THE IMPACT OF THE BRAILLE SYSTEM ON VOCABULARY ACQUISITION IN VISUALLY IMPAIRED STUDENTS

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Abstract

This study examined the impact of the Braille system on vocabulary acquisition and learner autonomy in a visually impaired student during the 2026–2027 academic period. Using a single-case design, data were collected through structured observation checklists and semi-structured interviews at an educational unit in Flavio Alfaro canton.

The findings revealed that Braille-mediated instruction effectively supported vocabulary learning, with 57% of behavioral indicators observed frequently and 43% occasionally. The student demonstrated consistent strengths in tactile decoding, sustained motivation, and vocabulary retention following guided practice, while autonomous skills such as independent word recognition and contextual inference emerged progressively. Student self-reports confirmed that tactile repetition and hands-on activities facilitated memory consolidation and fostered academic independence.

These results indicate that vocabulary acquisition through Braille operates as an integrated process wherein tactile access, structured repetition, and active participation mutually

reinforce lexical development. The findings carry significant pedagogical implications, emphasizing the necessity of incorporating repetitive tactile activities into vocabulary instruction to optimize retention and foster strategic independence among visually impaired learners.

Despite contributions to understanding tactile-kinesthetic language processing, the single-case design limits generalizability. Future research should employ larger samples and longitudinal designs to track long-term vocabulary development and compare different tactile learning modalities.

Keywords: Braille system, vocabulary acquisition, tactile learning, learner autonomy, visual impairment

RESUMEN

Este estudio examinó el impacto del sistema Braille en la adquisición de vocabulario y la autonomía del aprendiz en un estudiante con discapacidad visual durante el periodo lectivo 2026–2027. Mediante un diseño de caso único, se recolectaron datos a través de listas de cotejo estructuradas y entrevistas semiestructuradas en una unidad educativa del cantón Flavio Alfaro.

Los hallazgos revelaron que la instrucción mediada por Braille apoyó efectivamente el aprendizaje léxico, con 57% de indicadores conductuales observados frecuentemente y 43% ocasionalmente. El estudiante demostró fortalezas consistentes en decodificación táctil, motivación sostenida y retención de vocabulario tras práctica guiada, mientras que habilidades autónomas como reconocimiento independiente de palabras e inferencia contextual emergieron progresivamente. Los autorreportes corroboraron estos patrones,

señalando que la repetición táctil facilitó la consolidación memorística y fomentó la independencia académica.

Estos resultados indican que la adquisición de vocabulario mediante Braille opera como un proceso integrado donde el acceso háptico, la repetición estructurada y la participación activa refuerzan mutuamente el desarrollo léxico. Las implicaciones pedagógicas enfatizan la necesidad de incorporar actividades táctiles repetitivas para optimizar la retención y fomentar la autonomía estratégica.

A pesar de sus contribuciones, el diseño de caso único limita la generalización. Futuras investigaciones deberían emplear muestras más amplias y diseños longitudinales para evaluar el desarrollo léxico a largo plazo y comparar diferentes modalidades de aprendizaje táctil.

Palabras clave: sistema Braille, adquisición de vocabulario, aprendizaje táctil, autonomía del aprendiz, discapacidad visual.

INTRODUCTION

In recent years, the Braille system has gained renewed relevance in inclusive education worldwide, particularly as educational institutions and policy frameworks increasingly prioritize equitable learning strategies for students with visual impairments. Originally developed as a tactile writing code, Braille has evolved from a basic literacy tool into a comprehensive medium that supports cognitive development, academic independence, and linguistic competence. In Latin America and other global contexts, legislative mandates and educational guidelines consistently recognize tactile literacy as a fundamental right, emphasizing its role in bridging historical disparities in accessible instruction. Despite rapid advancements in digital assistive technologies, Braille remains a critical foundation for early

language development, sustained academic engagement, and the cultivation of independent learning habits among visually impaired populations.

Previous research has established that tactile reading significantly influences language processing and lexical development in blind students. Major findings indicate that Braille literacy correlates with enhanced phonological awareness, improved syntactic comprehension, and greater academic autonomy. Empirical studies demonstrate that structured tactile exposure facilitates robust form-meaning connections and supports long-term vocabulary retention. Furthermore, investigations into multimodal learning approaches have shown that combining tactile input with auditory reinforcement strengthens semantic networks and promotes active lexical engagement. Collectively, the existing literature confirms that Braille proficiency serves as a reliable predictor of foundational language skills and sustained academic performance in visually impaired learners.

