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Improving Attention Abilities in Children with ADHD Characteristics through the Multisensory VAKT Method

Rustiana*
Universitas Negeri Yogyakarta, Indonesia

Bayu Pamungkas
Universitas Negeri Yogyakarta, Indonesia

***Corresponding Author:** rustiana.2024.@student.uny.ac.id

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Abstract
Attention Deficit Hyperactivity Disorder (ADHD) affects 5-7% of school-aged children globally, with affected children experiencing significant difficulties in maintaining focus, completing tasks, and adapting to educational environments. This study investigated the effectiveness of the Visual, Auditory, Kinesthetic, and Tactile (VAKT) method in improving attention abilities among early childhood children with ADHD characteristics. The research employed classroom action research design utilizing the Kemmis and McTaggart model across two implementation cycles at TK Negeri 1 Kec. Sangatta Selatan during the 2024/2025 academic year. Fifteen children from Group B2 participated, with particular focus on four children displaying ADHD characteristics including attention difficulties and disruptive behaviors. Data collection utilized structured behavioral observations assessing attention development across visual, auditory, kinesthetic, and tactile modalities using a four-point developmental scale. The intervention integrated multisensory activities including picture guessing games, animal sound imitation, obstacle courses, mystery box exploration, and finger painting activities designed to simultaneously engage all sensory processing systems. Results demonstrated substantial progressive improvements, with overall attention development scores increasing from 49.99% at baseline to 83.21% following Cycle II implementation, representing a 33.22 percentage point improvement. Among children with ADHD characteristics, three of four participants advanced to "Developing as Expected" category, showing marked improvements in sustained attention, reduced disruptive behaviors, and enhanced task completion. The VAKT method effectively addressed fundamental attention deficits by providing multiple simultaneous processing pathways that compensated for compromised executive function systems. These findings provide empirical evidence that theoretically-grounded multisensory interventions can produce meaningful improvements in attention capabilities, offering practical solutions for inclusive early childhood education settings serving children with diverse learning needs and neurodevelopmental differences.

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) represents one of the most prevalent neurodevelopmental conditions globally (Bishop, 2010), with epidemiological studies indicating occurrence rates of 5 to 7% among school-aged populations (Polanczyk et al., 2007). This condition manifests as behavioral alterations that compromise daily functioning and development, distinguished by levels of inattention, impulsiveness, and hyperactivity that exceed typical developmental expectations across educational, social, and familial environments (American Psychiatric Association, 2013). Current data indicates that approximately 3-5% of children are diagnosed with ADHD globally, with prevalence rates increasing by 2.4% among elementary school students (Lorient, 2023). Research indicates that ADHD constitutes one of the most common disorders occurring in early childhood populations (Adiputra et al., 2021).

ADHD is characterized as a complex neurodevelopmental disorder involving deficits in attention, hyperactive behavior, and impulsive tendencies, reflecting an inability to focus attention for extended

periods and difficulty controlling behavior and impulses (Custodio et al., 2024). Children with ADHD typically exhibit difficulties in maintaining concentration, demonstrate restless behavior, struggle with task completion, and are easily distracted by environmental stimuli (Putra, 2022). One easily recognizable characteristic of children with ADHD is their inability to remain in one place for extended periods, often moving around and rarely able to sit still for 5-10 minutes when asked to complete tasks by adults (Awiria et al., 2020). These manifestations often result in academic underachievement and social isolation, as affected children frequently experience rejection from peers and face punitive responses from educators who may misinterpret their behaviors as deliberate defiance rather than neurological differences (Setiawati, 2020).

The theoretical foundation for understanding ADHD-related attention difficulties draws from Executive Function theory proposed by Barkley (1997), which explains that ADHD is characterized by deficits in brain executive functions, including inhibitory control, working memory, and cognitive flexibility. These deficits directly impact children's ability to focus attention and maintain concentration on tasks. Focused attention, defined as the voluntary act of trying to ignore certain stimuli while attending to others, serves as an important prerequisite for learning and functions as a long-term predictor for children's academic achievement (Posner & DiGirolamo, 1998; Steele et al., 2012). Attention is fundamental to the acquisition of skills and knowledge, to adaptive function within the environment and to educational and social success (Anderson et al., 2008; Deluca & Leventer, 2008). Attention is generally conceived as multifaceted, involving a network of interrelated processes, including basic selective and sustained skills and higher-order, controlled components (Klimkeit et al., 2004; Posner & Dehaene, 1994).

