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Braille Media in Vocabulary Learning for Blind Students at Special Needs School: A Review of Educational Psychology

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ABSTRACT

Blind children in special needs schools struggle to learn the Arabic language without visual aid. Educational psychology must study how to maximize the learning medium for blind students' psychological and tactile demands. This study aims to explore and describe the effectiveness of using Braille media in teaching Arabic vocabulary to blind students, especially from an educational psychology perspective that includes cognitive aspects, motivation, and the language acquisition process. This study uses a descriptive qualitative approach. The subjects of the study were blind students at SLB-A YAPTI Makassar. Data collection was carried out through participant observation, in-depth interviews with teachers and students, and analysis of learning documents to gain a comprehensive understanding of the implementation and impact of Braille in the vocabulary learning process. The results of the study indicate that Braille media has high effectiveness as the main tool in learning Arabic vocabulary for blind students. From an educational psychology perspective, Braille functions as a cognitive facilitator that allows students to activate tactile-kinesthetic memory, improve concentration, and build linguistic schemes in a structured manner. The use of Braille, integrated with appropriate teaching methods, has also been shown to increase students' intrinsic motivation due to their independence in accessing and processing vocabulary materials. Vocabulary retention is also more optimal due to multi-sensory engagement. This study adds to educational psychology and special education literature by examining how Braille media helps visually impaired students learn foreign languages. It helps teachers and curriculum developers create successful and inclusive language teaching tools that accommodate visually impaired kids' specific psychological mechanisms.

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1. INTRODUCTION

Education is a fundamental right for every individual, including those with disabilities. In the context of special education, particularly for students with visual impairments, the learning process requires specific adaptations to the curriculum,

methodology, and teaching media (Bessarab et al., 2025). Blind individuals, as individuals with total or partial vision impairments (low vision), must rely on non-visual senses—primarily touch and hearing—to access information and develop a cognitive understanding of the world (Kauffman & Hallahan, 2009).

In Indonesia, Special Schools (SLB) are vital institutions that bridge this educational need (Kadarisman et al., 2024; Somad et al., 2024; Suwarta et al., 2025). One of the greatest challenges in education for the blind is literacy. Braille, invented by Louis Braille, is a tactile reading and writing code consisting of raised dots that has been globally recognized as the primary literacy system for the blind (Gurnani & Kaur, 2025). Braille functions not only as a mechanical tool for reading, but psychologically, it plays a crucial role in facilitating students' cognitive, linguistic, and academic independence development (Martiniello & Wittich, 2022; Kana & Hagos, 2025).

Learning a foreign language, such as Arabic, is an integral part of the educational curriculum in many special needs schools in Indonesia, particularly those affiliated with religious institutions (Muslim & Harisca, 2021; Nurmaliyah et al., 2023). In this context, mastery of vocabulary is the primary foundation that determines students' ability to understand texts, communicate, and access religious resources.

For blind students, the vocabulary acquisition process is particularly complex (Campbell et al., 2024). Sighted students generally acquire vocabulary through visual (reading, seeing objects/pictures), audio (hearing), and contextual exposure. In contrast, blind students must rely on a combination of tactile (through Braille), audio, and limited concrete experiences (Carpio et al., 2017). When the vocabulary taught is abstract or refers to objects they rarely touch, Braille must work harder to facilitate concept formation in students' minds. Therefore, the effectiveness of Braille media lies not only in students' ability to identify the letter symbols, but also in the extent to which this media can trigger and support the psychological processes underlying vocabulary acquisition: tactile memory, linguistic processing, and learning motivation.

This study specifically uses a review of educational psychology as its analytical framework. This perspective focuses on how the mental processes (cognition) of blind students interact with Braille media in learning situations. In the cognitive model, Braille acts as tactile information input that must be processed into linguistic representations in the brain (Gaca et al., 2025). The speed and accuracy of Braille reading are highly dependent on finger sensitivity and tactile perception (Park et al., 2023). Educational psychology seeks to understand how effectively these Braille stimuli (raised dots) are processed, encoded, and stored as vocabulary memory, especially when dealing with unique letter systems such as Arabic Braille (Braille Hijaiyah), which has a different configuration than Latin Braille.