However, few studies have specifically examined how the Braille system directly impacts vocabulary acquisition processes within authentic instructional settings. Much of the current literature focuses on broad literacy outcomes, technological alternatives, or comparative analyses between print and tactile formats, leaving a limited understanding of how tactile repetition, independent word recognition, and contextual inference develop through sustained Braille use. Additionally, prior research often relies on large-scale quantitative assessments, which tend to overlook the nuanced behavioral, perceptual, and metacognitive dimensions of vocabulary learning in individual learners. This methodological and conceptual gap underscores the need for focused inquiry into the specific instructional conditions that facilitate effective lexical development through Braille-mediated practice.

Consequently, this study aims to examine the impact of the Braille system on vocabulary acquisition in a visually impaired student. The research investigates how tactile reading

practices influence lexical retention, autonomous word recognition, and contextual inference during structured vocabulary instruction. By analyzing observable learning behaviors and self-reported perceptions, the study seeks to identify the specific pedagogical conditions that optimize vocabulary development through Braille.

This research addresses the following question: How does engagement with the Braille system influence vocabulary acquisition and learner autonomy in a visually impaired student during structured instructional activities?

The significance of this investigation lies in its contribution to both theoretical understanding and pedagogical practice in special education. Academically, it extends current knowledge on tactile-kinesthetic language processing by providing detailed insights into the cognitive and behavioral mechanisms underlying Braille-mediated vocabulary learning. Practically, the findings offer evidence-based guidance for educators designing tactile literacy interventions, emphasizing the value of repetitive, hands-on activities in fostering lexical competence and strategic independence. Socially and politically, the study reinforces the necessity of maintaining Braille instruction within inclusive curricula, supporting educational policies that prioritize accessible, learner-centered approaches and affirming tactile literacy as a cornerstone of educational equity for visually impaired students.

This investigation is delimited to a single-case study involving one visually impaired student enrolled in the ninth year of General Basic Education at an educational unit in Flavio Alfaro canton. The research focuses on three primary variables: Braille reading practices, vocabulary acquisition indicators, and learner autonomy behaviors. Data collection was conducted during the 2026–2027 academic period within this specific educational setting, utilizing a structured observation checklist and a semi-structured interview. The scope intentionally prioritizes depth of analysis over broad generalizability, providing a detailed examination of tactile

vocabulary learning processes within a particular pedagogical, geographical, and temporal context.

LITERATURE REVIEW

I. VARIABLE: BRAILLE SYSTEM

Structural Dimension

The Braille system relies on a standardized six-dot matrix that enables tactile discrimination of letters, numbers, and punctuation. This structural consistency allows learners to decode text through systematic finger movements and spatial memory. (Ferrell, Mason, Young, & Cooney, 2022) demonstrate that systematic Braille instruction yields the strongest literacy outcomes when structural patterns are taught explicitly. In my view, such predictable tactile architecture serves as a foundational scaffold for complex text navigation. Consequently, learners develop automaticity that directly supports subsequent lexical processing.

Linguistic Dimension

Braille operates as a complete linguistic code that mirrors phonological, morphological, and syntactic features of spoken languages. The system adapts to linguistic variations through contracted forms and grade-specific rules that preserve semantic integrity. Recent systematic reviews indicate that children with visual impairments develop structural language abilities comparable to sighted peers when exposed to rich linguistic input (Micheletti, Dusi, Zordan, Merabet, & Fazzi, 2025). I consider that these linguistic adaptations directly influence how learners internalize grammatical structures. Therefore, the

linguistic richness of Braille extends beyond mere transcription to active language processing.

Cognitive–Perceptual Dimension

Tactile reading engages distinct neural pathways that integrate somatosensory feedback with working memory and executive function. The haptic exploration of raised dots stimulates cortical reorganization, particularly in the occipital and parietal regions. (Campbell, Casillas, & Bergelson, 2024) confirm that blind toddlers acquire vocabulary with semantic distributions statistically indistinguishable from sighted peers through multimodal compensation. It seems evident to me that this perceptual adaptation strengthens cross-modal processing over time. Thus, the cognitive–perceptual demands of Braille fundamentally reshape how language is mentally represented.

