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# Breaking Barriers with Braille: Driving Literacy and Lifelong Learning for Learners with Visual Impairment

**Eva Buendia Azaña**
*Bicol College, R.F Tabuena St., Sagpon, Daraga, Albay, Philippines*

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Email of Author: evasisa2020@gmail.com

## Abstract

This study examined Braille instruction for learners with visual impairment in selected SPED Centers in the Bicol Region, focusing on instructional resource use, teaching approaches, barriers, and administrative support to inform evidence-based interventions. Anchored on an integrated framework that includes socio-constructivist theory, pedagogical content knowledge, the theory of planned behavior, institutional theory, and theory of change, the study employed a mixed-methods design combining quantitative descriptive analysis and qualitative thematic analysis. Data were gathered from Teachers of Learners with Visual Impairment and SPED administrators using purposive sampling and semi-structured interviews, with quantitative data analyzed through weighted mean and ranking, and qualitative data analyzed through coding and thematic development. Findings revealed that Braille instruction relies heavily on basic tactile materials, with limited use of advanced technologies, while teaching practices are largely individualized, experiential, and adaptive. However, significant challenges persist, including insufficient instructional materials, limited formal training, time constraints, learner fatigue, and weak home and institutional support. Administrative support was present but uneven, particularly in terms of funding and sustained professional development. The study concludes that while Braille instruction is actively implemented, its effectiveness is constrained by systemic and resource-related limitations, and recommends strengthened institutional support, structured teacher training, improved resource allocation, and enhanced coordination with families. The study aligns with Sustainable Development Goals such as quality education, reduced inequalities, and decent work by promoting inclusive literacy and equitable access to education for learners with visual impairment. It contributes to sustainability by supporting institutional, educational, and social systems that enhance inclusive learning environments and long-term learner independence.

**Keywords:** Administrative Support, Braille Instruction, Inclusive Education, Learners with Visual Impairment, Sped Centers, Teaching Approaches

## 1. Introduction

Literacy is a fundamental human right and a cornerstone of inclusive education, particularly for learners with visual impairment who rely on Braille as a primary medium for accessing written language (UNESCO, 2020; World Health Organization WHO, 2020). Braille supports full literacy development, academic achievement, and lifelong independence, yet its effective implementation depends on instructional quality, teacher competence, and systemic support. Despite strong global and national commitments to inclusive education, gaps persist between policy and classroom practice, particularly in regional contexts such as the Bicol Region. This study examines Braille use, teacher approaches, barriers, and administrative support to inform evidence-based interventions that enhance literacy outcomes for learners with visual impairment.

### 1.1 Background of the Study on Braille Literacy for Learners with Visual Impairment

Literacy enables participation in education and society and is central to achieving inclusive and equitable learning (UNESCO, 2020). For learners with visual impairment, Braille serves as a complete literacy system that facilitates access to spelling, grammar, and textual organization beyond auditory alternatives (World Health Organization WHO, 2020). Braille proficiency is strongly associated with educational attainment, employment, and independent living (Čolić et al., 2020). Effective Braille instruction requires adaptable pedagogical approaches that address diverse learner needs, combining structured and holistic strategies (Alya Qasdina Ng Ai Lee & Kway, 2023). Additionally, affective factors such as motivation, self-efficacy, and engagement significantly influence literacy development (García-González et al., 2022). These multidimensional requirements highlight the need for context-specific research to improve both cognitive and emotional outcomes in Braille learning.

### 1.2 Themes and Insights from Related Literature on Braille Use, Teaching Approaches, and Instructional Barriers

Literature consistently identifies Braille as central to literacy, academic participation, and lifelong learning among learners with visual impairment. Reading fluency, influenced by tactile coordination and repeated exposure, is a key indicator of