The maturation of attention is considered to be a multistage process in which specific components develop at different times, beginning in infancy and continuing into adolescence (Anderson et al., 2001; Klenberg et al., 2001). Several studies have documented developmental pathways for lower-order attentional components, including sustained and selective attention, indicating rapid maturation of sustained attention in infancy and early childhood, with adult-level performances demonstrated by children as young as age six (McKay et al., 1994; Manly et al., 2001; Rebok et al., 1997). Research indicates that emotional maturity levels of children with ADHD may be significantly below their neurotypical peers (Medika, 2023). Without appropriate intervention, children with ADHD are at risk of experiencing difficulties in responding adaptively to challenging situations and face obstacles in controlling behaviors that do not conform to prevailing norms or regulations (Wijaya et al., 2024).

The educational implications of ADHD are particularly significant in early childhood settings. Attention (focus) plays a crucial role in supporting active participation of children in completing tasks both at school and at home, with the ability to maintain attention also being related to children's future achievements. Lack of attention is often associated with poor impulse and behavioral control, making it difficult for children to adapt to new environments (Khairunnisa & Hartini, 2022). Observations of children show that the majority of five-year-olds cannot maintain attention for more than 14 minutes, indicating barriers in developing optimal focus abilities at this developmental stage.

Given these challenges, there is an urgent need for effective educational interventions that can accommodate the unique learning needs of children with ADHD. The Visual, Auditory, Kinesthetic, and Tactile (VAKT) method represents a promising multisensory approach that engages all human senses in the learning process. Originally developed by Grace M. Fernald, this method focuses on involving all sensory modalities—visual/sight, auditory/hearing, kinesthetic/movement, and tactile/touch—to provide optimal learning experiences (Sutisna & Rahmawati, 2018). The multisensory approach assumes that children can learn optimally and master material effectively when instruction is presented through multiple sensory modalities.

Previous research has demonstrated the effectiveness of the VAKT method across various populations with special needs. Studies have shown positive outcomes in vocabulary development for autistic children (Afriliya & Widajati, 2015), improved counting abilities in children with Down

syndrome (Aryuningtias et al., 2025), and enhanced vocabulary mastery in deaf children (Erija & Fatmawati, 2021). Research has also demonstrated the method's effectiveness in improving letter recognition abilities in deaf children (Jannah et al., 2024) and enhancing literacy skills in children with intellectual disabilities (Jayanti & Pratisti, 2023). The VAKT method has proven particularly beneficial for children with dysgraphia in developing initial writing skills (Rahmansyah et al., 2016) and has been successfully applied in multisensory learning approaches for children with dyslexia at the elementary level (Sepsita & Wijaya, 2024). Notably, the method has shown promise as a solution for reading difficulties in hyperactive children (Susanto & Nugraheni, 2020), has demonstrated effectiveness in improving geometric shape recognition in children with cerebral palsy (Sutisna & Rahmawati, 2018), has enhanced initial reading abilities in children with dyslexia (Van Donal & Efrina, 2019), and has proven effective in improving reading abilities for children with reading difficulties in elementary settings (Zuhroh & Nugrahani, 2023).

Research by Zeinab Mohammadi et al. (2013) specifically demonstrated that the VAKT approach can effectively help children with ADHD improve their focus abilities. The method aligns with Piaget's theory of child development, particularly for early childhood learners in the preoperational stage (2-7 years), where children learn actively through direct experience, exploration, and sensorimotor interaction. By providing multisensory stimulation, the VAKT method helps children with ADHD better understand and focus attention on learning materials. Willis (2007) noted that multisensory approaches like VAKT can activate more brain regions, thereby enhancing children's focus and attention.

Despite the growing body of evidence supporting multisensory approaches for various populations with special needs, there remains a significant gap in research specifically examining the effectiveness of the VAKT method in improving attention abilities among early childhood children with ADHD. This gap is particularly concerning given the critical importance of early intervention during the formative years when neuroplasticity is at its peak. Furthermore, most existing studies have focused on academic skills such as reading and writing, with limited attention to the fundamental cognitive process of attention that underlies all learning activities.

This study aims to address this research gap by investigating the effectiveness of the VAKT method in enhancing attention abilities among early childhood children with ADHD. The research is significant as it provides empirical evidence for educators and practitioners working with young children who exhibit ADHD symptoms, offering a practical, evidence-based intervention strategy that can be implemented in early childhood educational settings. The findings will contribute to the growing body of literature on inclusive education practices and provide valuable insights into effective pedagogical approaches for children with neurodevelopmental differences. Moreover, this research has the potential to inform policy development regarding educational accommodations and support services for children with ADHD in early childhood settings, ultimately promoting more inclusive and effective educational environments for all learners.