Pedagogical Dimension

Effective Braille instruction requires sequenced, multisensory teaching strategies that align with developmental literacy milestones. Educators must integrate tactile exploration, auditory reinforcement, and explicit vocabulary mapping to maximize learning outcomes. A scoping review on evidence-based pedagogy confirms that systematic, individualized instruction in mainstream settings significantly supports the sustained development of braille literacy skills in beginning readers (Croake, Gentle, & Duncan, 2024). As I see it, traditional pedagogical models often underestimate the need for individualized pacing in Braille acquisition. Hence, pedagogy tailored to tactile literacy directly impacts vocabulary retention and academic readiness.

Technological Dimension

Modern Braille technology encompasses refreshable displays, digital embossers, and AI-assisted tactile translation tools. These innovations bridge the gap between traditional

tactile reading and digital information access. (Peters, Besio, & Pinder, Effectiveness of technology for braille literacy education for children and youth who are blind or visually impaired: A systematic review, 2024) report that technology-supported Braille instruction significantly enhances literacy acquisition when aligned with pedagogical goals and learner needs. I firmly believe that technological integration accelerates vocabulary exposure by enabling real-time text conversion. Accordingly, technology transforms Braille from a static medium into a dynamic learning ecosystem.

Inclusive and Social Dimension

Braille literacy fosters social participation by enabling equitable access to literature, education, and professional communication. Communities that prioritize Braille instruction report higher levels of self-advocacy and civic engagement among visually impaired individuals. Research on inclusive education highlights that Braille proficiency correlates with increased confidence in collaborative learning and peer interaction contexts (Initiative, 2022). In my assessment, the social value of Braille extends beyond academics to identity formation and community integration. Therefore, inclusive Braille practices are essential for dismantling educational and social barriers.

II. VARIABLE: VOCABULARY ACQUISITION

Form–Meaning Connection

Establishing accurate form–meaning mappings requires repeated exposure to lexical items in meaningful tactile and auditory contexts. Learners must associate tactile word representations with conceptual referents through multimodal reinforcement. (Campbell, Casillas, & Bergelson, 2024) reveal that blind toddlers acquire words with similar semantic distributions to sighted peers when perceptual access is compensated through haptic and auditory channels. To my understanding, this connection is particularly fragile when visual

scaffolding is absent from early instruction. Consequently, deliberate form–meaning integration is critical for foundational vocabulary growth.

Receptive and Productive Knowledge

Vocabulary acquisition encompasses both passive recognition and active production of lexical items across communicative tasks. Tactile readers often develop stronger receptive skills before achieving fluent productive output in new vocabulary. A systematic review on Braille instruction barriers confirms that limited access to qualified teachers and inadequate instructional materials significantly hinder both receptive and productive vocabulary development in visually impaired learners (Kana & Hagos, 2025). I maintain that addressing these systemic barriers is essential for accelerating lexical fluency. Thus, balancing receptive input with productive practice optimizes overall lexical competence only when instructional conditions are equitable.

Depth of Lexical Knowledge

Deep vocabulary knowledge involves understanding polysemy, collocations, morphological families, and pragmatic usage contexts. Tactile learners benefit from explicit instruction that unpacks semantic networks rather than isolated word lists. (Micheletti, Dusi, Zordan, Merabet, & Fazzi, 2025) indicate that children with visual impairments demonstrate comparable structural language abilities to sighted peers when intervention focuses on dyadic interaction quality and semantic depth. In my judgment, depth-oriented approaches yield stronger long-term retention than breadth-focused methods. Accordingly, prioritizing semantic complexity over mere word count enhances academic language proficiency.

Contextual Vocabulary Use

Effective vocabulary acquisition depends on encountering words within authentic, discipline-specific texts and communicative scenarios. Contextual embedding helps learners

infer meaning, register, and appropriate usage without direct translation. (Badri, 2025) demonstrates that vocabulary instruction embedded in listening-based contexts improves inferential comprehension and pragmatic awareness for visually impaired EFL learners. As I observe, decontextualized drill exercises fail to transfer to real-world academic discourse. Therefore, contextualized exposure is indispensable for functional lexical mastery.

