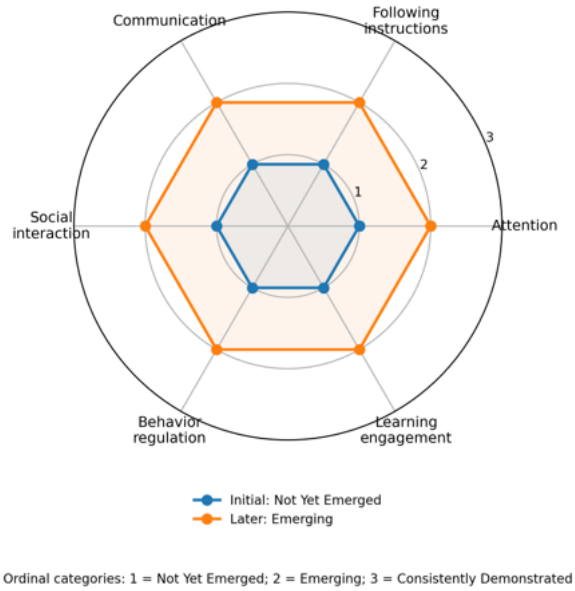

Figure 1. Qualitative visualization of learning-readiness categories across six domains.

Note. Ordinal categories visualize qualitative reduction of the case data; they are not standardized scores or effect sizes.

Monitoring records also documented practical changes that cut across the six themes. Child A could remain seated for longer during a final learning evaluation, use a pencil with greater stability, and complete the task with substantially less continuous assistance than at the beginning of the research period. In other activities, he progressed from frequent interruption to completing an activity, from intensive teacher support toward reduced support, and from avoiding selected materials toward using a wider range of media. These observations reinforce the interpretation of "emerging" readiness while also showing why "consistent" readiness would be premature: performance continued to depend on the task, the sensory characteristics of materials, the child's condition, and the type of assistance provided.

Supporting and Inhibiting Factors Were Interdependent

Four supporting factors recurred across observation, interviews, and documents. First, assessment and the RPI made learning targets individual and visible. Second, the teacher's ability to read Child A's response allowed immediate adaptation of instructions, media, and assistance. Third, access to varied concrete and multisensory materials enabled the teacher to shift the route of participation without abandoning the learning objective. Fourth, communication between school and family provided information about behavior outside school and helped align follow-up activities.

The main constraints were equally contextual. Child A's attention could shift rapidly, particularly when other sounds, objects, or activities competed with the learning task. Hyperactive characteristics meant that movement needs could conflict with activities demanding prolonged sitting.

Sensory responses were not stable across all materials; sticky textures such as glue initially produced discomfort. Development also varied across sessions, so a strategy that worked on one day could require modification on another. Finally, consistency of support between school and home could not be completely controlled by the teacher or researcher. Table 5 presents these factors together with the pedagogical responses observed during the study.

Table 5

Supporting and constraining factors in multisensory implementation

Type	*Factor*	*Meaning for implementation*
Supporting	Initial assessment and RPI	Learning goals were individualized and linked to observed prerequisites for participation.
Supporting	Teacher responsiveness and scaffolding	Instructions, media, and prompt levels could be changed immediately according to Child A's response.
Supporting	Varied concrete/multisensory media	The teacher could change the route of access while maintaining the educational objective.
Supporting	School-family communication	Home information contextualized school observations and supported continuity of follow-up.
Constraining	Fluctuating attention/hyperactive characteristics	Tasks sometimes required movement, shortened demands, refocusing, or changes in activity structure.
Constraining	Variable sensory responses	Some media, particularly sticky glue, initially produced discomfort and required gradual adaptation.
Constraining	Session-to-session variability	A strategy effective in one session could require revision in another.
Constraining	Consistency across environments	School could encourage follow-up but could not fully control the level or form of support outside school.

A Case-Derived Cyclical Prototype

The final analytic synthesis produced a six-stage prototype: initial identification, individualized planning through the RPI, multisensory implementation, learning-readiness monitoring, developmental evaluation, and adjustment/follow-up. The cycle begins with understanding the child rather than selecting a sensory medium. Planning converts identified needs into targets and determines potentially appropriate modalities. Implementation provides the activity while the teacher observes how the child responds. Monitoring captures emerging patterns across readiness domains. Evaluation compares the response with the individual target. Adjustment then modifies media, instruction, assistance, or the next target, and the resulting information feeds into the next cycle of planning.

