

Improving Reading Skills of Dyslexic Students in Remote Areas Through a Multisensory Alphabet Wheel Intervention

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Abstract : This study examines the effectiveness of a multisensory intervention using an alphabet-wheel medium to improve the reading skills of dyslexic primary school students in a remote 3T (frontier, outermost, underdeveloped) region. The research employed a Single Subject Research (SSR) A-B-A design with one third-grade participant from SDN 001 Muara Ancalong, East Borneo. The intervention combined visual, kinesthetic, and tactile elements to address phonological and visual processing difficulties common in dyslexia. Data were collected through structured oral reading tests focusing on syllabic patterns (CV, VCV, CVCV) across twelve sessions. Descriptive statistics and visual analysis were used to compare performance across phases. The findings showed clear improvement; mean reading accuracy rose from 46.62% in the first baseline to 62.96% during intervention and reached 72.83% in the second baseline. Learning independence also increased, with task completion without assistance improving from 20% to 65%. These results indicate that a simple and low-cost alphabet-wheel can effectively enhance reading performance and learner independence. The study concludes that multisensory methods are practical and context-sensitive solutions for inclusive education in low-resource areas and recommends further teacher training and digital adaptation of the alphabet wheel for wider use.

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Introduction

Reading ability is a fundamental foundation for success in primary education, as it determines both academic achievement and social skills in children. Within the framework of inclusive education, every child, including those with dyslexia, has the right to equitable learning opportunities that allow their potential to develop optimally (Taufan et al., 2020). Inclusive education requires an adaptive learning system that respects the unique ways in which each individual's brain functions. Ideally, the education system provides evidence-based interventions to address learning barriers such as dyslexia, which affects 10-15% of the school-aged population worldwide (Vellutino et al., 2004).

One of the most widely recognized theoretical approaches is the multisensory method (VAKT: Visual, Auditory, Kinesthetic, and Tactile). This approach engages multiple senses to build strong connections between symbols and sounds, thereby facilitating comprehensive reading comprehension (Anwar & Anjarningsih, 2024; Schneider & Crombie, 2012).

Developed countries such as the United States, the United Kingdom, and Australia have established evidence-based inclusive policies for addressing dyslexia, including structured pedagogical and psychological interventions (Sadusky et al., 2022). These practices serve as an ideal reference for inclusive education systems in various countries.

In Indonesia, the reality on the ground presents different challenges. It is estimated that 5-8 million students experience dyslexia (Dyslexia Center Indonesia, 2019), yet comprehensive national data are not available. This situation reflects a weak system for identifying and monitoring dyslexia cases. Unlike developed countries, Indonesia also lacks specific regulations governing educational services for students with dyslexia. As a result, equitable access to education remains difficult to achieve, particularly in the 3T regions (Frontline, Outermost, and Lagging Regions), which face limited access to specialists and educational resources (Rahim et al., 2024)

Teachers in 3T schools, such as SDN 001 Muara Ancalong, face significant challenges due to limited training in inclusive methods, a shortage of adaptive learning materials, and the absence of systematic intervention guidelines. Without appropriate interventions, students with dyslexia are at risk of losing motivation, demonstrating low literacy skills, and experiencing difficulties in social participation conditions that run counter to the principles of inclusive education itself (Taufan et al., 2020).

Several studies indicate that multisensory methods are effective in improving learning outcomes. For example, research by Abbas (Abbas, 2022) found a highly significant effect ($\text{Eta Squared} = 0.99$) on the reading ability of MTs students, while a study by Isroyati et al. (Isroyati et al., 2024) demonstrated the effectiveness of this approach for children with autism. Simple media, such as an alphabet reading wheel, also have the potential to address phonological and visual weaknesses in students with dyslexia. This approach is particularly relevant when developed using inexpensive local materials, such as letter cards or sand, making it suitable for resource-limited 3T regions.

However, there remains a research gap that urgently needs to be addressed. First, most multisensory studies to date have been conducted at the secondary level and with children with autism, leaving the context of primary school students with dyslexia largely unexplored. Second, no study has examined the implementation of this method in 3T regions, with all their inherent limitations. Third, specific media, such as the alphabet reading wheel designed to master basic syllable patterns (CV, VCV, CVVC) in children with dyslexia, have not yet been tested for effectiveness.

