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# Experiential Learning through Sensory Integration in Improving Vocabulary Mastery of Children with Autism: A Single-Subject Study

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**Abstract**

Children with Autism Spectrum Disorder (ASD) often experience difficulties in language development, particularly in vocabulary acquisition, which is essential for communication and learning participation. This study aimed to examine the effect of experiential learning integrated with sensory integration on vocabulary mastery in a child with autism using a Single Subject Research (SSR) design. An $A_1$–B–$A_2$ design was employed across 22 sessions, consisting of baseline (4 sessions), intervention (11 sessions), and withdrawal phases (7 sessions). The intervention involved direct experiential activities supported by multisensory stimulation using 50 functional target words. Data were collected through a vocabulary performance test and analyzed using visual analysis, including trend, level, stability, and data overlap. The results showed an increasing trend in vocabulary performance during the intervention phase and relatively stable performance during the withdrawal phase. These findings suggest that experiential learning combined with sensory integration may support vocabulary development within the context of this single-subject study. However, the results are limited to the characteristics of the participant and research conditions.

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## INTRODUCTION

Inclusive education requires the provision of learning services that can accommodate the diverse needs of students, including children with Autism Spectrum Disorder (ASD). Children with autism generally experience barriers in communication and social interaction that directly impact language development, particularly vocabulary acquisition (Haebig et al., 2025; MacDonald-Prégent et al., 2025; Wieder, 2021). Vocabulary is the main foundation of language skills because it plays an important role in understanding instructions, expressing needs, and participating in social interactions and learning activities. Limited vocabulary mastery in children with autism often hinders optimal learning engagement, requiring intervention strategies designed according to their developmental characteristics and information processing (Haebig et al., 2021).

Recent research shows that the vocabulary acquisition of children with autism is not only influenced by linguistic ability, but also by the quality of learning experiences that children obtain in everyday contexts. A number of studies have found that children with autism often have a functional understanding of objects—knowing how to use them—but are not yet able to consistently associate these experiences with verbal representations or word naming (Savarese et al., 2025; Schaaf & Mailloux, 2015; Shu et al., 2024). These

findings indicate a gap between concrete experiences and language symbols, so that vocabulary learning that relies solely on verbal instruction or imitation strategies is less effective because it does not provide a meaningful context that supports the formation of deep word meaning (Katz-Nave et al., 2020).

The research problem in this study lies in the low level of vocabulary mastery among children with ASD, which has a significant impact on their communication skills as well as their participation in learning and social interaction. Vocabulary is a fundamental component of language development, yet children with autism often experience difficulties in acquiring and using vocabulary in a functional and meaningful way. Based on initial observations, it was found that children exhibit a gap between their understanding of the function of an object and their ability to verbally name or label that object. Children tend to be able to use objects in daily activities but are not yet able to consistently link these experiences to linguistic representations. Furthermore, the child's engagement in conventional verbal learning remains relatively low, indicating that the learning approach employed does not yet fully align with the child's learning characteristics, particularly in terms of sensory processing and information processing.

In an effort to bridge this gap, experiential learning and sensory integration approaches are gaining attention in special education research. Experiential learning emphasizes the active involvement of learners through direct experience as the primary source of knowledge formation (Camino-Alarc'on et al., 2024; Liu et al., 2025), while sensory integration focuses on the individual's ability to process and integrate various sensory stimuli as the basis for learning and language development (Bundy & Lane, 2019). Recent research shows that experience-based learning and multisensory stimulation have the potential to improve attention, engagement, and learning responses in children with autism, particularly in the context of communication (Unwin et al., 2022).

However, existing studies tend to examine experiential learning and sensory integration as separate approaches and primarily focus on general communication or social skills outcomes (Fleury et al., 2020; Unwin et al., 2022). Limited research has specifically investigated the integration of these approaches in supporting functional vocabulary acquisition (Haebig et al., 2021; Oh et al., 2024). In addition, empirical studies employing Single Subject Research (SSR) designs to evaluate such integrated interventions remain scarce, particularly in the context of the special education (Horner et al., 2021). This indicates a gap both in intervention design and methodological application.