METHODS

This study employed a classroom action research design utilizing the Kemmis and McTaggart model, which consists of four interconnected components forming complete cycles: planning, action, observation, and reflection. The research investigated the effectiveness of the Visual, Auditory, Kinesthetic, and Tactile (VAKT) method as the independent variable in improving attention abilities among early childhood children with ADHD characteristics as the dependent variable. The action research approach was selected to enable systematic intervention implementation while allowing for iterative improvements based on reflective analysis of each cycle's outcomes.

The study was conducted at TK Negeri 1 Kec. Sangatta Selatan, located at Jalan Cemara Komperta KM. 13 Desa Sangkima, Kec. Sangatta Selatan, Kab. Kutai Timur, during the second semester of the 2024/2025 academic year in April 2025. The research setting comprised a kindergarten facility with five classrooms, one health unit, an assembly hall, administrative offices,

kitchen facilities, and extensive outdoor play areas with varied equipment. The school serves a rural community with a total enrollment of 62 students supervised by five teachers, one principal, and support staff.

The research participants consisted of 15 children from group B2, with particular focus on four children displaying ADHD characteristics including difficulty maintaining focus during learning activities and disruptive classroom behavior. These target participants were identified through preliminary observations of their attention span, hyperactive tendencies, and challenges in following classroom routines. The selection criteria were based on observable behavioral patterns consistent with ADHD symptomatology rather than formal clinical diagnosis, as appropriate for the educational setting and research objectives.

Data collection was conducted through systematic behavioral observation using structured observation sheets designed to assess attention development across four VAKT modalities. The observation instrument evaluated visual development (focusing on visual stimuli and retaining visual information), auditory development (responding to verbal/non-verbal instructions and maintaining focus on auditory information), kinesthetic development (following physical movements and activities requiring body coordination), and tactile development (recognizing touch stimuli and manipulating physical objects). Each indicator was assessed using a four-point developmental scale: Belum Berkembang (BB/Not Yet Developed - score 1), Mulai Berkembang (MB/Beginning to Develop - score 2), Berkembang Sesuai Harapan (BSH/Developing as Expected - score 3), and Berkembang Sangat Baik (BSB/Developing Very Well - score 4). The instrument's validity was ensured through alignment with early childhood developmental indicators and VAKT method principles, while reliability was maintained through consistent application across observation periods.

The research procedure followed cyclical implementation involving four phases. The planning phase included developing daily activity plans, preparing observation sheets, organizing documentation equipment, and preparing learning materials and media. The action phase involved implementing learning activities according to planned procedures while maintaining flexibility for necessary adjustments. The observation phase utilized structured observation sheets to document children's attention behaviors during learning processes. The reflection phase analyzed observation data to evaluate action effectiveness and determine the necessity for subsequent cycles.

Data analysis employed descriptive statistics using Suharsimi Arikunto's formula: Percentage Score = (Total Score Obtained by Student / Maximum Total Score) × 100%. Results were interpreted using four achievement levels: Good (76%-100%), Adequate (56%-75%), Poor (45%-55%), and Very Poor (<45%). Learning mastery was achieved when students obtained "Adequate" or "Good" categories (≥56%). Success criteria were determined by positive behavioral changes in ADHD-characteristic children, particularly improved attention during learning activities. Cross-cycle analysis compared data to identify consistent improvements in attention behaviors, with intervention success indicated by increased scores and percentages in "Adequate" and "Good" categories across successive cycles.

RESULTS AND DISCUSSION

Results

This section presents the findings from the classroom action research investigating the effectiveness of the Visual, Auditory, Kinesthetic, and Tactile (VAKT) method in improving attention abilities among early childhood children with ADHD characteristics. The research was conducted through two cycles, with each cycle consisting of two meetings, following a systematic observation and intervention process.

Pre-Action Baseline Assessment

Prior to implementing the VAKT method intervention, a baseline assessment was conducted to establish the initial attention development levels of all 15 participants in Group B2. This preliminary observation served as the foundation for measuring subsequent improvements following the VAKT

method implementation. The assessment utilized a structured observation instrument evaluating four key attention indicators: visual focus capabilities, auditory response abilities, kinesthetic coordination skills, and tactile sensitivity development.