The use of psychologically appropriate media can increase students' self-efficacy and intrinsic motivation (Shin & Bolkan, 2021). Braille provides independence; students do not need to constantly rely on teachers or audio recordings. This sense of control and ability to access information independently is an important affective factor that positively correlates with learning outcomes (Quílez-Robres et al., 2021). Irrelevant media (monotonous or difficult to access) can lead to boredom and decreased interest,

as often found in early Braille literacy research (Ramadhani & Irdamurni, 2022). Constructivism emphasizes that students construct their own knowledge through interaction with the environment. For the visually impaired, this interaction is tactile (multisensory). Braille's effectiveness in vocabulary learning will be assessed by its ability to help students construct the meaning of new vocabulary as a whole (Hoskin et al., 2024), rather than simply memorizing dot symbols (see also: Multisensory Theory in the Context of Special Needs Children).

Although Braille is recognized as a primary medium, its implementation and impact on vocabulary acquisition (Arabic) need to be explored empirically, especially in specific settings. SLB-A YAPTI Makassar was chosen as the subject because it is one of the educational centers for the blind that has a structured Arabic language learning program, thus providing a rich context for observing teaching practices and analyzing learning outcomes. The research question to be answered is: How effective is Braille media in facilitating the cognitive processes, memory, and motivation of blind students at SLB-A YAPTI Makassar in mastering Arabic vocabulary, based on the principles of educational psychology? A descriptive qualitative approach will allow researchers to capture the depth of students' experiences, teachers' adaptation strategies, and the dynamics of tactile-linguistic interactions in a natural setting.

While numerous studies have examined Braille media (Andrisani & Iswari, 2021; Pransiska & Sari, 2022; Firdausya et al., 2022), the uniqueness of this study resides in the convergence of three specific variables that have not been thoroughly investigated in an integrated manner, particularly within the Indonesian context. This study does not aim to create new media; instead, it seeks to describe and analyze the efficacy of existing Braille (books/reglets) as psychological-cognitive tools for vocabulary instruction in a real-world special education context. The focus is on the acquisition of Arabic vocabulary—an advanced skill that requires an understanding of abstract concepts and syntax, not simply letter recognition. This task requires a more in-depth analysis of memory retention processes and linguistic concept formation. This study provides an exclusive review from the perspective of educational psychology. This study explicitly uses concepts such as tactile cognitive load, tactile intrinsic motivation, and Braille's role in constructing linguistic schemas as the primary lens for analyzing the data, providing a richer theoretical understanding of how visually impaired students actually learn and remember vocabulary.

By focusing on analyzing how and why Braille is effective from a cognitive and affective perspective in SLB-A YAPTI Makassar in learning mufradat, this study seeks to fill the gap in the literature by presenting rich descriptive qualitative data based on educational psychology theory. The results will provide significant contributions for educators and educational psychologists in designing learning strategies that are not only inclusive but also based on a deep understanding of how the brain of blind people processes language information through touch.

This study aims to explore and describe the effectiveness of using Braille media in Arabic vocabulary learning for blind students at SLB-A YAPTI Makassar through an educational psychology approach. This research is expected to provide theoretical and

practical contributions to the development of inclusive learning that is oriented towards the needs of students with special needs, particularly in the context of Arabic language learning.

2. METHOD

This study employed a qualitative approach with a descriptive design. The qualitative approach was chosen to gain a deeper (holistic and contextual) understanding of the phenomenon under study, namely the effectiveness of Braille media in facilitating vocabulary learning from an educational psychology perspective, which involves the interpretation of meaning and mental processes. The descriptive design aims to describe, record, and analyze the conditions, situations, and processes that occur naturally in the research subjects without manipulating variables. This is crucial to capture the unique interactions between blind students and Braille media in vocabulary learning as they occur in the field.

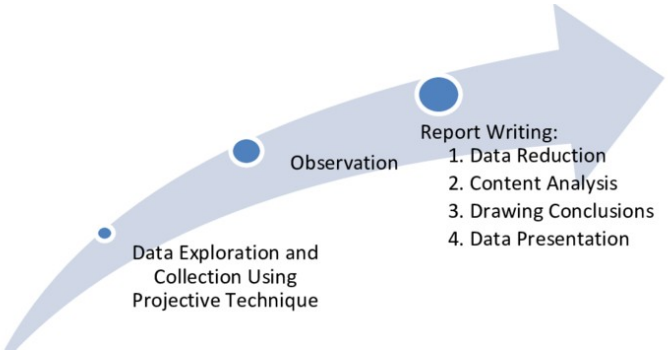

Figure 1. Descriptive Qualitative Method

This research was conducted at the YAPTI Special Needs School (SLB-A) in Makassar. This location was chosen based on the consideration that SLB-A YAPTI Makassar has a structured educational program for blind students, including Arabic language instruction, which is the focus of this study. The primary subjects in this study were blind students actively participating in Arabic vocabulary learning at SLB-A YAPTI Makassar. Subjects were selected using a purposive sampling technique, with the following criteria: students with visual impairments (totally blind or low vision who use Braille as their primary medium) enrolled and actively participating in Arabic language classes, students who already possess basic Braille reading and writing skills, and students with good communication skills to be interviewed. Supporting informants in this study included Arabic language teachers and classroom teachers directly involved in the use of Braille, as well as the principal or curriculum coordinator of SLB-A YAPTI Makassar.