In this study, functional vocabulary refers to words that are directly related to the child's daily activities and meaningful interactions, such as objects and actions encountered in everyday contexts. Experiential learning is operationalized as structured learning activities that involve direct interaction with real objects, allowing the child to construct meaning through concrete experience. Sensory integration is applied by engaging multiple sensory modalities, including visual, tactile, auditory, and kinesthetic inputs, to support the processing and retention of vocabulary. The integration of these approaches is expected to bridge the gap between concrete experience and verbal representation, thereby facilitating more meaningful vocabulary acquisition in children with autism.

Based on these gaps, this study contributes by integrating experiential learning and sensory integration into a structured intervention specifically targeting functional vocabulary acquisition in a child with autism. In addition, the use of a Single Subject Research (A–B–A) design provides detailed insight into individual learning responses, which have remained underexplored in previous studies. Therefore, this study aims to examine the effect of experiential learning integrated with sensory integration on the functional vocabulary acquisition of a child with autism.

## METHODS

This study used a quantitative approach with the Single Subject Research (SSR) method to evaluate the effect of experiential learning intervention through sensory integration on the vocabulary mastery of children with autism. The SSR method was chosen because it allows researchers to observe changes in the subjects' behavior in depth, repeatedly, and in a controlled manner, making it very suitable for use in special education intervention studies with a limited number of subjects (Kazdin, 2011; Sunanto, Takeuchi, & Nakata, 2005). The research design used was A–B–A, which consisted of three phases, namely the first baseline ($A_1$), intervention (B), and second baseline ($A_2$). Phase $A_1$ aimed to identify the subjects' initial vocabulary acquisition abilities without treatment. Phase B is the stage of providing experiential learning intervention through sensory integration. Next, phase $A_2$ is carried out to observe the stability and sustainability of behavioral changes after the intervention is stopped. This design allows for a clearer identification of the functional relationship between treatment and changes in subject behavior (Sunanto et al., 2005). Each session lasted approximately 30–45 minutes and was conducted daily (7 times per week). This intensive implementation was made possible as the study was conducted in the child's home environment, which allowed for greater flexibility and supported consistency and repeated observation across all phases of the study.

This study employed an SSR design, which focuses on the intensive and repeated measurement of an individual's behavior to examine the functional relationship between the intervention and behavioral change. Consequently, this study does not utilize the concepts of population and sample as commonly applied in conventional quantitative research. The subject of this study is a 13-year-old child who has been diagnosed with Autism Spectrum Disorder (ASD) and experiences difficulties in vocabulary acquisition, both receptively and expressively. The subject was selected using a purposive sampling technique based on specific criteria, namely: (1) having a diagnosis of ASD, (2) demonstrating limitations in functional vocabulary, and (3) exhibiting a discrepancy between understanding the function of an object and the ability to verbally name the object. Subject selection was based on the results of an initial assessment, indicating limitations in functional vocabulary acquisition and a discrepancy between understanding the function of objects and the ability to name them verbally. The study was conducted in the subject's home environment to ensure comfort, minimize distractions, and allow for the use of concrete objects familiar to the child's daily activities. Ethical approval for this study was obtained from the relevant institutional authority. Informed consent was obtained from the subject's parent prior to the study. The parent was informed about the research procedures, potential benefits, and the voluntary nature of participation. The study was conducted in the subject's home environment with full parental supervision and approval to ensure the child's comfort and safety.

The research instrument used in this study was a vocabulary performance test presented through picture cards. This instrument contained 50 target words that were selected purposively based on their functionality and relevance to the child's daily activities, such as objects commonly used at home and in everyday interactions. The selection of target words was also adjusted based on the results of an initial assessment to ensure that the vocabulary items were developmentally appropriate but not yet fully mastered by the child. The selection of the 50 target words was based on their functional relevance to the child's daily life and communication needs. These words represented familiar objects and activities frequently encountered by the child, ensuring ecological validity. The selection process was further validated through consultation with a special education expert and the child's caregiver. To ensure content validity, the instrument was reviewed by experts in special education and child language development. The experts evaluated the relevance,

appropriateness, and level of difficulty of each vocabulary item in relation to the characteristics of children with ASD. The vocabulary mastery criteria are listed in Table 1.