Table 1. Pre-Action Baseline Assessment Results

No	Student ID	Observation Score	Final Score	Category
1	Wn	7	43.75%	MB
2	Rd	7	43.75%	MB
3	Ar	10	62.5%	BSH
4	Af	8	50%	MB
5	Sl	8	50%	MB
6	Mk	10	62.5%	BSH
7	Ft	6	37.5%	BB
8	Al	9	56.25%	BSH
9	At	9	56.25%	BSH
10	Gb	7	43.75%	MB
11	Rs	8	50%	MB
12	Zr	6	37.5%	BB
13	Nz	10	62.5%	BSH
14	Nw	6	37.5%	BB
15	Nl	9	56.25%	BSH
Total		120	749.95%	
Average		8	49.99%	

Note: BB = Not Yet Developed, MB = Beginning to Develop, BSH = Developing as Expected, BSB = Developing Very Well

The baseline data revealed that the overall average attention development score was 49.99%, indicating that most children were functioning at the "Beginning to Develop" (MB) level. Specifically, no children achieved the "Developing Very Well" (BSB) category, six children were classified as "Developing as Expected" (BSH), six children were at the "Beginning to Develop" (MB) level, and three children remained in the "Not Yet Developed" (BB) category. Among the four children identified with ADHD characteristics (Ft, Zr, Nw, and one additional participant), most demonstrated significantly lower attention scores, particularly struggling with sustained focus and following multi-step instructions.

Cycle I Implementation Results

Following the baseline assessment, Cycle I was implemented over two meetings in April 2025, focusing on integrating VAKT method activities including picture guessing games, animal sound imitation, mini obstacle courses, mystery box exploration, and finger painting activities. These multisensory activities were designed to simultaneously engage visual, auditory, kinesthetic, and tactile processing systems.

The Cycle I results demonstrated notable improvement, with the average attention development score increasing from 49.99% to 62.5%. This represented a 12.51 percentage point improvement, moving the overall group performance from "Beginning to Develop" to "Developing as Expected" category. The distribution showed four children (26.7%) achieving "Developing Very Well" (BSB), seven children (46.7%) reaching "Developing as Expected" (BSH), three children (20%) remaining at "Beginning to Develop" (MB), and one child (6.7%) still in the "Not Yet Developed" (BB) category.

Notably, among the children with ADHD characteristics, improvement patterns varied considerably. While some showed measurable progress in sustained attention during structured activities, others continued to exhibit challenges with impulse control and task completion. Observational notes indicated that children with ADHD characteristics began showing increased

engagement with multisensory activities but required frequent redirection and structured breaks to maintain optimal participation levels.

Table 2. Cycle I Observation Results

No	Student ID	Observation Score	Final Score	Category
1	Wn	10	62.5%	BSH
2	Rd	11	68.75%	BSH
3	Ar	13	81.25%	BSB
4	Af	11	68.75%	BSH
5	Sl	13	81.25%	BSB
6	Mk	13	81.25%	BSB
7	Ft	7	43.75%	MB
8	Al	12	75%	BSH
9	At	11	68.75%	BSH
10	Gb	7	43.75%	MB
11	Rs	10	62.5%	BSH
12	Zr	7	43.75%	MB
13	Nz	13	81.25%	BSB
14	Nw	6	37.5%	BB
15	Nl	11	68.75%	BSH
Total		151	937.5%	
Average		10.1	62.5%	

Cycle II Implementation Results

Based on reflective analysis of Cycle I outcomes, Cycle II incorporated enhanced motivational strategies including reward systems (star stamps), clearer behavioral expectations, and increased activity variation. The implementation maintained the core VAKT methodology while addressing identified areas for improvement from the previous cycle.

Table 3. Cycle II Observation Results

No	Student ID	Observation Score	Final Score	Category
1	Wn	14	87.5%	BSB
2	Rd	14	87.5%	BSB
3	Ar	15	93.75%	BSB
4	Af	14	87.5%	BSB
5	Sl	15	93.75%	BSB
6	Mk	15	93.75%	BSB
7	Ft	11	68.75%	BSH
8	Al	15	93.75%	BSB
9	At	14	87.5%	BSB
10	Gb	11	68.75%	BSH
11	Rs	15	93.75%	BSB
12	Zr	10	62.5%	BSH
13	Nz	15	93.75%	BSB
14	Nw	8	50%	MB
15	Nl	15	93.75%	BSB
Total		201	1248.25%	
Average		13.4	83.21%	

Cycle II results revealed substantial improvement, with the average attention development score reaching 83.21%, representing a 20.71 percentage point increase from Cycle I and a 33.22 percentage point improvement from baseline. The distribution demonstrated significant positive change: eleven children (73.3%) achieved "Developing Very Well" (BSB), three children (20%) reached "Developing as Expected" (BSH), one child (6.7%) remained at "Beginning to Develop" (MB), and no children remained in the "Not Yet Developed" (BB) category.

The children with ADHD characteristics showed marked improvement in Cycle II. Three of the four children with ADHD characteristics advanced to the "Developing as Expected" (BSH) category, while one child achieved notable progress but remained in the "Beginning to Develop" (MB) category. Observational data indicated improved sustained attention spans, reduced disruptive behaviors, and increased voluntary participation in structured activities among children with ADHD characteristics.