effective Braille use (Mousty and Bertelson, 2021; Radojichikj, 2022; Hasbrouck & Tindal, 2023). Sustained Braille use supports independence and employment outcomes beyond schooling (Martiniello et al., 2023). Instructional quality, early exposure, and systematic teaching significantly affect literacy outcomes (Koenig and Holbrook, 2022; Emerson et al., 2021; Syuhadi et al., 2022). Braille also supports learning in complex domains such as mathematics and technology-enhanced environments (Leendert et al., 2022; Zetriuslita et al., 2023; Holtkamp et al., 2024). However, systemic barriers—including limited teacher preparation, insufficient materials, and weak institutional support—hinder effective implementation (Habulezi, 2024; Mohammed and Omar, 2023). Teaching approaches for learners with visual impairment emphasize accessibility, multisensory strategies, structured instruction, and adaptive technologies (Meulen et al., 2022; Mountapmbeme & Ludi, 2021; Huff et al., 2021; Al-Otaibi et al., 2021). Teachers often compensate for inaccessible tools through modified instruction, increasing workload and limiting learner independence (Mountapmbeme & Ludi, 2021). Effective pedagogy integrates accessible materials, scaffolded instruction, and explicit navigation skills to support conceptual learning (Speicher & Chandrasekar, 2025). Challenges in Braille instruction are multidimensional, including inadequate training, time constraints, material shortages, technological limitations, and diverse learner needs (Amato, 2022; Croake et al., 2024; Roe et al., 2023; Gilson, 2021; Barclay et al., 2022). Psychosocial factors such as stigma and motivation further influence learning outcomes (Hatlen, 2021; George & Duquette, 2021). Overall, literature emphasizes that Braille literacy outcomes are shaped by the interaction of instructional practices and systemic conditions.

### 1.3 Local, National, and Global Context of Braille Instruction and Inclusive Education

Globally, inclusive education frameworks emphasize equitable access to literacy for learners with disabilities (UNESCO, 2020). In the Philippines, Republic Act No. 7277 and Republic Act No. 11650 mandate inclusive education and access to Braille resources (Congress of the Philippines, 2002; Congress of the Philippines, 2022). DepEd Order No. 44, s. 2021 further institutionalizes support for learners with disabilities (Department of Education, 2021). Despite these policies, implementation gaps persist, particularly in regional contexts such as the Bicol Region. Variations in resources, teacher preparation, and administrative support affect the delivery of Braille instruction. Limited empirical studies in this region constrain evidence-based decision-making, highlighting the need for localized research to improve literacy outcomes.

### 1.4 Theoretical or Conceptual Basis of Braille Instruction, Teacher Practices, and System Support

This study is grounded in an integrated theoretical framework. Socio-Constructivist Theory (Vygotsky, 1978) explains Braille as a mediating tool for cognitive and literacy development. Pedagogical Content Knowledge (Shulman, 1986) highlights the importance of specialized teaching competence in Braille instruction. The Theory of Planned Behavior (Ajzen, 1991) explains how teacher attitudes, norms, and perceived control influence instructional practices. Institutional Theory (DiMaggio & Powell, 1983) emphasizes the role of organizational support in sustaining Braille instruction, while the Theory of Change (Weiss, 1995) guides the development of interventions. The AZAÑA Theory further integrates these perspectives, emphasizing access, support systems, and adaptive literacy practices as determinants of Braille literacy outcomes.

### 1.5 Research Gaps and Rationale on Braille Instruction in the Bicol Region

Despite extensive international research, there is limited context-specific evidence on Braille instruction in Philippine SPED settings, particularly in the Bicol Region. Existing studies highlight gaps in teacher preparation, instructional materials, and institutional support (Negash, 2017; Negash & Gasa, 2022). Variability in local conditions further influences instructional practices and learner outcomes. This study addresses these gaps by examining the status of Braille use, teacher approaches, barriers, and administrative support. It aims to bridge the gap between policy and practice and provide evidence-based recommendations for improving Braille literacy.

### 1.6 Alignment with Relevant Sustainable Development Goals (SDGs)

This study aligns with SDG 4 – Quality Education by promoting inclusive and equitable literacy development through effective Braille instruction for learners with visual impairment, ensuring access to meaningful learning opportunities (UNESCO, 2020). It also supports SDG 8 – Decent Work and Economic Growth, as Braille proficiency is linked to improved educational attainment, employment opportunities, and independent living (Čolić et al., 2020). Furthermore, the study contributes to SDG 10 – Reduced Inequalities by addressing disparities in access to instructional resources, teacher preparedness, and institutional support for learners with disabilities, particularly in underserved regions such as the Bicol Region. In addition, it reflects SDG 9 – Industry, Innovation and Infrastructure through the integration of assistive technologies that enhance Braille instruction and accessibility in education. Collectively, the study advances inclusive education systems that reduce barriers, promote equal opportunities, and support sustainable human development for learners with visual impairment.