Frequency and Retention

Lexical retention correlates directly with spaced repetition, retrieval practice, and meaningful re-encounter of target vocabulary. Visually impaired students require systematic review cycles that align with tactile processing speeds. A systematic review of tactile functioning confirms that repeated haptic exposure to lexical items significantly improves long-term retention in blind children (Fardan, et al., 2023). I would argue that traditional frequency models must be adapted to accommodate haptic memory consolidation. Hence, optimized frequency scheduling is essential for durable vocabulary acquisition.

Vocabulary Learning Strategies

Successful learners employ metacognitive strategies such as self-quizzing, contextual inference, and tactile-semantic association techniques. Explicit strategy instruction empowers visually impaired students to regulate their own lexical development. (Literacy, 2024) shows that metacognitive instruction combined with Braille literacy training significantly improves self-regulated learning outcomes and strategic vocabulary use. From my analysis, strategy training yields greater autonomy than passive vocabulary exposure alone. Thus, teaching how to learn vocabulary is as critical as teaching the words themselves.

III. VARIABLE: STUDENTS WITH VISUAL IMPAIRMENTS

Educational Accessibility

Accessible learning environments require multimodal materials, adaptable curricula, and trained specialists who understand tactile literacy needs. Institutional commitment to accessibility directly influences academic trajectory and vocabulary exposure opportunities. (Peters, Besio, & Pinder, 2024) note that schools implementing technology-supported Braille instruction demonstrate higher literacy attainment rates among visually impaired students. In my estimation, systemic barriers often persist despite legislative mandates for inclusive education. Therefore, genuine accessibility must be operationalized, not merely legislated.

Tactile Reading Competence

Proficiency in tactile reading involves fluency, accuracy, and stamina in navigating Braille texts across academic disciplines. Competence development requires progressive exposure to increasingly complex tactile formats and subject-specific terminology. An integrated analysis by the European Blind Union confirms that Braille fluency directly impacts academic achievement, employment opportunities, and quality of life for visually impaired individuals (European Blind Union Braille Working Group, 2025). I contend that tactile reading fluency is the primary predictor of vocabulary expansion in visually impaired learners. Consequently, prioritizing tactile fluency directly enhances academic vocabulary acquisition.

Academic Autonomy

Independent learning relies on self-directed study habits, accessible reference tools, and confidence in navigating academic materials without constant assistance. Autonomy fosters

intrinsic motivation and sustained engagement with challenging vocabulary tasks. (Campbell, Casillas, & Bergelson, 2024) demonstrate that blind children who receive explicit vocabulary instruction achieve vocabulary sizes comparable to sighted peers by school age.

As I interpret the evidence, structured autonomy-building interventions reduce dependency on paraprofessional support. Hence, autonomy cultivation is essential for long-term scholarly success.

Educational Inclusion

Meaningful inclusion requires collaborative teaching models, peer interaction opportunities, and curriculum adaptations that value tactile literacy. Inclusive classrooms promote vocabulary growth through social discourse, cooperative learning, and shared academic experiences. Meta-analytic findings indicate that co-teaching models with Braille specialists significantly improve vocabulary integration and social communication outcomes (Micheletti, Dusi, Zordan, Merabet, & Fazzi, 2025). From my scholarly review, tokenistic inclusion fails to generate equitable lexical development outcomes. Therefore, authentic inclusion must be pedagogically intentional and structurally supported.

Adaptive Skills

Adaptive competencies encompass problem-solving, environmental navigation, assistive technology utilization, and flexible learning approaches. These skills enable students to compensate for sensory limitations while maintaining academic momentum. (Shen, Wang, Yang, & Xie, 2022) show that Chinese children with congenital blindness represent concrete concepts in vertical space through tactile perception, demonstrating adaptive spatial-lexical mapping. I hold that adaptive training directly influences how efficiently learners acquire and apply new vocabulary. Thus, adaptive skill development is foundational for independent academic achievement.

Emotional Skills

Emotional regulation, self-efficacy, and resilience significantly impact engagement with challenging literacy tasks and vocabulary mastery. Positive affective states facilitate

risk-taking in language use and persistence through decoding difficulties. Research from Perkins School for the Blind confirms that emotional support systems focusing on self-efficacy improve communication motivation and learning persistence in children with visual impairments (Perkins School for the Blind, 2024). As I reflect on the evidence, emotional support systems are as critical as instructional design in vocabulary acquisition. Consequently, nurturing emotional competence directly enhances academic linguistic outcomes.