Cross-Cycle Comparative Analysis

The comprehensive analysis across all phases revealed consistent and substantial improvement patterns in attention development capabilities. The progression from baseline (49.99%) through Cycle I (62.5%) to Cycle II (83.21%) demonstrated the effectiveness of the VAKT method intervention in enhancing attention abilities among early childhood participants.

Table 4. Cross-Cycle Development Summary

Development Category	Baseline	Cycle I	Cycle II
Developing Very Well (BSB)	0 (0%)	4 (26.7%)	11 (73.3%)
Developing as Expected (BSH)	6 (40%)	7 (46.7%)	3 (20%)
Beginning to Develop (MB)	6 (40%)	3 (20%)	1 (6.7%)
Not Yet Developed (BB)	3 (20%)	1 (6.7%)	0 (0%)

The data revealed that the intervention successfully moved children from lower developmental categories to higher ones, with the most dramatic improvement occurring between Cycle I and Cycle II. This pattern suggested that sustained exposure to VAKT methodology, combined with refined implementation strategies, produced cumulative positive effects on attention development capabilities. Individual progress tracking demonstrated that all fifteen participants showed improvement from baseline to final assessment, with varying degrees of advancement. Children with ADHD characteristics, while showing initially slower progress rates, demonstrated meaningful improvement by Cycle II, suggesting that the multisensory approach effectively addressed their specific attention-related challenges.

Discussion

The results of this classroom action research provide compelling evidence for the effectiveness of the Visual, Auditory, Kinesthetic, and Tactile (VAKT) method in improving attention abilities among early childhood children, particularly those exhibiting ADHD characteristics. The findings demonstrate progressive and substantial improvements across all measurement phases, with the overall attention development average increasing from 49.99% at baseline to 83.21% following Cycle II implementation.

The significant improvements observed in this study gain particular relevance when considered against the widespread prevalence of ADHD in educational settings. As global research indicates that this neurodevelopmental condition affects approximately 5-7% of school-aged children (Polanczyk et al., 2007), the demonstrated effectiveness of VAKT methodology addresses a substantial educational need. The behavioral changes documented in children with ADHD characteristics—including enhanced sustained attention, reduced disruptive behaviors, and improved task completion—directly counter the typical manifestations described in the literature, where affected children commonly struggle with concentration maintenance, exhibit restlessness, and face difficulties with task completion while being easily distracted by environmental stimuli (Putra, 2022).

The transformation observed in three of four children with ADHD characteristics from baseline scores below 50% to "Developing as Expected" category represents more than statistical improvement; it signifies meaningful functional change that could mitigate the academic underachievement and social isolation frequently experienced by children with ADHD. This finding is particularly significant given that children with attention difficulties often encounter peer rejection and punitive responses from educators who may misinterpret their behaviors as deliberate defiance rather than recognizing underlying neurological differences (Setiawati, 2020).

The research findings provide robust empirical support for Executive Function theory as proposed by Barkley (1997), which conceptualizes ADHD as characterized by deficits in core brain executive functions encompassing inhibitory control, working memory, and cognitive flexibility. The observed improvements suggest that the VAKT method effectively compensates for these neurological deficits by providing multiple simultaneous pathways for information processing, thereby reducing the cognitive burden on any single compromised executive function system.

The multifaceted nature of attention, as conceptualized through contemporary neuroscientific understanding, encompasses a complex network of interrelated processes including basic selective and sustained skills alongside higher-order controlled components (Klimkeit et al., 2004; Posner & Dehaene, 1994). The VAKT method's effectiveness appears to stem from its ability to simultaneously engage these multiple attentional networks, creating redundant processing pathways that prove particularly beneficial for children with compromised attentional systems. This aligns with the understanding that attention involves distinct components including the ability to sustain focus on task-relevant inputs, filter out irrelevant background information, and shift attentional focus between activities (Anderson et al., 2008).

The developmental trajectory observed in this study corresponds with established patterns of attentional maturation, which represents a multistage process beginning in infancy and continuing through adolescence (Anderson et al., 2001; Klenberg et al., 2001). The progressive improvement from Cycle I to Cycle II suggests that the VAKT intervention effectively supported natural developmental processes, with the multisensory stimulation potentially accelerating typical maturation patterns. This interpretation gains support from neurological evidence indicating that attentional processes are subsumed by diffuse neural networks including the reticular formation, medial thalamus, superior temporal regions, inferior parietal areas, and prefrontal cortex, all of which experience significant developmental growth spurts around ages six and nine years (Gogtay et al., 2004; Sowell et al., 2003).