Therefore, this study holds high urgency in exploring the application of multisensory methods through the alphabet reading wheel for third-grade primary school students with dyslexia in 3T regions. The research focuses on improving reading ability, learning independence, and mastery of basic syllable patterns. The results are expected to provide a contextual and practical inclusive model as a solution for areas with limited resources.

Research Method

This study employs a quantitative experimental approach with a single-subject research (SSR) design to assess the effectiveness of multisensory methods in improving the early reading skills of children with dyslexia (Erath et al., 2024; Hastjarjo, 2019). An A-B-A design was implemented through three phases; the first baseline (A_1) to measure initial abilities without intervention; the intervention phase (B), involving multisensory learning using the alphabet reading wheel, which engages visual, auditory, kinesthetic, and tactile modalities; and the second baseline (A_2) to evaluate retention and the impact of the intervention. The research design based on the A-B-A concept serves as a standard to demonstrate a functional relationship by examining whether behavioral changes during the intervention diminish when conditions return to the baseline (Gast & Ledford, 2018). The intervention was conducted progressively from simple to complex patterns, with a focus on reading independence, and was carried out at SDN 001 Muara Ancalong, a 3T region, in April-May 2025, with a third-grade student identified as having dyslexia as the subject based on the certificate of children with special needs issued by the Kutai Timur District Health Office.

Data were collected through oral early reading tests conducted in four sessions for each phase, using a 37-item reading list containing syllables and words with CV, VCV, and CVVC patterns, and evaluated on a five-point scale. The instrument was validated by experts, as documented in the instrument validation certificate from Universitas Negeri Yogyakarta. Data were analyzed descriptively using visual techniques in accordance with SSR principles, including within-condition analysis to evaluate trends and score stability in each phase, and between-condition analysis to compare changes in reading ability from the first baseline to the intervention and the second baseline. This included examining trend direction, rate of change, and the percentage of overlapping data as indicators of intervention effectiveness (Mutia & Iswari, 2020; Yulianti, 2023).

Results and Discussion

Results

Baseline Phase 1 (A_1)

In Baseline Phase 1 (A_1), the researcher conducted initial measurements to identify the subject's ability to read alphabet letters. Observations were made under natural conditions without any intervention or guidance from the researcher. The Baseline-1 (A_1) test can be described as an initial assessment conducted over four sessions. The reading ability test included the ability to read syllables with consonant-vowel patterns, open syllables with vowel-consonant-vowel patterns, and open syllables with consonant-vowel-consonant-vowel patterns. The test consisted of 37 items, with a maximum score of 5 and a minimum of 1. Based on the reading ability tests conducted from Session 1 to Session 4 over four days, the results can be accumulated and illustrated in the following diagram:

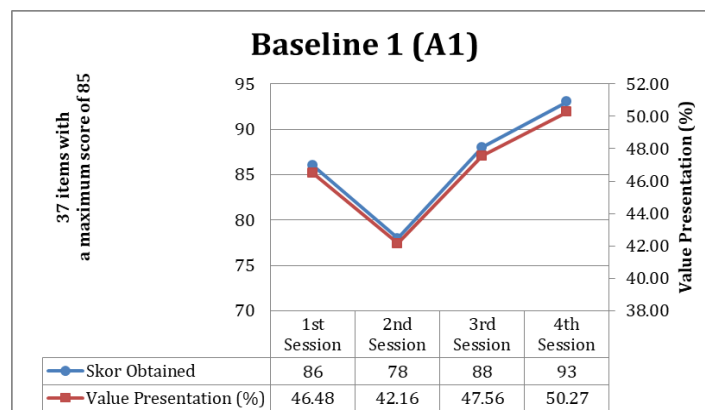


Figure 1. Baseline 1 (A₁) Test Graph, Students' Reading Ability

Based on the results of the Baseline-1 (A₁) test conducted over four sessions, it can be concluded that the student's initial reading ability was low and showed very limited progress. From the first to the third session, the student struggled to read various syllable patterns and was only able to complete a small portion of the items, with none completed independently in the third session. The main obstacles stemmed from internal factors, such as being quiet, awkwardness, lack of focus, and difficulty communicating. However, in the fourth session, there was a slight improvement, with the highest score reaching 50.27%, although assistance was still required. Overall, the table of progress from the first to the fourth session shows a positive trend, though not yet significant, indicating the need for further intervention to comprehensively improve the student's reading ability.