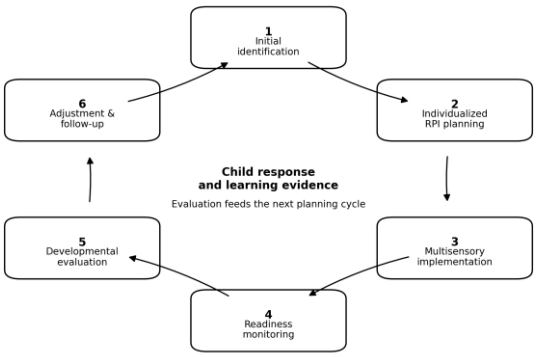

Figure 2. Case-derived cyclical prototype for multisensory learning implementation.

This prototype summarizes documented decisions, not tested effectiveness. Identification drew on the 1 April initial assessment; planning on the RPI; implementation on lesson plans and observation notes; monitoring on developmental records; evaluation on June activities; and adjustment on teacher follow-up, including fading prompts and gradually reintroducing initially uncomfortable materials.

The prototype is deliberately described as case-derived. It was not developed through a research-and-development design, subjected to expert validation as a product, or tested experimentally for effectiveness. Its value lies in making the observed pedagogical logic explicit: multisensory learning was most coherent when it operated as an adaptive cycle connecting assessment, individualized goals, classroom action, evidence of response, and revision. It should therefore be treated as a conceptual-practical framework that requires re-identification of needs before use with another child or in another educational setting.

DISCUSSION

Three aspects of the case are especially relevant: adaptive integration of multisensory tasks, individualized planning through the RPI, and teacher-led inclusion under limited specialist support. The central finding of this study is that multisensory learning supported school readiness not as a collection of sensory activities but as an individualized, iterative pedagogy. The observed process started from the child's readiness profile, translated priorities into an RPI, combined sensory modalities according to instructional purpose, monitored participation, and revised support according to response. This interpretation matters because it shifts attention away from the question "Which sensory activity works for autism?" toward the more educationally useful question "What participation barrier is present, what learning goal is being pursued, and which modality or combination can make the goal more accessible for this child at this time?" Such a stance is consistent with evidence-informed recommendations that sensory supports be selected and evaluated according to individualized need rather than used generically (Dynia et al., 2023).

The six readiness themes identified in this case highlight a multidimensional understanding of school readiness, encompassing attention, instruction following, communication, social interaction, behavior regulation, and learning engagement. These processes were interconnected: improved attention supported instruction processing, clearer understanding encouraged task participation, communication enabled reciprocal guidance, and behavioral regulation helped sustain engagement. This pattern aligns with Izuno-Garcia et al. (2022), who argue that readiness in autistic children extends beyond academic precursors, and with Mukkiri et al. (2022), whose school-readiness work reflects multiple functional domains. It is also compatible with evidence that executive-function and attention abilities are related to language and social communication in young autistic children (Howard et al., 2023).

The observed shift from Not Yet Emerged to Emerging in all six domains should be interpreted cautiously. The study does not establish that multisensory learning caused the changes because there was no comparison condition, no standardized pre-post measure, and only one participant. The three-

category radar representation is ordinal and derived from qualitative data, so the numerical distance between categories cannot be interpreted statistically. Nevertheless, repeated observation, documentation, and informant convergence support a credible descriptive claim: during the period in which individualized multisensory teaching was implemented and monitored, Child A displayed more functional participation across all six readiness themes than was evident in the initial profile. This type of process evidence can complement intervention research by describing how change is recognized and acted upon within an ordinary classroom.

These observations may also reflect increasing familiarity with classroom routines, repeated practice, a developing teacher-child relationship, and maturation over the study period. The evidence cannot isolate any of these influences. A plausible explanation within the case is that concrete demonstrations reduced verbal demands while structured movement and graded tactile contact offered alternative ways to participate.

Attention and sensory regulation were closely intertwined. Child A was easily distracted, sought movement, and initially showed discomfort with certain tactile materials. Rather than eliminating sensory experiences or adding stimuli indiscriminately, the teacher adapted activities through short instructions, concrete objects, modeling, movement opportunities, and gradual exposure to challenging materials. This finding aligns with Marcham and Tavassoli (2024), who found associations between directly observed sensory reactivity differences and classroom behavior. It also resonates with Dyer et al. (2026), who showed that multisensory environments are not universally positive for autistic pupils. Thus, multisensory teaching should be selective and responsive, using additional modalities only when they clarify tasks or support participation without increasing distraction.