The substantial improvements in sustained attention capabilities observed among participants, particularly children with ADHD characteristics, provide important insights into the mechanisms underlying successful attention development interventions. The VAKT method's effectiveness appears to address the fundamental challenge that focused attention—defined as the voluntary capacity to ignore certain stimuli while attending to others—serves as a critical prerequisite for learning and functions as a long-term predictor of children's academic achievement (Posner & DiGirolamo, 1998; Steele et al., 2012).

The research findings suggest that the multisensory approach successfully addressed the complex, multifaceted nature of attention by engaging multiple component processes simultaneously. This approach proves particularly relevant for children with ADHD, whose emotional maturity levels may lag significantly behind their neurotypical peers (Medika, 2023), requiring interventions that accommodate both cognitive and developmental differences. The VAKT method's integration of concrete, experiential activities appears to provide developmentally appropriate support for attention development while addressing the specific challenges faced by children with executive function deficits.

The observation that attention appears vulnerable to disruption in contexts of psychopathology and developmental disorders (Anderson et al., 2008) underscores the significance of the improvements documented in this study. The fact that children with ADHD characteristics demonstrated measurable progress in sustained attention, selective attention, and attentional shifting capabilities suggests that the VAKT intervention successfully supported fundamental attentional processes that are typically compromised in this population.

The progressive improvement pattern observed across intervention cycles aligns with contemporary understanding of attention as a complex construct that cannot be measured as a single process but must be studied through separable, interrelated components (Fletcher, 1996; Manly et al., 2001). The VAKT method's effectiveness appears to stem from its simultaneous engagement of

multiple attentional networks, addressing the reality that attention tests inevitably incorporate a range of lower- and higher-order functions, where impairment in any component can result in overall performance deficits (Anderson et al., 2001a).

The documented improvements in children with ADHD characteristics gain additional significance when considered against typical developmental trajectories for attentional components. Research indicates that sustained attention shows rapid maturation in infancy and early childhood, with adult-level performance demonstrated by children as young as six years (McKay, Halperin, Schwartz, & Sharma, 1994; Manly et al., 2001; Rebok et al., 1997). However, children with ADHD often fail to achieve these normative developmental milestones. The fact that three of four children with ADHD characteristics in this study achieved "Developing as Expected" status suggests that the VAKT intervention successfully supported their attentional development toward age-appropriate levels.

The multisensory nature of the VAKT approach appears particularly well-suited to address the documented vulnerability of attention systems to disruption in developmental disorders. By providing multiple simultaneous pathways for information processing and attention maintenance, the method creates compensatory mechanisms that support children whose primary attentional networks may be compromised. This interpretation aligns with neurological evidence suggesting that the prefrontal cortex, which subsumes higher-order attentional processes including shifting and divided attention, continues developing through childhood and may be particularly responsive to targeted interventions during critical developmental periods (Stuss et al., 1995).

The research findings align with Grace M. Fernald's original theoretical framework, which emphasizes that learning optimization occurs when multiple sensory modalities are simultaneously engaged (Nurfadhillah, 2023). The 33.22 percentage point improvement from baseline to final assessment validates this multisensory principle, demonstrating that children with attention difficulties benefit substantially from interventions that engage visual, auditory, kinesthetic, and tactile processing systems concurrently.

The progressive improvement from Cycle I to Cycle II (20.71 percentage points) provides critical evidence supporting Schunk's (2012) assertion that multisensory approaches facilitate enhanced information processing and retention by activating multiple neural pathways simultaneously. This cumulative improvement pattern suggests that the VAKT method creates lasting neurological changes that support sustained attention development, particularly relevant given that attention skills are fundamental to acquisition of knowledge, adaptive environmental functioning, and educational and social success (Anderson et al., 2008; Deluca & Leventer, 2008).

The observed improvements gain additional theoretical significance when viewed through the lens of attention's developmental complexity. The fact that all participants demonstrated measurable progress across multiple attentional components—sustained attention, selective attention, and attentional shifting—supports the understanding that these skills progress through childhood via interconnected developmental pathways (Brodeur, Trick, & Enns, 1997; Klimkeit et al., 2004). The VAKT method's effectiveness appears to stem from its capacity to support this natural progression while providing compensatory mechanisms for children whose typical developmental trajectory may be compromised.

The current findings demonstrate consistency with previous research documenting VAKT method effectiveness across various populations with special needs, while extending understanding into fundamental cognitive domains. The positive outcomes observed align with established evidence from Afriliya and Widajati's (2015) vocabulary development research with autistic children and Aryuningtias et al.'s (2025) work on counting abilities in children with Down syndrome. However, this study represents a critical advancement by demonstrating effectiveness in improving foundational cognitive processes—specifically attention—that underlie all subsequent learning activities.