Intervention Phase (B)

The student's performance in the first baseline phase (A₁) served as the basis for evaluating changes after the intervention. The next phase was the intervention (B), during which the student received treatment using the alphabet reading wheel in the learning process. This intervention was conducted in the teachers' room at SDN 001 Muara Ancalong in East Kutai, starting at 10:00 WITA until the session concluded. Data collection in this phase aimed to observe the impact of the media on improving the student's reading ability.

The alphabet reading wheel was used in the learning process by having the student rotate and select the circular boards according to the reading task. The teacher provided instructions: for reading vowel letters, rotate to circle one; for consonants, rotate to circle two; and for reading syllables, rotate to circle three. The word or syllable to be read had to be positioned on the right side of the media. For example, to read the word "baju," the student first located the syllable "ba" on circle three and moved it to the right. Then, the consonant "j" was found on circle two and aligned to the right of "ba." Finally, the vowel "u" was rotated from circle one and aligned so that all letters formed a straight line: "ba" - "j" - "u." In this way, the word "baju" could be read fully and systematically using this media. The following shows the Intervention (B) Data on the student's reading ability in a graphical visualization:

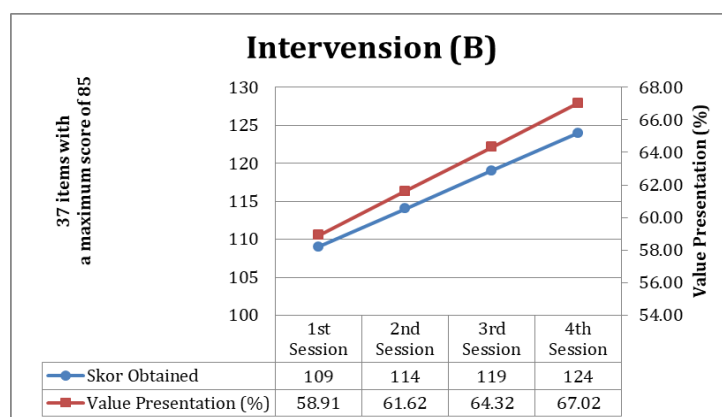


Figure 2. Intervention (B) Test Graph, Students' Reading Ability

Baseline Phase A₂

After four intervention sessions were administered to the student, the researcher proceeded to Baseline Phase 2 (A₂). The purpose of this phase was to compare the post-intervention results with the initial baseline (A₁), to determine whether there was an improvement in the ability to read consonant-vowel, vowel-consonant-vowel, and consonant-vowel-consonant-vowel patterns through the multisensory approach.

Data collection in Baseline Phase 2 (A₂) was conducted in the classroom at SDN 001 Muara Ancalong, starting at 09:00 WITA until the session concluded. All data from Sessions 9 through 12 were compiled by the researcher as part of Baseline Phase 2 (A₂) as follows:

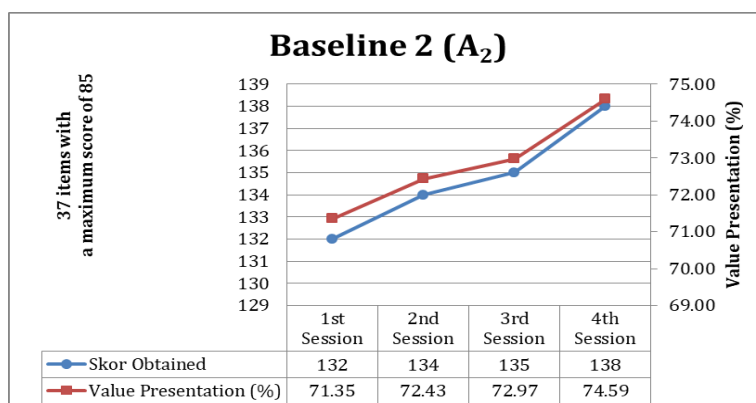


Figure 3. Baseline 2 (A₂) Test Graph, Students' Reading Ability

Trend Analysis

This study employed a descriptive analysis method, with data processing and graphical presentation based on the results obtained from the subject. The statistical analysis techniques applied included within-condition and between-condition analyses. The data analyzed encompassed the percentage of success in Baseline Phase 1 (A₁), Intervention (B), and

Baseline Phase 2 (A₂) in reading ability tests, including the ability to read consonant-vowel patterned syllables, open syllables with vowel-consonant-vowel patterns, and open syllables with consonant-vowel-consonant-vowel patterns.