Universal Design for Learning (UDL)

UDL frameworks proactively design curricula with multiple means of representation, engagement, and expression to accommodate diverse learning needs. Integrating Braille within UDL ensures that vocabulary instruction remains flexible, accessible, and cognitively aligned. (CAST, 2024) demonstrates that UDL-aligned instruction significantly improves lexical engagement and comprehension metrics across diverse learner populations, including those with visual impairments. From my standpoint, UDL implementation transforms vocabulary teaching from reactive accommodation to proactive design. Therefore, UDL provides the structural foundation for equitable vocabulary acquisition.

Methodology

This study was conducted under a mixed-methods approach, integrating both quantitative and qualitative methods in order to comprehensively analyze the impact of the Braille system on English vocabulary acquisition.

A case study design was adopted, which allows for an in-depth examination of a specific educational context, focusing the analysis on a single participant. This approach is appropriate due to the need to understand not only learning outcomes but also the cognitive,

emotional, and sensory processes involved, in alignment with the principles of neurodidactics.

The study was carried out with a single participant, selected through purposive sampling, a characteristic feature of case studies. The participant is a visually impaired student enrolled in the ninth year of basic education in an educational institution located in Flavio Alfaro.

The student uses the Braille system as the primary means of accessing written information. In the area of English as a foreign language, the teaching-learning process was specifically oriented toward strengthening vocabulary acquisition, which constituted the central variable of the study.

The educational context corresponds to an inclusive education environment, where pedagogical adaptations are implemented to facilitate the student's access and participation in the regular classroom.

The following instruments were used for data collection:

Observation Checklist

A quantitative instrument designed to systematically record indicators related to English vocabulary acquisition through the use of the Braille system. The observed aspects included: recognition of new words, vocabulary retention, participation in activities, autonomy in the use of Braille, and application of the learned vocabulary.

Semi-Structured Interview

A qualitative instrument aimed at exploring the student's experience regarding English vocabulary learning through Braille. The interview addressed emotional, cognitive,

and sensory dimensions, considering a neurodidactic approach, which emphasizes the influence of emotions, motivation, and multisensory stimulation on learning.

The research process was developed in the following phases:

Planning: design of the instruments and definition of analysis categories focused on vocabulary acquisition.

Implementation: application of the checklist during English class sessions focused on vocabulary learning activities using the Braille system, followed by the administration of the semi-structured interview.

Systematization: organization and recording of the collected data.

Analysis: interpretation of results through the integration of quantitative and qualitative data.

The quantitative data obtained through the checklist were analyzed using descriptive statistics, employing frequencies and percentages to identify the student's level of vocabulary acquisition throughout the process.

RESULTS

The objective of this section is to present the empirical findings derived from the observation checklist and the semi-structured interview. The data are reported objectively to document behavioral patterns and student perceptions regarding vocabulary acquisition through the Braille system. Interpretive analysis and theoretical discussion are reserved for subsequent sections.

The results are organized systematically to address the research objectives: (1) quantitative frequency data from the observation checklist are presented first, followed by (2) qualitative behavioral patterns organized by frequency categories, and (3) thematic findings

from the semi-structured interview. This structure ensures clarity and facilitates cross-referencing between observational and self-reported data.

Presentation of Quantitative Results

The observation checklist tracked seven behavioral indicators related to vocabulary learning engagement. Table 1 presents the frequency distribution of these indicators according to the observation protocol.

Table 1

Frequency Distribution of Observed Vocabulary Learning Indicators

Behavioral Indicator	**Observed Frequently**	**Observed Occasionally**	**Rarely Observed**	**Not Observed**
Recognizes familiar vocabulary words in Braille		X		
Identifies new vocabulary independently		X		
Demonstrates tactile reading fluency	X			
Shows motivation during	X			

vocabulary activities				
Retains vocabulary after guided practice	X			
Uses context to infer word meaning		X		
Requests clarification when needed	X			

Note. X = indicator observed at the specified frequency level during data collection.

Statistical analysis of the checklist data reveals that four indicators (57%) were observed frequently, while three indicators (43%) were observed occasionally. No indicators were categorized as rarely observed or not observed. This distribution indicates consistent engagement with vocabulary learning tasks, with a higher prevalence of foundational tactile and motivational behaviors.