Table 1 Vocabulary mastery criteria

| Score | Criteria |
|---|---|
| 2 | Children were able to mention the names of objects independently. |
| 1 | Children were able to mention the names of objects with verbal assistance. |
| 0 | Children were unable/unwilling to mention the names of objects even after being given verbal assistance. |

Thus, the maximum vocabulary mastery score that a child can obtain is 100, while the minimum score is 0.

To ensure the consistency of the intervention, treatment fidelity was monitored throughout the study. A structured intervention protocol was developed, outlining the steps of experiential learning activities integrated with sensory stimulation. A fidelity checklist was used during selected sessions to ensure that each component of the intervention was implemented as planned. The intervention procedures were applied consistently across sessions.

To improve data reliability, inter-observer agreement was planned for this study. However, its implementation was limited due to resource constraints and the study's home-based setting. Nevertheless, data consistency was maintained through the repeated use of the same assessment procedures and scoring criteria at each measurement session

The data obtained were analyzed using visual analysis, which is the main technique in single-subject research. Visual analysis was conducted by examining data within conditions (within-condition analysis) and between conditions (between-condition analysis), including trends, stability levels, level changes, and data overlap percentages. This analysis is used to assess the effectiveness of interventions based on patterns of direct and sustained changes in subject behavior (Lane & Gast, 2014; Sunanto et al., 2005). Determination of data stability refers to the 15% stability criterion, whereby data is considered stable if at least 85% of data points are within ±15% of the median value in each condition. This criterion is used to ensure data consistency and the reliability of behavioral changes observed as a result of the intervention (Lane & Gast, 2014; Sunanto et al., 2005). This analysis aims to assess the effectiveness of the intervention based on patterns of change in the subjects' vocabulary mastery directly and continuously.

The research procedure was carried out systematically following the A–B–A design stages in Single Subject Research (SSR), consisting of Baseline 1 ($A_1$), Intervention (B), and Baseline 2 ($A_2$) stages. The study was conducted over a total of 22 sessions, distributed across the three phases. The Baseline 1 phase ($A_1$) was conducted in 4 sessions. In this phase, the subject was asked to name the target vocabulary using picture cards without receiving any specific intervention. This phase aimed to obtain initial data on the subject's vocabulary mastery and to identify the baseline level of performance. The intervention phase (B) was conducted in 11 sessions. During this phase, experiential learning through sensory integration was implemented. The subject was actively involved in learning activities that integrated multiple sensory modalities, including visual, tactile, auditory, and kinesthetic experiences. The intervention involved direct interaction with concrete objects corresponding to the target vocabulary, allowing the subject to connect real experiences with verbal representations. The Baseline 2 phase ($A_2$) was conducted in 7 sessions. In this phase, the intervention was withdrawn, and the subject was again asked to perform the vocabulary task using the same instrument as in the baseline phase. This phase aimed to examine the stability and maintenance of the subject's vocabulary mastery after the intervention had been discontinued. Each session followed a consistent procedure, including the presentation of picture cards, the subject's response to each vocabulary item, and scoring based on predetermined criteria. The sessions were conducted sequentially to allow continuous observation of changes in the subject's vocabulary performance across

conditions. The intervention was administered by the researcher, who has a background in special education and experience in working with children with autism. A time gap of seven days occurred before the implementation of the second baseline phase ($A_2$). This interval was not associated with any structured intervention and was intended to observe whether the acquired vocabulary skills were maintained without continued treatment.