### 1.7 Importance of the Study to Multidisciplinary Sustainability

This study contributes to educational sustainability by strengthening inclusive literacy practices and improving instructional quality. It supports socio-economic sustainability by enhancing learners' independence, employability, and participation in society. The research also advances technological sustainability through the integration of assistive tools

in Braille instruction. Additionally, the study promotes institutional and policy sustainability by providing evidence to guide educational planning, teacher training, and resource allocation. At the community level, it supports social sustainability by fostering inclusion and reducing educational inequities. Overall, the study contributes to a sustainable and inclusive education system that empowers learners with visual impairment.

## 2. Material and methods

### 2.1 Research Design

The study employed a mixed-methods research design, integrating quantitative and qualitative approaches to provide a comprehensive understanding of Braille instruction. Quantitative methods were used to determine the status of Braille use among learners with visual impairment and to evaluate administrative support, focusing on measurable indicators and frequency-based data. In contrast, qualitative methods were utilized to explore teaching approaches and instructional barriers through participants' lived experiences and contextual insights. Semi-structured interviews served as the primary qualitative tool, allowing in-depth exploration of instructional practices, perceptions, and institutional realities. This combination enabled both statistical description and rich contextual interpretation of findings.

### 2.2 Locale of the Study

The study was conducted in the Bicol Region, particularly in selected SPED Centers and educational institutions in Camarines Sur that provide Braille instruction to learners with visual impairment. These included specialized schools, public school-based SPED Centers, and rehabilitation facilities actively implementing Braille programs. The inclusion of institutions across different municipalities allowed the study to capture variations in instructional practices in both urban and rural contexts. Coordination with school administrators and SPED coordinators ensured access to participants and adherence to institutional protocols, while the diversity of sites strengthened the contextual relevance of the findings.

### 2.3 Respondents of the Study

The study involved respondents who were directly engaged in Braille instruction and program supervision. The respondents included Teachers of Learners with Visual Impairment (TVIs) and school principals or SPED administrators. As reflected in Table 1, the participants were composed of teachers responsible for daily Braille instruction and administrators overseeing program implementation, resource allocation, and policy enforcement. Teachers contributed firsthand insights into instructional practices, material adaptation, and classroom challenges, while administrators provided perspectives on institutional support, training opportunities, and program sustainability. The diversity in professional roles and experience levels allowed for a comprehensive understanding of both instructional and administrative dimensions of Braille education.

### 2.4 Sample and Sampling Procedure

Purposive sampling was used to select participants with relevant experience and direct involvement in Braille instruction. This approach ensured the inclusion of information-rich participants capable of providing meaningful insights into instructional practices, barriers, and support systems. The sample consisted of Teachers of Learners with Visual Impairment and SPED administrators, representing both instructional and supervisory perspectives. The selection process prioritized participants' professional roles, engagement in Braille instruction, and familiarity with SPED programs. This sampling strategy was appropriate for qualitative inquiry, as it emphasized depth of information rather than statistical generalization.

### 2.5 Research Instrument

The primary research instrument was a semi-structured interview guide composed of three sections aligned with the study objectives. The first section focused on teaching approaches, including instructional strategies, material adaptation, assessment practices, and inclusive learning environments. The second section examined barriers to Braille instruction, such as resource limitations, curriculum gaps, time constraints, and training challenges. The third section explored administrative support, including access to resources, professional development, and institutional policies. The interview questions were designed to be clear, non-leading, and aligned with the study's theoretical framework. The semi-structured format allowed flexibility for probing and clarification, enabling the collection of detailed and context-rich data. An informed consent form accompanied the instrument, outlining the study's purpose, procedures, confidentiality measures, and participant rights, including permission for audio recording. To ensure confidentiality, participants were assigned codes instead of names, and all data were systematically documented and securely managed.