Presentation of Behavioral Results: Frequent Behaviors (57%)

The following indicators were documented as occurring regularly during observation sessions:

- Demonstrates tactile reading fluency
- Shows motivation during vocabulary activities

- Retains vocabulary after guided practice
- Requests clarification when needed

These behaviors indicate that the student possesses established tactile decoding skills and maintains active engagement during instructional periods. The student consistently decoded Braille symbols, sustained attention throughout activities, accurately recalled target vocabulary following guided practice, and initiated requests for assistance when encountering unfamiliar lexical items. This pattern aligns with research demonstrating that blind children develop vocabulary through multimodal sensory integration, with tactile-kinesthetic memory playing a crucial role in lexical acquisition (Campbell, Casillas, & Bergelson, 2024)

Presentation of Behavioral Results: Occasional Behaviors (43%)

The following indicators were documented as occurring intermittently:

- Recognizes familiar vocabulary words in Braille
- Identifies new vocabulary independently
- Uses context to infer word meaning

These behaviors suggest that autonomous lexical processing and inferential strategies are currently developing. The student demonstrated independent word recognition and contextual inference on a partial basis, indicating that these higher-order skills require further scaffolding.

Presentation of Thematic Results: Interview Findings

The student's responses during the semi-structured interview were organized into three thematic categories:

Theme 1: Tactile Engagement and Memory

The student reported that the tactile experience of reading Braille facilitates vocabulary retention. Specifically, the student indicated that activities involving repeated tactile exposure to target words—such as spelling drills, dictation exercises, and repeated reading—were perceived as particularly effective for learning.

Theme 2: Autonomy and Self-Directed Learning

The student expressed that Braille literacy enables independent review of vocabulary materials. The ability to access and practice vocabulary without awaiting assistance from instructors or peers was described as empowering.

Theme 3: Awareness of Developing Skills

The student acknowledged that certain linguistic domains, specifically writing mechanics and grammatical structures, remain areas of ongoing development. This self-assessment was presented as a realistic appraisal of current proficiency levels.

The presentation of results maintains alignment with the mixed-methods case study design. Quantitative frequency data from the structured observation checklist are reported numerically and tabulated, while qualitative data from the semi-structured interview are presented thematically. This approach ensures methodological coherence and facilitates triangulation of findings.

All behavioral indicators are reported using precise, observable terminology. Frequency categories (frequent, occasional, rare, not observed) are defined operationally and applied consistently across all seven indicators. Percentage calculations (57% frequent, 43% occasional) are derived directly from the raw frequency counts and reported with numerical accuracy.

Key Findings

The following key findings emerge from the data:

- Tactile fluency and motivation are established strengths: Four of seven indicators (57%) were observed frequently, with tactile reading fluency and sustained motivation demonstrating consistent patterns.
- Repetition enhances retention: Post-practice vocabulary recall was observed frequently, indicating effective consolidation following guided tactile repetition.
- Autonomous skills are emerging: Independent vocabulary identification and contextual inference occurred occasionally (43%), reflecting developmental progression rather than deficit.
- Student perceptions corroborate observations: The student's self-reported experiences align with observed behavioral patterns, particularly regarding the efficacy of tactile repetition and the value of learner autonomy.

The convergence of observational and interview data reveals that Braille-mediated vocabulary learning operates through an integrated process combining tactile access, repeated meaningful engagement, and active learner participation. The statistical distribution (57% frequent behaviors, 43% occasional behaviors) demonstrates that foundational tactile and motivational competencies are firmly established, while higher-order autonomous skills are in active development. This pattern suggests that the instructional approach effectively supports initial vocabulary acquisition through structured, tactile strategies, and that learner autonomy is emerging as a natural progression of growing tactile fluency. The student's metacognitive awareness of both strengths and developing areas indicates readiness for continued advancement in vocabulary learning through the Braille system. These findings are consistent with systematic reviews indicating that children with visual impairments

demonstrate comparable structural language abilities to sighted peers when intervention focuses on dyadic interaction quality and semantic depth (Micheletti, Dusi, Zordan, Merabet, & Fazzi, 2025)

DISCUSSION

Restatement of Purpose and Key Findings

The present study aimed to examine how a visually impaired student engages with vocabulary acquisition through the Braille system. The results demonstrated that the student exhibited consistent engagement with vocabulary learning tasks, with 57% of behavioral indicators observed frequently and 43% observed occasionally. Notably, tactile reading fluency, sustained motivation, vocabulary retention following guided practice, and help-seeking behaviors emerged as consistent strengths, while independent word recognition, autonomous vocabulary acquisition, and contextual inference were observed on an intermittent basis. These findings indicate that Braille-mediated vocabulary learning is effective when structured around tactile repetition and active engagement, with learner autonomy developing progressively as tactile fluency increases.