## RESULTS AND DISCUSSION

### Data Presentation

The research procedure followed a SSR design with an A–B–A pattern consisting of Baseline 1 ($A_1$), Intervention (B), and Baseline 2 ($A_2$). The study was conducted over 22 sessions with repeated measurements in each session to examine trends, data stability, and the effect of the intervention on the child's vocabulary mastery. During the Baseline 1 phase ($A_1$), which consisted of 4 sessions, the subject was asked to name vocabulary items using picture cards without any specific intervention. The data from this phase served as the initial baseline of the child's vocabulary ability. The intervention phase (B), conducted over 11 sessions, involved the implementation of experiential learning through sensory integration. The subject actively engaged with concrete objects through direct experience, modeling, guided practice, and positive reinforcement to support vocabulary acquisition. In the Baseline 2 phase ($A_2$), which consisted of 7 sessions, the intervention was withdrawn, and the procedure returned to baseline conditions to examine the stability of the child's vocabulary skills after the intervention. In line with these procedures, the results section presents session-by-session data to illustrate changes in vocabulary mastery, including trends, stability, and the overall effect of the intervention. Children's vocabulary mastery during baseline 1 ($A_1$), intervention (B), and baseline 2 ($A_2$) is shown in Table 2.

Table 2 Vocabulary mastery of the child during baseline 1 ($A_1$), intervention (B), baseline 2 ($A_2$)

| Phase | Session | Date | Score |
|---|---|---|---|
| Baseline 1 ($A_1$) | 1 | 20 December 2025 | 40 |
| | 2 | 21 December 2025 | 37 |
| | 3 | 22 December 2025 | 36 |
| | 4 | 23 December 2025 | 34 |
| Intervention (B) | 5 | 25 December 2025 | 51 |
| | 6 | 26 December 2025 | 61 |
| | 7 | 27 December 2025 | 62 |
| | 8 | 28 December 2025 | 66 |
| | 9 | 29 December 2025 | 72 |
| | 10 | 30 December 2025 | 68 |
| | 11 | 31 December 2025 | 77 |
| | 12 | 1 January 2026 | 85 |
| | 13 | 2 January 2026 | 86 |
| | 14 | 3 January 2026 | 88 |
| | 15 | 4 January 2026 | 93 |
| Baseline 2 ($A_2$) | 16 | 5 January 2026 | 92 |
| | 17 | 6 January 2026 | 93 |
| | 18 | 7 January 2026 | 88 |
| | 19 | 8 January 2026 | 94 |
| | 20 | 9 January 2026 | 93 |
| | 21 | 16 January 2026 | 89 |
| | 22 | 17 January 2026 | 85 |

As shown in Table 2, the subject's vocabulary performance in the Baseline 1 ($A_1$) phase was relatively low, with scores ranging from 34 to 40 and showing a slight downward trend. During the intervention phase (B), the scores increased progressively from 51 to 93,

indicating an improvement in vocabulary performance. Although minor fluctuations were observed, the overall trend was upward. In the Baseline 2 ($A_2$) phase, the scores remained relatively high, ranging from 85 to 94, suggesting maintenance of vocabulary performance after the withdrawal of the intervention.

Figure 1 illustrates the trend of vocabulary performance across phases. A clear upward trend is observed during the intervention phase compared to the initial baseline. In the withdrawal phase ($A_2$), the performance remains relatively stable at a higher level than the initial baseline, indicating maintenance of the acquired vocabulary skills.