Description of Visual Analysis Within Conditions

Condition Length

The number of data points in each phase is referred to as the condition length. In this study, the condition length included 4 sessions in Baseline Phase 1 (A₁), 4 sessions in the Intervention Phase (B), and 4 sessions in Baseline Phase 2 (A₂). The condition length data can be visualized in the following table:

Tabel 1. Condition Length

Condition	A ₁	B	A ₂
Session length	4	4	4

Estimated Trend Direction

In Baseline Phase 1, the data showed an upward trend, although not very significant. During the intervention phase, the ability to read consonant-vowel patterned syllables, open syllables with vowel-consonant-vowel patterns, and open syllables with consonant-vowel-consonant-vowel patterns increased with the implementation of the multisensory method. Similarly, in Baseline Phase 2, the data continued to show an upward trend. Overall, the increasing trend across Baseline Phase 1, the intervention, and Baseline Phase 2 indicates an improvement in the percentage of success in early syllable reading ability. The results of this analysis are presented by the researcher in the following table:

Tabel 2. Estimated Trend Direction

Estimate	A ₁	B	A ₂
Trend Direction of Early Reading			

Stability Trend

Stability Range

The stability of the trend was determined at 15% by multiplying the highest value in the data by 0.15. The following shows the stability range for reading ability with CV, VCV, and CVVC patterns:

$$\text{Highest Score} \times \text{Stability Criteria} = \text{Stability Range}$$

Baseline 1 (A₁)

$$50,27 \% \times 0.15 = 7,54 \%$$

Intervention B

$$67,02 \% \times 0.15 = 10,53\%$$

Baseline 1 (A₂)

$$74,59 \% \times 0,15 = 11,18 \%$$

Mean Level

The mean value was calculated by summing all scores in each phase and then dividing by the number of tests conducted in that phase. The mean levels of reading ability for CV, VCV, and CVVC patterns obtained are as follows:

$$\text{Total Score for Each Phase} \div \text{Number of Tests} = \text{Average Score}$$

Baseline 1 (A₁)

$$\frac{46,48 + 42,16 + 47,56 + 50,27}{4} = 46,62$$

Intervention B

$$\frac{58,91 + 61,62 + 64,32 + 67,02}{4} = 62,96$$

Baseline 1 (A₂)

$$\frac{71,35 + 72,43 + 72,97 + 74,59}{4} = 72,83$$

Upper Data Limit

The upper data limit was obtained by adding the mean value (mean level) to half of the stability range. The calculation results for reading ability are as follows:

$$\text{Mean Level} + \frac{1}{2} \text{Stability Range} = \text{Upper Data Limit}$$

Baseline 1 (A₁)

$$46,62 + 3,77 = 50,39$$

Intervensi B

$$62,95 + 5,27 = 68,22$$

Baseline 1 (A₂)

$$72,83 + 5,59 = 78,42$$

Lower Data Limit

The lower data limit was obtained by subtracting half of the stability range from the mean value (mean level). The calculation results for reading ability are as follows:

$$\text{Mean Level} - \frac{1}{2} \text{Stability Range} = \text{Lower Data Limit}$$

Baseline 1 (A₁)

$$46,62 - 3,77 = 42,85$$

Intervensi B

$$62,95 - 5,27 = 57,68$$

Baseline 1 (A₂)

$$72,83 - 5,59 = 67,24$$

Stability Percentage

The stability percentage was calculated by dividing the number of data points within the stability range by the total number of data points in each phase. The data obtained regarding reading ability are as follows:

$$\text{Stability Percentage} = \left(\frac{\text{Amount of Stable Data}}{\text{Total Number of Data}} \right) \times 100 \%$$

Baseline-1 (A₁)

The number of data points in Baseline Phase 1 (A₁) that fell within the range of 42.85% to 50.39% was 3. Thus, the stability percentage was calculated as follows: $\frac{3}{4} \times 100\% = 75\%$ (Variable).