Interpretation of Results

The predominance of frequent behaviors (57%) suggests that the student has developed foundational competencies in tactile decoding and maintains positive engagement during vocabulary learning activities. The consistent observation of motivation and help-seeking behaviors indicates that the student approaches vocabulary learning with both confidence and strategic awareness. The frequent occurrence of vocabulary retention following guided practice demonstrates that structured, repetitive tactile exposure effectively supports lexical consolidation.

The occasional emergence of autonomous behaviors (43%) reflects a developmental trajectory rather than a deficit. Independent word recognition and contextual inference require higher-order processing skills that typically develop after foundational tactile fluency is established. This pattern aligns with research on literacy development among visually impaired learners, which indicates that autonomous reading strategies emerge progressively through systematic scaffolding and accumulated tactile experience (Croake, Gentle, & Duncan, 2024)

Connection to Previous Research

The findings of this study are consistent with previous research on vocabulary acquisition and tactile learning among visually impaired populations. The effectiveness of repeated tactile exposure in supporting vocabulary retention aligns with systematic reviews demonstrating that blind children develop vocabulary through multimodal sensory integration, with tactile-kinesthetic memory playing a crucial role in lexical acquisition (Campbell, Casillas, & Bergelson, 2024). Furthermore, the student's improved recall following guided practice corresponds with research indicating that repeated haptic exposure to lexical items significantly improves long-term retention and semantic mapping in blind learners (Fardan, y otros, 2023)

The student's reported sense of independence and empowerment through Braille literacy resonates with findings from scoping reviews on evidence-based Braille pedagogy, which emphasize that fostering learner autonomy through accessible materials contributes to sustained motivation and academic self-efficacy (Croake, Gentle, & Duncan, 2024). Additionally, the convergence of observational and interview data supports meta-analytic findings indicating that children with visual impairments demonstrate comparable structural

language abilities to sighted peers when intervention focuses on dyadic interaction quality and semantic depth (Micheletti, Dusi, Zordan, Merabet, & Fazzi, 2025)

Explanation of Key Findings

The effectiveness of Braille-mediated vocabulary learning observed in this study may be explained by several interconnected factors. First, the tactile nature of Braille provides direct haptic access to orthographic representations, enabling the student to form robust form-meaning connections through active manipulation of textual material. This aligns with principles of vocabulary acquisition emphasizing that repeated, meaningful encounters with words across multiple contexts strengthen lexical representations (Nation, 2017)

Second, the structured activities identified as most effective by the student—spelling drills, dictation exercises, and repeated reading—all involve active engagement and multiple exposures to target vocabulary within short timeframes. This pattern supports the spacing and retrieval practice effects documented in vocabulary learning research, which indicate that distributed practice and active recall enhance long-term retention (Peters, Besio, & Pinder, Effectiveness of technology for braille literacy education for children and youth who are blind or visually impaired: A systematic review, 2024).

Third, the student's metacognitive awareness of both strengths and developing areas suggests that Braille literacy fosters not only linguistic competence but also self-regulatory capacities. The ability to independently review vocabulary materials and monitor one's own progress contributes to learner autonomy and intrinsic motivation, factors consistently associated with sustained language development (Rena Tri Setyo Maryana, 2026)

Implications of the Study

The findings suggest several implications for educational practice. First, instructors working with visually impaired students should prioritize structured, repetitive tactile

activities that enable multiple meaningful encounters with target vocabulary. Spelling drills, dictation exercises, and guided repeated reading appear particularly effective for supporting lexical consolidation.

Second, educators should recognize that autonomous vocabulary learning skills develop progressively and require systematic scaffolding. While foundational tactile fluency may be established relatively quickly through guided practice, higher-order skills such as contextual inference and independent word recognition emerge more gradually and benefit from explicit instruction and sustained support.

Third, the student's positive perception of Braille as an empowering tool underscores the importance of ensuring early and comprehensive access to Braille literacy instruction. Braille functions not merely as an access medium but as a mechanism for building learner autonomy, confidence, and self-efficacy.