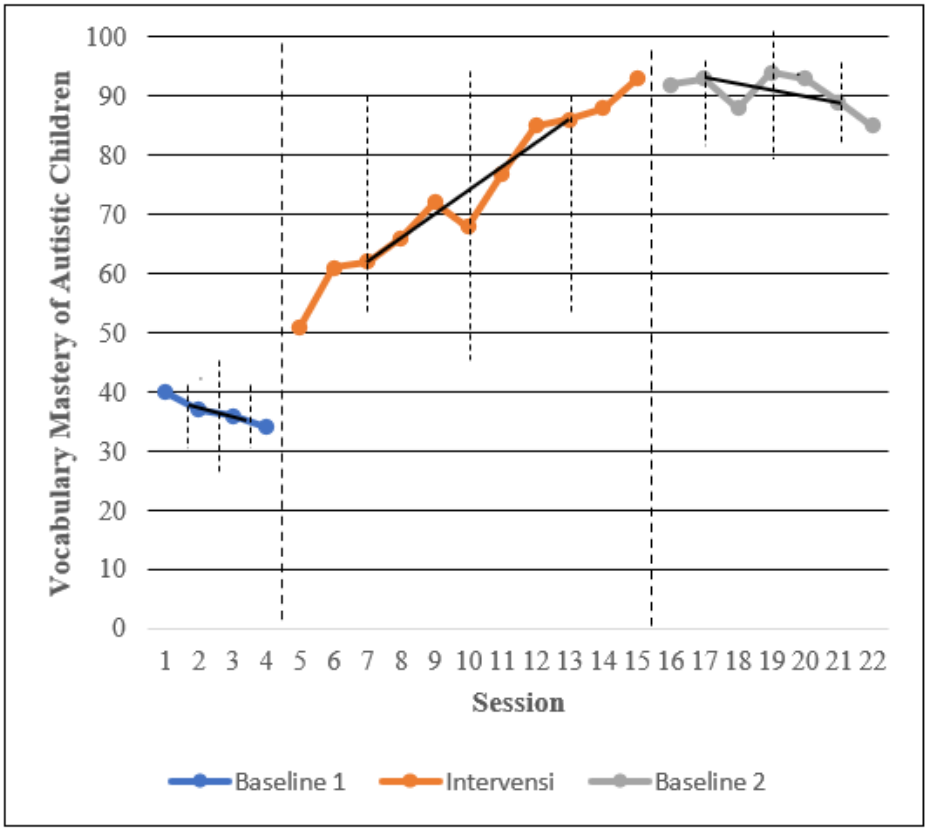



Figure 1 The trend in vocabulary acquisition among the child during baseline 1 ($A_1$), intervention (B), and baseline 2 ($A_2$)

In Baseline Phase 1 ($A_1$), indicated by the blue line, vocabulary mastery scores were relatively low and showed a downward trend. This pattern indicates that before the intervention, the child's vocabulary mastery skills were not yet optimally developed and tended to be unstable.

Entering the intervention phase (B), marked by the orange line, the graph shows a significant change. Vocabulary mastery scores gradually increased from session to session, although there were slight fluctuations at several measurement points. Overall, the direction of the data trend in this phase shows an upward trend, indicating that the application of sensory integration-based experiential learning has a positive impact on improving the child's vocabulary mastery.

Furthermore, in the Baseline 2 phase ($A_2$), indicated by the grey line, vocabulary mastery scores were at a relatively high and stable level. Although there was a slight decline in the final session, in general, the graph shows that the child’s vocabulary mastery skills were maintained after the intervention was stopped. This indicates that the effects of the

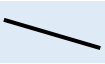
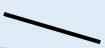
intervention were not temporary but were able to maintain the child's learning outcomes for a certain period of time.

Overall, the graph in Figure 1 shows clear differences between the research phases. The change in trend from the baseline 1 phase ($A_1$) to the intervention phase (B), as well as the stability in the baseline 2 phase ($A_2$), reinforces the finding that experiential learning through sensory integration contributes to improving the vocabulary of the child with autism.

**Analysis Within Conditions**

Within-condition analysis was conducted to examine trends, stability, and level changes across each phase ($A_1$, B, and $A_2$). In the Baseline 1 phase, the data showed a stable but decreasing trend at a low level. During the intervention phase, an increasing trend with moderate variability was observed, indicating responsiveness to the intervention. In the Baseline 2 phase, the data became stable at a higher level, suggesting maintenance of the acquired skills. Analysis under certain conditions is shown in Table 3.