The finding also extends environmental discussions of inclusive early learning. Abdou and Younis (2026) emphasize sensory and interactive design strategies for neurodevelopmental diversity, while this case shows that adaptation can occur at a micro-pedagogical level even without redesigning the entire environment. A whiteboard drawing, picture card, manipulable object, balance activity, or modeled action can alter the accessibility of a task when it is deliberately linked to the child's readiness need. Kurniawan et al. (2022) similarly demonstrate the importance of structured movement guidance for learners with autism, and Asril et al. (2025) report benefits of multisensory multimedia learning in a special-school context. The present study contributes a complementary naturalistic account in which low-technology materials and teacher judgment were central.

Visual and concrete supports appeared particularly helpful when verbal instruction alone was insufficient. The teacher routinely shortened instructions and paired them with demonstrations or objects. This pattern is consistent with Bateman et al. (2023), who showed that visual communication supports embedded in preschool routines can increase conversational engagement. It also accords with Julianingsih and Huda (2022), who developed an augmented-reality communication medium for autistic children, although the technological form differs. Across these studies, the common principle is not the specific medium but the externalization of information: directions, choices, or social content become more perceptible and actionable when represented beyond spoken language alone.

The teacher's role was more important than any single multisensory material. Child A was supported through prompting, demonstration, reinforcement, observation, and gradual fading of assistance. When attention weakened or materials caused discomfort, the teacher adapted activities while maintaining individual goals. This responsive approach aligns with Taşdemir and Yazici (2025), who highlight classroom practices and support strategies for promoting autistic children's engagement. It also reflects Yolandha et al. (2025), who describe teachers as facilitators, motivators, mentors, and evaluators in supporting social interaction. This case further demonstrates how these roles can be integrated into a continuous assessment-adjustment cycle.

Individualization through the RPI was another significant feature. The initial assessment did not merely label areas of difficulty; it determined which readiness capacities should become immediate instructional priorities and how those priorities would be approached. This finding closely relates to Selliawati et al. (2025), who reported the use of realia within individual learning programs for autistic children in an early childhood setting. In both cases, concrete media were most meaningful when

situated within individualized goals. The broader implication is that "multisensory" should describe the mode of access to a learning objective, whereas the objective itself must still come from a defensible understanding of the child's developmental and educational needs.

School-family communication also functioned as part of the instructional system. The parent described changes in attention, direction following, acceptance of learning media, calmness, and independence, while the teacher communicated about school progress and suggested follow-up activities. This does not demonstrate identical implementation across home and school, but it created a feedback channel through which classroom observations could be contextualized. Research on inclusive preschool collaboration characterizes home-school partnership as dynamic and consequential for children with special needs (Çelik & Tomris, 2024). In this case, family communication was valuable because the child's readiness behaviors were not assumed to be stable traits; teachers needed information about how responses varied across environments.

The importance of collaboration becomes even clearer when considering the resource context. Aeera Cendikia did not provide a dedicated special education assistant or routine professional therapy on site during the studied period. The school did not position classroom teaching as a substitute for professional therapy; however, pedagogical support still had to be delivered during the child's time in school. Indonesian research has described the institutional and cultural work required for inclusive early childhood education, including leadership, teacher capacity, and pedagogy responsive to diversity (Jusni et al., 2023; Yasin et al., 2023). Vitriana et al. (2024) similarly identify trained human resources, facilities, and flexible curriculum as important for inclusive PAUD readiness. The present case shows what adaptation can look like when teacher-led classroom practice carries much of the day-to-day responsibility for access and engagement.

This resource reality also underscores the need to distinguish education from therapy. The prototype produced here is pedagogical: it guides identification of educational needs, RPI planning, classroom implementation, observation, evaluation, and adjustment. It does not claim to diagnose, treat, or change the clinical features of autism. This boundary is consistent with attempts to bridge autism-specific intervention knowledge and inclusive early education without collapsing the distinct roles of educational and clinical systems (Siller et al., 2024). Olsson and Slewa (2025) show that unclear divisions of labor and weak interprofessional collaboration can hinder inclusion, while Muñoz-Martínez et al. (2023) emphasize organizational and collaborative factors in facilitating autistic students' educational inclusion. A practical implication is that teachers need sufficient competence to make pedagogical adaptations while maintaining referral and collaboration pathways for needs that require other professional expertise.