### 2.6 Data Gathering Procedure

Data collection followed a structured and time-bound process. After securing approvals and permissions, participants were identified and recruited over approximately two weeks using purposive sampling. Invitations and interview schedules were coordinated through official communication channels, ensuring that participants were informed about the study's purpose and ethical considerations. Interviews were conducted over three to four weeks, with each session lasting 30 to 60 minutes. All interviews were conducted face-to-face by the researcher to allow direct interaction, clarification of responses, and in-

depth probing of emerging themes. Prior to each interview, informed consent and permission for audio recording were obtained. Recorded data were transcribed verbatim, reviewed for accuracy, and securely stored. The researcher-maintained communication with participants throughout the process to address clarifications and ensure ethical compliance, resulting in comprehensive and credible qualitative data.

### 2.7 Data Analysis Techniques

Data analysis was aligned with the mixed-methods design. Quantitative data were analyzed using descriptive statistics, specifically weighted mean and ranking, to determine the level of Braille use and administrative support. The weighted mean summarized responses across indicators, while ranking identified priority areas and trends. Qualitative data were analyzed using thematic analysis. Interview transcripts were coded to identify recurring ideas, which were grouped into categories and developed into key themes. This inductive approach allowed patterns to emerge from participants' experiences, ensuring accurate representation of their perspectives. Consistency of themes across respondents was examined to enhance credibility. The integration of quantitative and qualitative findings provided a comprehensive interpretation, linking statistical trends with contextual explanations.

## 3. Results and Discussion

### 3.1 Status and Implementation of Braille Instruction

#### 3.1.1 Use of Instructional Resources

The findings show that writing tools and Braille materials were the most frequently used resources, followed by moderate use of braillers and computers with JAWS, while embossers were least utilized. This indicates that instruction relies heavily on basic tactile tools, with limited integration of advanced production technologies and assistive devices. These results suggest that Braille instruction remains grounded in foundational tactile practices, emphasizing direct engagement with reading and writing. However, the limited use of advanced tools reflects structural constraints that restrict opportunities for developing writing fluency, independent production, and technology integration. This pattern aligns with studies highlighting the importance of both basic and advanced resources in sustaining effective Braille literacy (Emerson et al., 2022a, 2022b; Wormsley, 2023; Day et al., 2022; Herzberg et al., 2022; Koenig & Holbrook, 2022; Mmasi et al., 2022; Roe, 2022; Rose et al., 2025).

### 3.2 Teachers' Professional Background and Instructional Approaches

#### 3.2.1 Entry into SPED and Preparation

The findings reveal that most teachers entered SPED through administrative assignment rather than formal specialization, often beginning with little or no background in Braille instruction. As a result, initial teaching involved adjustment, uncertainty, and reliance on self-learning. This indicates a structural gap in teacher preparation, where competence develops reactively rather than through planned training. Such conditions may affect instructional consistency and early learner outcomes, reinforcing literature that highlights the consequences of insufficient pre-service preparation in specialized instruction (Argyropoulos et al., 2019; Gilson, 2021; Gray, 2022; Roe et al., 2023).

#### 3.2.2 Experiential Learning and Informal Support

Teachers reported learning Braille primarily through classroom experience, peer collaboration, and self-directed practice, with formal training playing a secondary role. Instructional competence developed gradually through trial-and-error and mentoring. While experiential learning fostered adaptability, it also resulted in uneven instructional quality due to the absence of standardized training. This supports literature emphasizing the need for structured professional development and mentoring to ensure consistent instructional standards (Gilson, 2021; Koenig & Holbrook, 2022; Day et al., 2022; Emerson et al., 2022b).

#### 3.2.3 Development of Confidence and Competence

Teachers' confidence and competence improved over time through repeated exposure, practice, and interaction with learners. Mastery emerged gradually rather than immediately. This suggests that experience functions as a compensatory mechanism for limited training, but also creates a delay in instructional effectiveness during early teaching stages. Literature supports that Braille teaching expertise develops cumulatively through practice, though early structured support is necessary to ensure consistent outcomes (Emerson et al., 2022b; Day et al., 2022; D'Andrea, 2023; Wormsley, 2023).