Table 3 Analysis within conditions

| **Conditions** | **Baseline 1 ($A_1$)** | **Intervention (B)** | **Baseline 2 ($A_2$)** |
|---|---|---|---|
| Length of Condition | 4 | 11 | 7 |
| Direction Trend |  | | |
| Stability Trend | 100% (Stable) | 72.7% (Variable) | 100% (Stable) |
| Data Trace |  - | + | - |
| Stability Level and Range | Stable (34-40) | Variable (51-93) | Stable (85-94) |
| Level of Change | Stable (34 - 40) -6 | Variable (93 - 51) +42 | Stable (85 - 92) -7 |

Based on the summary of the analysis results, Baseline Phase 1 ($A_1$), which lasted for four sessions, showed a downward trend with a data stability level of 100% (stable). Vocabulary mastery scores ranged from 34 to 40 and showed a change in level of −6, indicating that the child's vocabulary mastery skills tended to be low and did not experience significant improvement before the intervention was given.

In the intervention phase (B), which was conducted over eleven sessions, the data showed an upward trend with a stability level of 72.7%, which is classified as variable. Vocabulary mastery scores ranged from 51 to 93, with a level change of +42. This condition reflects a significant improvement in the child's vocabulary mastery during the implementation of sensory integration-based experiential learning, although there were still variations in scores between sessions.

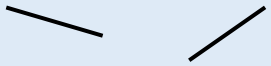
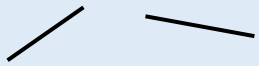
Furthermore, the Baseline 2 phase ($A_2$), which lasted for seven sessions, showed a relatively downward trend but remained at a high level of ability. The data in this phase had a stability level of 100% (stable) with a score range of 85–94 and a level change of −7. These results indicate that after the intervention was stopped, the child's vocabulary mastery ability tended to remain stable despite experiencing a slight decline.

**Analysis between conditions**

Between-condition analysis was conducted to examine changes in trend direction, stability, level, and data overlap across phases. The transition from Baseline 1 ($A_1$) to Intervention (B) showed a positive change in trend direction, an increase in level (+17), and no data overlap (0%), indicating a clear intervention effect. The transition from Intervention (B) to

Baseline 2 ($A_2$) showed a slight decrease in level (−1) with low overlap (14.3%), suggesting that the intervention effects were largely maintained after withdrawal. The analysis between conditions is shown in Table 4.

Table 4 Analysis between conditions

| **Conditions** | **$A_1$/B** | **B/$A_2$** |
|---|---|---|
| Number of variables changed | 1 | 1 |
| Change in directional trend |  (+) Positive |  (-) Negative |
| Change in stability trend | Stable to Variable | Variable to Stable |
| Level of change | (51 – 34)<br>+17 | (92 – 93)<br>-1 |
| Overlap | 0% | 14.3% |

Based on the results of the analysis between conditions from Baseline 1 ($A_1$) to Intervention (B), there was one variable that changed, namely the application of sensory integration-based experiential learning. The change in trend direction shows a positive pattern, from a downward trend in the initial condition to an upward trend in the intervention phase. The change in data stability from a stable condition to a variable condition indicates that the child responded to the intervention, as evidenced by the variation in scores during the learning process. A change in level of +17 (from a score of 34 to 51) and an overlap percentage of 0% indicate a clear difference between the conditions before and during the intervention, so it can be interpreted that the intervention had a significant impact on improving the child's vocabulary mastery.

Furthermore, in the comparison between Intervention (B) and Baseline 2 ($A_2$), the change in directional trend shows a negative pattern, characterized by a slight decrease in scores after the intervention was stopped. Data stability changed from variable to stable, indicating that the child's vocabulary mastery became more consistent even without intervention. A change in level of −1 (from a score of 93 to 92) and an overlap of 14.3% indicate relatively small data overlap, so the intervention results can still be said to persist despite a slight decline.

The maintained performance in the Baseline 2 ($A_2$) phase suggests that the vocabulary acquired during the intervention was retained beyond the structured learning sessions. This indicates that the learning experience may have been meaningful and functionally embedded for the subject.