Teacher competence is therefore a structural condition, not merely an individual characteristic. Tan and Abdullah (2024) found that preschool teachers' knowledge, attitudes, and self-efficacy are important for inclusion and point to the value of professional development. Kim et al. (2026) similarly report that early childhood teachers in a developing-country context identify both challenges and support needs when including autistic children. In the current study, the teacher's ability to observe a response, interpret whether the problem lay in attention, instruction, material, or demand, and then alter the next action was central to the implementation. Training for inclusive early childhood educators should therefore move beyond lists of autism characteristics or sensory activities and include practice in functional observation, individualized goal setting, prompt fading, task analysis, and data-informed adjustment.

The case also supports an ecological view of participation. Classroom engagement is not produced by the child alone; it emerges through an interaction between learner characteristics, adult behavior, task structure, materials, and social opportunities. Sparapani et al. (2023) found that classroom participation among young autistic learners is associated with features of instruction and teacher language. Similarly, the school-readiness program described by Datta et al. (2023) emphasizes preparation for the social and behavioral expectations of mainstream schooling. Child A's pattern is compatible with these accounts: attention and regulation improved most visibly when activities were concrete, instructions were accessible, expectations were graded, and support was responsive. Consequently, readiness should not be viewed only as a property the child must possess before

inclusion; it can also be constructed through environments that make participation more understandable and achievable.

This point is reinforced by the contribution of early educational experience to later development. Kim (2025) reports long-lasting associations between pre-kindergarten education and working-memory development among autistic children. Although the current single case cannot address long-term outcomes, it illustrates a plausible educational mechanism through which early learning environments may matter: repeated participation in appropriately scaffolded tasks provides opportunities for children to attend, respond, communicate, regulate, and complete activities. In this context, readiness should not be equated with sitting still, unquestioning compliance, or sustained eye contact, as gestures, pointing, responses to invitations, and shared activities can also indicate meaningful participation. Therefore, the goal is not to make children conform to a uniform classroom style, but to build functional readiness through accessible participation while adapting the learning environment to their individual needs.

The six-stage prototype draws these observations together through a cycle of identification, RPI planning, implementation, monitoring, evaluation, and adjustment. Its contribution is to represent multisensory learning as a recurring educational decision rather than merely a menu of activities. Conceptually, it connects individual readiness needs with classroom conditions that make participation possible. In practice, it offers teachers a framework for reflection, prompt fading, family communication, and referral when a child's needs exceed the scope of classroom pedagogical support. However, the prototype has not been validated or tested for effectiveness, and its targets, materials, and evaluation criteria must therefore be adapted to each educational setting.

The interpretation is limited by one child, one school, a specific teacher and family context, and approximately three months of observation. Changes may reflect more than the teaching approach; not every response was captured across activities or environments. The categorical radar chart represents descriptive judgments, not standardized scores or effect sizes. The prototype has not undergone feasibility, effectiveness, or formal validation testing. Studies across more children, classrooms, and longer periods could examine the decision cycle and its transferability while maintaining individualized adaptation.

CONCLUSION

In this case, multisensory learning was implemented as an adaptive and individualized pedagogical process rather than a fixed set of sensory activities. The teacher linked visual, auditory, tactile, and kinesthetic experiences to the child’s needs and RPI targets, monitored responses, and adjusted support. During April–June 2026, all six readiness domains were described as moving from Not Yet Emerged to Emerging, with less assistance required for selected tasks. These are descriptive developments, not evidence of causality. The contribution is a six-stage, case-derived prototype for pedagogical reflection and decision-making, not a standardized or tested model. Inclusive early childhood teachers may use the cycle to identify needs before selecting activities, monitor participation in varied forms, work with families, and seek specialist input when needed. Future research should examine more cases over longer periods.

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AUTHOR CONTRIBUTION STATEMENT

IR, SA, DE, IM: conceptualization, data collection, formal analysis, visualization, and original draft preparation. I, A: supervision, methodological review, and manuscript editing. CA: supervision

and manuscript review and editing.

AI DISCLOSURE STATEMENT

The authors state that ChatGPT (OpenAI) was used during the preparation of this manuscript for translation into English and proofreading. Following the use of this service, the authors thoroughly reviewed, verified, and edited the entire content as necessary and assume full responsibility for the accuracy, integrity, and substance of this publication.

CONFLICT OF INTEREST

The authors declare that this study was conducted with no conflicts of interest, whether financial, institutional, or personal that could influence the research planning process, data collection and analysis, interpretation of results, manuscript preparation, or the publication process. All stages of the research were conducted independently, objectively, and in accordance with the principles of integrity and scientific ethics. The authors are fully responsible for the content, accuracy, and reporting of the research results presented in this manuscript.

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