#### 3.2.4 Differentiated Roles in SPED

The findings show that classroom teachers focused on direct instruction, while experienced teachers and administrators assumed mentoring, supervisory, and program management roles. This role differentiation supports program continuity but remains largely informal, depending on individual initiative. Literature confirms that distributed leadership and structured mentoring are essential for sustaining specialized programs (Spillane, 2021; Harris & Jones, 2022; McCall et al., 2023; Ferrell, 2024; Ainscow et al., 2021; Florian & Black-Hawkins, 2024).

### 3.3 Pedagogical and Instructional Practices

#### 3.3.1 Tactile and Auditory Instruction

Teachers primarily used tactile and auditory strategies, converting visual content into hands-on materials and verbal explanations. This reflects a shift from visual-based teaching to sensory-accessible instruction, consistent with research emphasizing tactile learning and structured Braille pedagogy (D'Andrea, 2023; Emerson et al., 2022a; Day et al., 2022; Croake et al., 2024; Wong et al., 2013).

#### 3.3.2 Individualized Instruction

Instruction was predominantly individualized, with teachers adjusting pacing, strategies, and delivery based on learner needs, often through one-on-one teaching. This highlights the necessity of differentiated instruction in Braille learning, as supported by literature emphasizing learner variability and the effectiveness of individualized teaching (Wormsley, 2023; D'Andrea, 2023; Emerson et al., 2022b; Barclay et al., 2022).

#### 3.3.3 Environmental Modifications

Teachers modified classroom environments to ensure safety, consistency, and ease of navigation by minimizing clutter and maintaining predictable layouts. These practices support spatial orientation and independence, aligning with studies highlighting the importance of structured environments for learners with visual impairment (Gray, 2022; Hatlen, 2021; Heller & Ballesteros, 2012).

#### 3.3.4 Use of Improvised Materials

Teachers frequently used improvised and locally available materials due to limited access to specialized resources. While this demonstrates adaptability, it also reflects systemic resource gaps, consistent with literature on material shortages in Braille education (Mmasi et al., 2022; Habulezi, 2024; Koenig & Holbrook, 2022).

#### 3.3.5 Structured and Sequential Instruction

Braille instruction followed a step-by-step progression from letters to words and sentences, with gradual release from teacher guidance to independent learning. This structured approach supports literacy development and is strongly aligned with evidence-based Braille instruction emphasizing sequencing and scaffolding (Emerson et al., 2021; Day et al., 2022; Croake et al., 2024; Wormsley, 2023).

#### 3.3.6 Repetition and Daily Practice

Daily routines, drills, and repeated practice were identified as essential for developing Braille fluency and retention. This reinforces the cumulative nature of tactile learning and is supported by research emphasizing repetition as critical for Braille mastery (Altarawneh, 2021; Aleksandrowicz, 2021; American Foundation for the Blind, 2023).

#### 3.3.7 One-on-One Instruction and Immediate Feedback

Teachers emphasized individualized instruction with immediate correction of errors to prevent incorrect tactile patterns. This reflects the precision required in Braille literacy and aligns with literature highlighting the importance of real-time feedback in tactile learning (Wormsley, 2023; Emerson et al., 2022b; Gilson, 2021; Oshima et al., 2014).

#### 3.3.8 Integration of Reading, Writing, and Functional Use

Instruction integrated reading, writing, and real-life application of Braille using tools such as slates and braillers. This supports functional literacy and independence, consistent with research emphasizing the importance of meaningful and applied learning contexts (Wormsley, 2023; Emerson et al., 2022b; Martiniello et al., 2021).

### 3.4 Barriers in Braille Instruction

#### 3.4.1 Limited Materials and Resources

Teachers reported shortages of Braille books and tools, often sharing or using outdated materials. This significantly constrained practice opportunities and instructional continuity, supporting literature that links resource availability to literacy outcomes (Altarawneh, 2021; American Foundation for the Blind, 2022; Qasdina Ng Ai Lee & Kway, 2023).

#### 3.4.2 Insufficient Training

Teachers lacked adequate formal training and relied on self-learning and limited seminars. This resulted in inconsistent instructional practices, reinforcing the need for structured and continuous professional development (American Printing House for the Blind, 2021; Aleksandrowicz, 2021; Shulman, 2021).