Intervention (B)

The number of data points in the Intervention Phase (B) that fell within the range of 57.68% to 68.22% was 4. Thus, the stability percentage was calculated as follows:

$$\frac{4}{4} \times 100\% = 100\% \text{ (Stable)}$$

Baseline-2 (A₂)

The number of data points in Baseline Phase 2 (A₂) that fell within the range of 67.24% to 78.42% was 4. Thus, the stability percentage was calculated as follows:

$$\frac{4}{4} \times 100\% = 100\% \text{ (Stable)}$$

Data Path

Tracing the data pattern was conducted in the same manner as determining the trend direction. The pattern of reading ability data is presented in the following table:

Table 3. Data Path of Reading Ability			
Estimate	A ₁	B	A ₂
Data Path			

Stability Level and Range

The researcher presents the results of reading ability stability levels and ranges in the following table:

Table 4. Stability Level and Range of Reading Ability			
Condition	Baseline 1 (A ₁)	Intervention (B)	Baseline 2 (A ₂)
Stability Level and Range	42,85 % - 50,39 % (75 %) Variable	57,68 % - 68,22% (100%) Stable	67,24% - 78,42% (100%) Stable

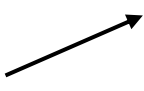
Change Level

The change level was identified by calculating the difference between two data points, specifically by subtracting the initial value from the final value. The direction of change is indicated by symbols: (=) for stable, (+) for increase, and (–) for decrease. The change levels in reading ability data in this study are presented as follows:

Table 5. Change Level			
Phase	Lower Limit	Upper Limit	Change Level
Baseline 1 (A ₁)	42,85 %	50,39 %	7,54 %
Intervention (B)	57,68 %	68,22%	10,53%
Baseline 2 (A ₂)	67,24%	78,42%	11,18%

Based on the analysis of reading conditions for syllable patterns CV, VCV, and CVVC above, a summary of the data can be presented in the following table:

Table 6. Visual Analysis Data

Condition	Baseline 1 (A ₁)	Intervention (B)	Baseline 2 (A ₂)
Condition Length	4	4	4
Trend	+	+	=
Direction			
Stability Tren	75 % (Variable)	100 % (Stable)	100 % (Stable)
Data Path	+	+	=
			
Stability Level and Range	Variable 42,85 %-50,39 %	Stable 57,68 % - 68,22%	Stable 67,24% -78,42%
Change Level	7,54 %	10,53 %	11,18 %

Description of Between-Condition Data Number of Variables

The number of variables that changed from Baseline Phase 1 to the Intervention Phase, and then to Baseline Phase 2, consisted of a single aspect: the ability to read syllable patterns CV, VCV, and CVVC. The analysis in this context focused on the reading ability variable. The data regarding the number of reading variables in each phase are presented as follows:

Table 7. Data on the Number of Variables Changed

Condition Comparison	B-A ₁	A ₁ -B ₂
Number of Variables Measured	1	1

Change in Trend Direction and Its Effect

Table 8. Data on Changes in Trend Direction and Their Effects

Condition Comparison	B-A ₁	A ₁ -B ₂
Trend Change		
Direction and Its Effect	Positive	Positive

Change in Stability Trend

The determination of changes in stability trends between conditions was carried out by analyzing the stability patterns in Baseline Phase 1, the Intervention Phase, and Baseline Phase 2. The data on changes in the stability trend of reading ability across these phases are presented in the following table:

Table 9. Data on Changes in the Stability Trend of Reading Ability

Length Condition	B-A ₁	A ₁ -B ₂
Change in Stability Trend	Variable - Stable	Stable - Stable

Level Change

Level change is determined by comparing the data point in the last session of the comparison phase with the data point in the first session of the subsequent phase. The difference between these two points is used to determine the magnitude of the level change. The results of the analysis of level change in reading ability are presented in the following table:

Table 10. Data on Changes in Reading Ability

Comparison of Conditions	B-A ₁	A ₁ -B ₂
Level Change	62,96 % - 46,62% = + 16,34 %	72,83 % - 62,96 % = + 9,87 %

The analysis of level change in reading ability across phases shows a significant improvement following the implementation of the intervention. In the comparison between Baseline 1 (A₁) and Intervention (B), there was an absolute increase of 16.34% (from 46.62% to 62.96%), representing a relative increase of 35.05%. This finding indicates that the intervention made a substantial contribution to enhancing students' reading ability, moving them from the low category to the medium category. Furthermore, in the comparison between Intervention (B) and Baseline 2 (A₂), although the intervention had been discontinued, reading ability still showed an absolute increase of 9.87%, with a relative increase of 15.68% (from 62.96% to 72.83%).