The results of the study indicate that sensory integration-based experiential learning has a positive effect on improving the vocabulary of children with autism. This is demonstrated by the clear differences between the Baseline 1 ($A_1$), Intervention (B), and Baseline 2 ($A_2$) phases. In the initial baseline phase, the child's vocabulary skills were at a low level and tended to decline. After the intervention was administered, there was a significant increase in scores with a positive trend and a large change in level. These findings directly answer the research question that the intervention was effective in improving the vocabulary mastery of the child with autism.

These findings were obtained through a Single Subject Research (SSR) design with an $A_1$–B–$A_2$ pattern, which allowed for intensive and repeated observation of behavioral changes. Analysis within conditions showed an upward trend and level increase during the intervention phase, while analysis between conditions showed a positive change in direction from $A_1$ to B with 0% data overlap. According to Ledford and (Ledford & Gast, 2018), low data overlap and clear level changes are strong indicators of the intervention effect in SSR research. The stability of the data that reappeared in the second baseline phase

indicates that the results of the intervention tended to persist even after the treatment was stopped.

Interpretatively, the increase in the child's vocabulary mastery during the intervention phase can be explained by the child's active involvement in direct and multisensory learning experiences. Experiential learning allows the child to construct vocabulary meaning through real activities, sensory exploration, and direct interaction with the learning environment. This approach is particularly relevant for the child with autism, who generally experiences difficulties in processing abstract language but responds better to visual, tactile, and kinesthetic stimuli (Oh et al., 2024; Savarese et al., 2025; Schaaf, Benevides, Kelly, & Mailloux, 2018; Schiano et al., 2024; Wen & Wu, 2025).

The results of this study are in line with experiential learning theory, which emphasizes that learning becomes more meaningful when learners are directly involved in concrete experiences followed by reflection and application (Unwin et al., 2022). Furthermore, these findings also support the principle of sensory integration, which states that the processing of organized sensory stimuli plays an important role in the child's cognitive and language development (Camino-Alarc'on et al., 2024; E Haebig et al., 2021; Horner et al., 2021; Lee, Choi, & Park, 2022). Recent research shows that sensory integration-based interventions can significantly improve the receptive and expressive language abilities of the child with autism spectrum disorder (ASD) (Alafnan, 2025; Choi, Park, Lee, Hong, & Kim, 2025; Wieder, 2021).

In the context of education, the integration of sensory integration into language learning provides empirical support for a more inclusive and individualized approach to learning. Recent studies confirm that multisensory learning strategies are effective in improving vocabulary and language comprehension in students with special needs, particularly autistic children, as they can be adapted to individual learning styles and sensory needs (Kapp, 2025; Liu et al., 2025).

From a methodological perspective, the findings of this study reinforce the use of SSR as a valid and responsive approach to evaluating the effectiveness of individual educational interventions in the child with autism (Horner et al., 2021). The SSR design allows researchers to capture behavioral changes in detail and contextually, making it highly suitable for use in special education research.

Theoretically, this study contributes by expanding the application of sensory integration theory from the realm of therapy to the realm of academic learning, particularly in vocabulary acquisition. These findings modify the previous understanding that sensory integration not only functions for sensory and behavioral regulation but also has a strategic role in supporting language development and meaningful learning for the child with autism. Thus, this study opens up opportunities for the development of language learning models that integrate direct experience and sensory processing as a systematic approach in inclusive education.

The findings of this study suggest that experiential learning integrated with sensory integration was associated with an improvement in the child's vocabulary performance. This is reflected in the differences observed across the Baseline 1 ($A_1$), Intervention (B), and Baseline 2 ($A_2$) phases. In the initial baseline phase, the child's vocabulary performance was relatively low and showed a declining trend. During the intervention phase, the scores increased with a clear upward trend and substantial level changes. These findings should be interpreted within the context of a Single Subject Research (SSR) design.