The data collected were qualitative, including descriptive data: interview transcripts, observation notes regarding students' tactile activities while reading Braille, descriptions of teacher-student interactions, and student expressions of their learning motivation. Documentary data: syllabi, lesson plans that include the use of Braille, and student work (e.g., vocabulary tests written in Braille).

Table 1. Data Collection Technique

Data Collection Techniques	Objectives	Procedure
Non-Active Participatory Observation	To describe in detail the practice of teaching vocabulary and observe students' cognitive-tactile processes when interacting with Braille.	The researcher observed the classroom learning process, recording student focus, Braille tactile speed, expressions of motivation, and teacher strategies in linking Braille symbols to vocabulary meanings.
In-Depth Interviews	To explore students' perspectives on Braille's ease/difficulty, vocabulary retention rates, and perceptions of Braille.	A semi-structured questionnaire was administered to both students and teachers. Questions focused on aspects of educational psychology: tactile memory, intrinsic motivation, and concept formation.
Documentation	To explore teachers' teaching strategies and their evaluations of Braille's effectiveness.	The Arabic curriculum documents, the Braille vocabulary teaching materials used, and student learning evaluation records were analyzed.

Data analysis was conducted inductively and continuously, following the qualitative analysis model developed by Miles and Huberman (1994), which involves three stages:

1. Data Reduction: Summarizing, selecting key points, focusing on findings relevant to the research objectives (the effectiveness of Braille and a review of educational psychology), and discarding irrelevant data.
2. Data Display: Presenting the reduced data in a structured narrative, table, or matrix format. This presentation focuses on the relationship between Braille use (media variables) and psychological outcomes (motivation, retention, cognitive processes).
3. Conclusion Drawing/Verification: Drawing conclusions based on patterns, themes, and relationships found in the data. Conclusions will be verified by comparing findings from observations, interviews, and documents (data triangulation).

To ensure the validity and reliability of the findings, this study employed Source Triangulation and Technique Triangulation. This validity ensures that the description of the role of Braille media in vocabulary learning truly reflects the phenomena that occur at SLB-A YAPTI Makassar.

3. RESULTS AND DISCUSSION

Results

The results of this study provide an in-depth description of the implementation of Braille media in teaching Arabic vocabulary and analyze its effectiveness from an educational psychology perspective at SLB-A YAPTI Makassar. The analysis focuses on three main aspects: cognitive-tactile processes, increased learning motivation, and the impact on vocabulary retention.

1. Implementation of Braille Media in Teaching Arabic Vocabulary

Braille media at SLB-A YAPTI Makassar is consistently used as the primary tool for introducing, practicing, and evaluating new Arabic vocabulary.

1.1. Braille Usage Techniques by Teachers

Arabic language teachers use Braille in two main ways: (1) printed Braille textbooks/worksheets for word presentation, and (2) Braille pens and reglets for writing, dictation, and student self-evaluation activities.

The process of teaching Arabic vocabulary generally begins with the teacher pronouncing the word (auditory stimulus), followed by the students feeling the word in Braille (tactile stimulus). This verbal and tactile repetition aims to create a strong association between sound (pronunciation), symbol (Braille dot configuration), and word meaning.

1.2. Tactile Dominance in Linguistic Access

Observations indicate that blind students inherently rely on their sense of touch to verify and process linguistic information. Braille is not simply a visual substitute, but rather a cognitive gateway that allows students to parse individual words (morphemes) and syllables. The use of both fingers (the right index finger for reading and the left index finger for finding the next line) demonstrates complex sensorimotor coordination, a psychological prerequisite for effective literacy.

2. Braille Effectiveness: A Review of Cognitive-Tactile Processes

From a cognitive psychology perspective, Braille has been shown to effectively facilitate three key processes in vocabulary acquisition:

2.1. Enhanced Tactile Memory and Encoding

Students demonstrated high levels of tactile memory (tactile memory). When asked about the Braille dot configuration for specific vocabulary (for example, the word "قَلَمٌ"/qalamun, meaning pen), students were often able to accurately describe the position of the dots without having to feel them again.