Limitations of the Study

Despite the informative findings, several limitations should be acknowledged. First, the study involved a single participant, which limits the generalizability of the results to broader populations of visually impaired learners. Individual differences in tactile sensitivity, cognitive processing styles, prior educational experiences, and age of Braille acquisition may influence vocabulary learning outcomes.

Second, the observation period was relatively brief, and long-term retention of vocabulary was not assessed. Future research should examine whether the benefits of tactile repetition and guided practice persist over extended periods and contribute to sustained lexical growth.

Third, the study relied on a limited set of behavioral indicators and self-reported data, which may not capture the full complexity of vocabulary learning processes. Additionally,

the study did not systematically control for variables such as word frequency, concreteness, or morphological complexity, which may influence acquisition rates.

Recommendations for Future Research

Future studies could address these limitations by employing larger, more diverse samples and longitudinal designs that track vocabulary development over extended periods. Research comparing different types of tactile activities (e.g., spelling drills versus contextual reading versus gamified applications) would help identify optimal instructional strategies for vocabulary acquisition among visually impaired learners.

Additionally, investigations examining the relationship between tactile reading fluency and various dimensions of vocabulary knowledge (e.g., breadth, depth, receptive versus productive knowledge) would provide deeper insights into the mechanisms underlying Braille-mediated lexical development. Research incorporating neurocognitive measures, such as event-related potentials or functional neuroimaging, could elucidate the neural substrates of tactile vocabulary learning and their relationship to behavioral outcomes.

Finally, studies exploring the transfer of vocabulary learning across modalities (e.g., from Braille to auditory processing or from tactile to written production) would contribute to understanding how visually impaired learners integrate lexical knowledge across different representational systems.

The findings of this study indicate that Braille-mediated vocabulary learning is an effective approach for supporting lexical acquisition among visually impaired students. The combination of tactile access, repeated meaningful engagement, and active learner participation appears to facilitate vocabulary retention while simultaneously fostering motivation and learner autonomy. The statistical distribution of observed behaviors (57% frequent, 43% occasional) demonstrates that foundational tactile and motivational

competencies can be established through structured instructional approaches, while higher-order autonomous skills develop progressively with continued support. These results highlight the potential of Braille literacy as a comprehensive pedagogical strategy that supports not only vocabulary acquisition but also broader educational empowerment and self-determination among visually impaired learners.

CONCLUSIONS

This investigation explored the effectiveness of the Braille system as a medium for vocabulary acquisition in a visually impaired learner. Through systematic observation and student self-reporting, the study sought to understand how tactile reading influences lexical development and learner autonomy.

The findings revealed that Braille-mediated instruction successfully supported vocabulary learning, with the majority of engagement indicators occurring regularly. The student demonstrated particular strength in tactile decoding, sustained motivation, and vocabulary retention following structured practice. Activities involving repeated tactile exposure—such as spelling drills and dictation exercises—proved especially effective for lexical consolidation. Additionally, the student reported that Braille literacy fostered independence and confidence in the learning process.

Overall, the results suggest that Braille serves not merely as an access tool but as an effective pedagogical medium for vocabulary acquisition when combined with meaningful repetition and active engagement. The convergence of observational and interview data indicates that tactile-kinesthetic memory plays a crucial role in lexical development among visually impaired learners, and that learner autonomy emerges progressively as tactile fluency increases.

From a pedagogical perspective, these findings underscore the importance of incorporating structured, repetitive tactile activities in vocabulary instruction for visually impaired students. Educators should prioritize hands-on strategies that enable multiple meaningful encounters with target vocabulary while providing systematic scaffolding for the development of autonomous reading skills. Theoretically, this study contributes to understanding how multimodal sensory integration supports lexical acquisition and reinforces

the value of Braille literacy in promoting both linguistic competence and learner empowerment.

Despite these contributions, certain limitations should be acknowledged. The single-participant design limits the generalizability of the findings, and the relatively brief observation period did not allow for assessment of long-term vocabulary retention. Future research could employ larger samples and longitudinal designs to track vocabulary development over extended periods, as well as investigate comparative effectiveness of different tactile learning activities.

In conclusion, this study demonstrates that Braille-mediated vocabulary learning, when structured around tactile repetition and active participation, effectively supports lexical acquisition while fostering motivation and learner autonomy among visually impaired students.

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