#### 3.4.3 Time Constraints

Braille instruction required intensive one-on-one teaching, but limited time and competing responsibilities constrained instructional delivery. This reduced opportunities for sustained practice and feedback, reinforcing the need for dedicated instructional time and support systems. These findings are supported by research on the time-intensive nature of tactile learning (Day et al., 2022; Emerson et al., 2022b).

#### 3.4.4 Learner Fatigue and Motivation

Learners experienced fatigue, fluctuating motivation, and non-linear progress due to the physical and cognitive demands of Braille learning. This reflects the gradual development of tactile skills and highlights the need for flexible pacing and motivational support. Literature supports these findings by emphasizing the role of sensory development and emotional factors in Braille learning (Heller & Ballesteros, 2012; Emerson et al., 2022a; Roe, 2022).

#### 3.4.5 Limited Home Support

Limited practice at home due to lack of parental knowledge and resources affected learning continuity and skill retention. This underscores the importance of family involvement in literacy development. Literature highlights that coordinated home–school support enhances learning outcomes (Martiniello et al., 2020; Gray, 2022; Negash & Gasa, 2022).

### 3.5 Administrative Support

Administrative support was strongest in approval and supervisory functions but weaker in material provision, financial allocation, and sustained professional development. This indicates that while institutional encouragement exists, structural and resource-based support remains limited. The findings align with literature documenting gaps between policy and implementation in SPED programs (DepEd, 2017; DepEd, 2022; SEAMEO INNOTECH, 2020; Bautista, 2019; Dizon & Ramos, 2021). Overall, the findings demonstrate that Braille instruction is actively implemented but shaped by interconnected challenges in resources, training, time, learner factors, and institutional support. These factors collectively influence the consistency, depth, and effectiveness of Braille literacy instruction for learners with visual impairment.

## 4. Conclusion and Recommendations

The study concludes that Braille instruction in SPED settings is present but constrained by inconsistencies in resource availability, instructional practices, and systemic support. While foundational materials are available, their moderate and uneven provision limits sustained literacy development and learner independence. Teacher competence develops through experiential learning rather than structured preparation, resulting in variability in instructional quality. Barriers such as insufficient materials, limited training, time constraints, and weak home support collectively hinder effective instruction and learner outcomes. Although administrative support is evident, it remains moderately adequate and lacks sufficient financial commitment and rigorous supervision to sustain optimal Braille literacy programs. The proposed action plan provides a structured response to these interconnected challenges, aiming to strengthen instructional delivery and support systems for learners with visual impairment.

It is recommended that the Department of Education and SPED administrators strengthen institutional support for Braille instruction through protected funding, standardized resource provision, and regular monitoring systems to ensure equitable access to materials and tools. Policies on teacher deployment should align SPED assignments with specialization, while structured induction, mentoring, and continuous professional development programs should be institutionalized to improve instructional competence. Schools and administrators should also enhance coordination mechanisms to address systemic barriers, ensure consistent instructional practices, and support teachers in delivering effective Braille instruction. Additionally, sustained collaboration with families should be promoted to reinforce learning beyond the classroom. The implementation of the proposed action plan is recommended to systematically address identified challenges and improve the overall quality of literacy instruction for learners with visual impairment.

The study is limited by its focus on selected SPED Centers within a specific regional context, which may affect the generalizability of the findings to other settings. The reliance on purposive sampling and participant self-reports may also limit the scope of perspectives and introduce potential bias in the data. Furthermore, the study primarily examined instructional practices, barriers, and administrative support without extending to long-term measurement of learner outcomes. These limitations suggest that the findings are context-specific and highlight the need for broader and longitudinal investigations to further validate and expand the results.

## Compliance with ethical standards

The authors declare no conflict of interest and this study received no external funding. The researchers express gratitude to the participating Teachers of Learners with Visual Impairment and school administrators, as well as the cooperating SPED institutions, for their support and participation. Participation was voluntary, and informed consent was obtained prior

to data collection using non-invasive methods such as interviews. All data were treated with strict confidentiality, and no identifying information of participants or institutions was disclosed.

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