> *Student Interview (S3): "For [the word] qalamun, I remember it looks like [dots] 1-2-4-5 at the beginning, then there's an alif [dot] 1, and finally [dots] 1-2-4. So, when I touch it, my brain immediately recognizes the dot shape and knows it means pen."*

This phenomenon suggests that Braille reduces irrelevant visual cognitive load and shifts it to the efficient tactile modality, enabling a more stable encoding of linguistic information into long-term memory.

2.2. Formation of Structured Abstract Concepts

For vocabulary referring to concrete objects (e.g., tables, books), Braille serves as a bridge between the tactile experience of the object (if any) and its linguistic symbol. However, Braille's greatest effectiveness is seen in helping students master abstract vocabulary (e.g., adjectives, verbs, or religious terms).

Braille provides a concrete and permanent physical representation of phonemes and morphemes, which cannot be achieved through audio alone. By repeatedly experiencing these words, students can build structured linguistic schemas, which are essential for understanding the grammar and contextual meaning of vocabulary.

3. Impact of Braille on Motivational and Affective Aspects

From an affective psychology perspective, the use of Braille has a significant impact on students' self-efficacy and intrinsic motivation.

3.1. Increasing Learning Independence

Braille gives blind students full autonomy in accessing learning materials, including vocabulary. Students no longer need to rely on audio recordings or verbal assistance from teachers or peers to repeat or review vocabulary. The ability to read, write, and self-correct in Braille fosters a sense of competence and control over their learning process.

> *Teacher Interview (G1): "Braille gives them power. They can carry their books everywhere and touch them whenever they want. If they only rely on sound, their memory quickly fades. With Braille, they feel like other students, able to learn independently."*

3.2. Reducing Learning Anxiety

The independence fostered by Braille is directly correlated with a decrease in learning anxiety. During oral evaluations or tests, students who have internalized vocabulary through Braille show lower levels of anxiety because they have a strong tactile base as an internal reference.

4. Vocabulary Retention and Application

Analysis of the evaluation results shows that students who actively and consistently use Braille during the repetition process (practicing with touch and writing) have a higher vocabulary retention rate compared to those who rely solely on auditory memory. Optimal Retention through Multi-Sensory Learning: Braille facilitates unique multi-sensory learning:

1. Tactile: Feeling the configuration of Braille dots.
2. Auditory: Hearing the teacher's pronunciation.
3. Kinesthetic: Writing Braille using a reglet and pen.

The simultaneous (or sequential) engagement of these three senses strengthens the neural pathways that store vocabulary information, aligning with the principles of cognitive learning that state that the more sensory modalities involved, the stronger the memory formed.

Overall, Braille has proven highly effective at SLB-A YAPTI Makassar, not only as a literacy tool, but as an essential educational psychological instrument in supporting

cognitive function, increasing motivation, and ensuring successful vocabulary acquisition for visually impaired students.

Discussion

This discussion section integrates findings regarding the effectiveness of Braille in learning Arabic vocabulary at SLB-A YAPTI Makassar with key theories in educational psychology. The research findings are contextualized to explain why Braille is a superior medium for blind students, particularly in supporting cognitive processes, motivation, and long-term retention.

1. Braille as a Cognitive Facilitator: Information Processing Theory

The finding that Braille effectively facilitates encoding and reduces cognitive load in blind students aligns with Information Processing Theory. In this theory, learning is viewed as an active process in which individuals receive, process, store, and retrieve information.

1.1. Optimizing the Tactile Channel

Blind students, who lack the visual channel, must rely on other information input channels. Braille converts abstract linguistic information (vocabulary) into structured and standardized tactile input. This optimizes their working memory. Braille provides a stable physical representation, allowing the brain to focus its cognitive resources on pattern recognition (six-dot configurations) and meaningful associations (vocabulary concepts), rather than struggling to retain rapidly fading auditory information (Gao et al., 2024).

1.2. Tactile Memory and Long-Term Retention

The students' ability to recall Braille dot configurations indicates the activation of tactile-kinesthetic memory. This supports the Dual Coding Theory by Paivio, which states that information is more likely to be remembered if it is encoded (stored) through two distinct channels (Wong & Samudra, 2021). Although Braille does not provide a visual channel, it combines the linguistic/verbal channel (word meaning) with the non-verbal/tactile channel (touched dot patterns). This dual engagement creates a stronger and more durable memory trace, which explains the high levels of vocabulary retention found in this study.