The observed changes were identified through an $A_1$–B–$A_2$ design, which allows for repeated and systematic observation of behavioral changes. Within-condition analysis showed an increasing trend and level change during the intervention phase, while between-condition analysis indicated a positive shift from $A_1$ to B with no data overlap (0%). According to (Ledford & Gast, 2018), low data overlap and clear level changes are

considered indicators of intervention effects in SSR. In addition, the relatively stable performance observed in the Baseline 2 ($A_2$) phase suggests that the improvement was maintained after the withdrawal of the intervention.

The improvement in vocabulary performance during the intervention phase may be explained by the child's active involvement in direct and multisensory learning experiences. Experiential learning provides opportunities for the child to interact with real objects and situations, allowing vocabulary to be constructed through meaningful experiences rather than abstract instruction. At the same time, sensory integration supports the processing of sensory input, which may enhance attention, engagement, and retention. This combination appears to facilitate a more accessible and concrete learning process for the child.

An important finding of this study is the relatively stable performance observed in the Baseline 2 ($A_2$) phase. This suggests that the vocabulary acquired during the intervention was retained beyond structured learning sessions. One possible explanation is that the learning activities were functionally embedded in the child's daily experiences, enabling the child to maintain and apply the acquired vocabulary. From an educational perspective, this indicates that learning approaches that connect language with real-life experiences may support longer-term retention.

These findings are consistent with experiential learning theory, which emphasizes that learning becomes more meaningful when individuals are directly involved in concrete experiences. This is particularly relevant for children with autism, who often experience difficulties in processing abstract language but respond more effectively to visual, tactile, and kinesthetic stimuli (Nadwodny et al., 2025; Samuels et al., 2024; Savarese et al., 2025; Schaaf et al., 2018; Schiano et al., 2024).

In addition, the results support the principles of sensory integration, which highlight the role of organized sensory processing in cognitive and language development (Camino-Alarcón, Robles-Bello, Valencia-Naranjo, & Sarhani-Robles, 2024; E Haebig et al., 2021; Horner et al., 2021; Lee et al., 2022). Previous studies have also shown that sensory-based interventions may support improvements in receptive and expressive language skills in children with autism (Alafnan, 2025; Choi et al., 2025; Wieder, 2021).

From a methodological perspective, this study supports the use of SSR as a responsive approach for evaluating individualized educational interventions. The design allows for detailed observation of behavioral changes over time, providing insight into how the child responds to specific intervention strategies (Horner et al., 2021).

Theoretically, this study contributes by integrating experiential learning and sensory integration within the context of vocabulary acquisition. While previous studies have often examined these approaches separately, this study highlights their combined potential in supporting meaningful language development. These findings also suggest opportunities for developing instructional approaches that integrate direct experience and sensory processing in inclusive education settings.

## CONCLUSION

This study suggests that experiential learning integrated with sensory integration was associated with improved vocabulary performance in a child with autism within a SSR framework. The results showed an increasing trend during the intervention phase and relatively stable performance after the withdrawal phase, indicating that the acquired vocabulary may be retained beyond structured learning sessions. However, these findings are limited to the characteristics of the subject and the specific research context. Therefore, the results cannot be generalized to a wider population without further investigation. Future research involving multiple participants and varied settings is recommended to strengthen the generalizability of the findings. From a practical perspective, educators may consider

adapting experiential and multisensory learning approaches by incorporating real-life objects and direct experiences into vocabulary instruction. Such approaches may support more meaningful and contextually relevant language learning, particularly in inclusive and special education settings.

## CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHOR CONTRIBUTIONS STATEMENT

M contributed to the conceptualization, methodology, and writing of the original draft of the manuscript. DJS was responsible for instrument development and data analysis. Lusiana Vera Anjani conducted data collection in the field. All authors contributed substantially to the work and approved the final manuscript.

## AI DISCLOSURE STATEMENT

The authors used artificial intelligence (AI) technology for language editing and academic writing refinement. The entire research, data analysis, interpretation, and scientific substance were carried out entirely by the authors. The author takes full responsibility for the content of this article.

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