The research findings particularly resonate with Mohammadi et al.'s (2013) investigation, which specifically demonstrated VAKT effectiveness in improving focus abilities among children with ADHD. The current research substantially extends these findings by providing systematic analysis of

improvement patterns across structured intervention cycles and demonstrating effectiveness within naturalistic educational settings rather than controlled clinical environments. This ecological validity represents a crucial advancement, given that attention problems manifest most significantly in educational contexts where children must sustain focus despite environmental distractions and competing demands.

The substantial improvement observed among children with ADHD characteristics (three of four children advancing to "Developing as Expected" category) supports and significantly extends findings from Susanto and Nugraheni (2020), who identified the VAKT method as a promising intervention for reading difficulties in hyperactive children. The current research demonstrates that these benefits transcend specific academic skills to encompass broader attention capabilities that serve as prerequisites for educational success across domains.

The research findings provide compelling evidence that the VAKT method successfully addresses the fundamental challenge that attention represents a multifaceted construct requiring complex assessment approaches, as traditional evaluation methods struggle to capture its separable yet interrelated components (Fletcher, 1996; Manly et al., 2001). The multisensory intervention appears to circumvent these assessment limitations by directly engaging multiple attentional networks simultaneously, creating measurable improvements across the full spectrum of attention-related behaviors.

The cyclical improvement pattern observed suggests that the VAKT method effectively supports the natural developmental trajectory of attention, which shows variable maturation rates for different components. While some research indicates that sustained attention reaches adult levels by age six, with selective attention achieving relative maturity by age ten (McKay et al., 1994; Klinberg et al., 1999), children with ADHD often fail to achieve these normative milestones. The documented improvements in this study indicate that multisensory interventions can effectively support delayed attention development, helping children with ADHD characteristics progress toward age-appropriate attentional capabilities.

The enhanced effectiveness observed in Cycle II, following methodological refinements including reward systems and clearer behavioral expectations, provides important insights into optimization strategies for attention-focused interventions. This finding suggests that combining multisensory learning approaches with structured behavioral supports creates synergistic effects that enhance overall intervention effectiveness, particularly for children whose attentional systems are vulnerable to disruption in contexts of developmental challenges.

The research findings have substantial implications for early childhood educational practice, particularly in inclusive settings serving children with diverse learning needs and attention difficulties. The demonstrated effectiveness of VAKT methodology suggests that educators can implement evidence-based multisensory approaches to address attention difficulties without requiring specialized clinical training or extensive additional resources, addressing a critical need given that impaired attention represents a hallmark characteristic in numerous developmental disorders including ADHD and autism, with far-reaching implications for children's educational, vocational, and social success (Anderson et al., 2008).

The progressive improvement pattern observed across cycles indicates that sustained implementation represents a crucial factor for optimal outcomes. This finding suggests that VAKT methodology should be integrated as a core pedagogical approach rather than implemented as a short-term intervention, aligning with contemporary understanding that attention skills develop through extended maturational processes requiring consistent support. The enhanced effectiveness observed in Cycle II following methodological refinements underscores the importance of reflective practice and continuous improvement in educational interventions targeting attention development.

The successful implementation of reward systems (star stamps) as motivational enhancement provides practical guidance for educators working with children exhibiting attention difficulties. This finding gains theoretical support from research indicating that children with ADHD often demonstrate

emotional maturity levels significantly below their neurotypical peers (Medika, 2023), requiring intervention approaches that accommodate both cognitive and emotional developmental differences. The documented synergistic effects of combining multisensory learning approaches with positive reinforcement strategies offer concrete guidance for optimizing attention-focused educational interventions.

While the research demonstrates clear positive outcomes, several limitations warrant critical acknowledgment and inform directions for future investigation. The sample size, while appropriate for classroom action research methodology, included only four children with ADHD characteristics, limiting generalizability to the broader ADHD population. Given the multifaceted nature of attention, which encompasses a complex network of interrelated processes including basic selective and sustained skills alongside higher-order controlled components (Klimkeit et al., 2004), future research should include larger samples with diverse ADHD presentations to establish more comprehensive effectiveness profiles across different attentional subtypes.

The study's focus on observable behavioral improvements, while educationally relevant and practically meaningful, did not include neurological or physiological measurements that could provide deeper insights into the specific mechanisms underlying observed improvements. This limitation assumes particular significance given contemporary understanding that attentional processes are subsumed by diffuse neural networks involving the reticular formation, medial thalamus, and prefrontal cortex, which experience significant developmental changes during early childhood (Gogtay et al., 2004). Future research incorporating neuroscientific methodologies could illuminate the specific brain processes influenced by VAKT implementation and validate the theoretical mechanisms proposed to explain intervention effectiveness.