2. Braille in an Affective Context: Needs and Motivation Theory

Braille's effects on increasing learning independence and reducing anxiety align with motivational theories, particularly Self-Determination Theory (SDT) (Smith et al., 2024; Deci & Ryan, 2024).

2.1. Supporting the Need for Autonomy

SDT posits that humans have three innate psychological needs: competence, relatedness, and autonomy. Findings indicate that Braille directly addresses students' need for autonomy. The ability to read and write vocabulary independently, without constant teacher intervention or assistive technology, gives students complete control

over their material. This sense of autonomy transforms learning from an external task into an activity driven by intrinsic motivation.

2.2. Increasing Self-Efficacy

Increased mastery of Braille in accessing vocabulary enhances students' sense of competence. When students feel competent in using their primary literacy tool, their self-efficacy in learning a foreign language also increases. This increase in self-efficacy, as expressed by Bandura, is a strong predictor of academic success and persistence in the face of learning difficulties (Alfayez, 2022; Woodcock & Tournaki, 2023).

3. Pedagogical Implications: Multi-Sensory and Inclusive Learning

The primary implication of these findings is the reaffirmation of Braille's role not only as a reading and writing tool, but as a fundamental multi-sensory instructional strategy in inclusive education.

3.1. Emphasis on Three Modalities

Effective vocabulary learning must always integrate three modalities working together: Tactile: Touching Braille (Visual-Substitution), Auditory: Hearing correct pronunciation (Audio), and Kinesthetic: Writing using reglet (Motor-Tactile). The use of this combination strengthens vocabulary encoding and retrieval. In the Arabic context, where pronunciation (makhorijul huruf) is crucial, tactile reinforcement helps students distinguish letters that have similar sounds.

3.2. Psychological Needs-Based Curriculum Development

The results of this study recommend that the development of a mufradat curriculum should not only focus on vocabulary quantity, but also on the quality of tactile interaction with Braille. Teachers should be encouraged to use methods that actively involve reglets and pens (kinesthetic) for vocabulary writing exercises, as this is the most powerful mechanism for strengthening tactile memory.

4. Limitations and Directions for Future Research

Although this study provides a rich description, it is limited by its descriptive qualitative approach in one special education school (SLB-A YAPTI Makassar). The generalizability of the findings may be limited.

Future research is recommended to:

a. Use a quantitative experimental design to statistically compare vocabulary retention between groups using Braille intensively versus groups using predominantly audio media.
b. Explore the role of Braille in learning sentence structure (nahwu/sharaf), which involves more complex cognitive processes than just vocabulary.
c. Examine the impact of using digital Braille technology (refreshable Braille displays) on reading motivation and speed, comparing it with paper Braille.

Overall, Braille media has proven to be an irreplaceable pedagogical and psychological principle in ensuring equal and effective linguistic access, as well as the development of strong self-efficacy in blind students.

4. CONCLUSION

Research findings at SLB-A YAPTI Makassar concluded that Braille media has very high effectiveness and plays a crucial role as an irreplaceable psychological-educational instrument in learning Arabic vocabulary for blind students. From a cognitive psychology perspective, Braille has been proven to optimize the linguistic encoding process (information input). It provides a stable physical (tactile) representation for vocabulary, which effectively reduces auditory cognitive load and facilitates the formation of strong long-term memory, in line with the principles of Dual Coding Theory (verbal and tactile). From an affective psychology perspective, the consistent use of Braille fosters intrinsic motivation and increases students' self-efficacy. Braille directly fulfills the psychological need for autonomy (self-control) in learning, allowing blind students to access, repeat, and review vocabulary materials independently. In addition, the vocabulary learning process that integrates touch (feeling Braille), hearing (pronunciation), and kinesthetic (writing with a reglet) creates comprehensive multi-sensory learning. This combination strengthens memory traces, resulting in higher levels of vocabulary retention compared to single modalities. Overall, Braille is an essential foundation for literacy, its primary function extending beyond reading and writing; it serves as a psychological prerequisite for blind students to master abstract linguistic concepts and achieve independent learning.

As suggestion, teachers are advised not only to use printed Braille but also to routinely integrate vocabulary writing activities using Braille reglets and pens as a core part of vocabulary repetition exercises. This kinesthetic activity is highly effective in strengthening tactile memory. Research using a quantitative experimental approach is recommended to statistically measure differences in vocabulary retention effectiveness between groups using Braille predominantly and groups using other learning methods. Furthermore, future research could expand the focus to analyze Braille's role in the acquisition of more complex language skills, such as understanding sentence structure (nahwu) or correspondence skills.

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