The research was conducted within a single educational setting with specific demographic and cultural characteristics, potentially limiting the generalizability of findings across diverse educational contexts. Given that attention appears vulnerable to disruption in various environmental contexts, replication across diverse educational settings—including urban environments, different socioeconomic populations, and various cultural backgrounds—would strengthen evidence for VAKT method generalizability and ecological validity.

Additionally, the study's two-cycle duration, while sufficient to demonstrate immediate effectiveness, did not address long-term retention of attention improvements or maintenance of intervention effects over extended periods. This limitation assumes particular importance given that attention development represents a multistage process continuing through adolescence (Anderson et al., 2001), with different components achieving maturity at varying developmental stages. Longitudinal follow-up studies would provide valuable insights into the sustained benefits of VAKT methodology and inform recommendations for maintenance strategies.

This research makes several significant theoretical and practical contributions to the literature on inclusive early childhood education and attention development interventions. Primarily, it provides robust empirical evidence for VAKT method effectiveness specifically targeting attention abilities in children with ADHD characteristics, addressing a previously identified research gap while contributing to understanding of how multisensory approaches can support fundamental cognitive processes underlying all learning activities.

The research contributes important theoretical insights regarding attention development mechanisms, demonstrating that interventions engaging multiple sensory modalities can effectively support the complex, multifaceted nature of attention by simultaneously addressing its separable yet interrelated components. This finding advances theoretical understanding by providing empirical evidence that multisensory approaches can compensate for deficits in specific attentional networks while supporting overall attention system development.

The study also contributes significant methodological insights regarding the importance of cyclical implementation with reflective refinement. The enhanced outcomes observed in Cycle II validate the classroom action research approach as an effective framework for developing and optimizing

educational interventions, while demonstrating that systematic reflection and methodological adjustment can substantially improve intervention effectiveness.

Finally, the findings provide crucial practical guidance for educators working with diverse learners, demonstrating that multisensory approaches can effectively accommodate varying learning needs while promoting inclusive educational environments. The research supports the growing movement toward universal design for learning principles that recognize and accommodate neurodiversity in educational settings, offering concrete evidence that interventions designed for children with specific challenges can benefit all learners.

The comprehensive improvement observed across all participants, with particular benefits for children with ADHD characteristics, suggests that VAKT methodology represents a valuable addition to the evidence-based intervention toolkit for early childhood educators committed to supporting all children's learning potential. This finding assumes particular significance given the widespread prevalence of attention difficulties in educational settings and the fundamental importance of attention skills for academic, social, and life success. The research demonstrates that theoretically-grounded, systematically implemented multisensory interventions can produce meaningful improvements in attention capabilities, offering hope and practical solutions for educators working with children who face attention-related challenges.

CONCLUSION

The conclusion serves as the closing section of a scientific article, aiming to distill the essence of the entire research process and convey the core message in a concise yet meaningful manner. The first step in crafting a conclusion involves presenting a brief recap of the study. Here, the author succinctly restates the main problem that was the focus of the research and the objectives that were intended to be achieved. This summary need not be lengthy, but should adequately remind the reader of the fundamental context of the study. If relevant, a brief mention of the research method can also be included—particularly if the approach or design played a pivotal role in attaining the results.

A well-written conclusion should also provide a synthesis of the main findings. The author highlights the most significant results—those that directly address the primary research questions. This is not a simple repetition of data but a distilled presentation of the essential insights, integrated into a broader narrative that underscores what has truly been learned through the research.

The next component to include is the research contribution to the field. The researcher briefly explains what makes the study important—whether it involves a novel discovery, a solution to a previously unresolved issue, or the development of existing theories and concepts. The aspect of novelty is critical here, as it demonstrates the added value of the research to scientific advancement.

The implications of the findings should also be outlined briefly but clearly. These include the key consequences that arise from the research results, both theoretical and practical. The author may touch upon how the findings can be applied in professional practice, public policy, or serve as a foundation for further research. Following this, the researcher should offer strategic recommendations. These recommendations must be grounded in the study's findings and analyses, reflecting the most impactful and relevant suggestions. The author may also propose directions for future research by identifying knowledge gaps that still need exploration.

Finally, a strong conclusion should end with a compelling closing statement. The final sentence should underscore the overall value of the study and deliver a memorable "take-home message" for the reader. With clear and succinct delivery in three to five paragraphs, the conclusion becomes a comprehensive reflection of the research's contribution and significance as a whole.

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