This indicates that the impact of the intervention was sustainable, as it was able to maintain and even further improve learning outcomes in the short term after the intervention had ended. These findings reinforce the assumption that the intervention was not only effective in the immediate sense but also produced residual positive effects on the improvement of students' reading literacy.

Data Overlap

The following description presents the overlap data related to reading ability in each phase of the study. This data is used to examine the extent of similarity or difference in performance across phases, as well as to identify the consistency of changes that occurred throughout the intervention process.

Baseline 1 / Intervention

The analysis of data overlap between the phases in this study shows that there was no overlap in reading ability scores across the phases. In the comparison between Baseline 1 (A₁) and Intervention (B), the score range in phase A₁ was between 42.16% and 50.27%, while phase B was in the range of 58.91% to 67.02%. Since none of the data points in phase B fell within the range of phase A₁, the overlap result was 0%.

$$\frac{\text{Data number B within the range A}_1 \times 100 \%}{\text{Data Total B}} = 0 \%$$

Intervention / Baseline 2

A similar pattern was observed in the comparison between the Intervention phase (B) and Baseline 2 (A₂). The score range in phase B was 58.91% to 67.02%, while the scores in phase A₂ were within 71.35% to 74.59%. Since no data points from A₂ fell within the range of phase B, the overlap value was 0%. This finding indicates that each phase had a clearly distinct data distribution with no overlap, reflecting consistent and significant changes across phases in students' reading ability.

$$\text{Data Number A}_2 \text{ within the range B} \times 100 \% = 0 \%$$

Data total A₂

The overlap of reading data obtained from the study is presented in the following table:

Table 11. Reading Data Overlap

Length Condition	B-A ₁	A ₁ -B ₂
Overlap data	$\frac{0}{4} \times 100\% = 0\%$	$\frac{0}{4} \times 100\% = 0\%$

The analysis indicates that there was no overlap among the three phases of the study, namely Baseline 1 (A₁), Intervention (B), and Baseline 2 (A₂). The data ranges across these phases were statistically distinct, suggesting that each phase had a significantly different distribution of scores. The absence of overlap provides strong evidence that the intervention applied in phase B effectively improved reading ability compared to the preceding phase. To further support the visual and descriptive findings, additional statistical indicators were calculated. The Percentage of Non-overlapping Data (PND) between Baseline 1 (A₁) and Intervention (B) was 100%, as no intervention data points overlapped with baseline values. This result, according to Scruggs and Mastropieri (1998), indicates a highly effective intervention. Similarly, the PND between Intervention (B) and Baseline 2 (A₂) also reached 100%, confirming the consistency and maintenance of the treatment effect. Moreover, the effect size (Cohen's *d*), estimated from the mean difference between A₁ (46.62%) and B (62.96%) with a standard deviation of approximately 3.77, was around 4.33; reflecting a very large practical impact. These statistical results reinforce the conclusion that the multisensory alphabet reading wheel substantially improved and sustained the student's reading ability across phases.

The Effectiveness of the Multisensory Alphabet Wheel

This study aims to examine the dynamics of learning transformation in a student with dyslexia from a 3T (frontier, remote, and disadvantaged) region. The learning difficulties encountered are linked to limited access to early childhood education and the lack of supporting facilities, which have resulted in slow progress in basic literacy development (Rachmaningsih, 2024). The geographically isolated setting has further restricted access to early intervention and to instructional methods tailored to the student's needs.

In classroom practice, conventional approaches centered on lectures and one-way delivery of material have proven inadequate in addressing the subject's cognitive needs (Ma'rifah et al., 2025). The manifestation of dyslexia in the subject is evident in the difficulty

of distinguishing visually similar letters such as *j*, *q*, and *p*, as well as a tendency to write letters in reverse. The stigma of being labeled a ‘slow learner’ by the school environment reflects a limited understanding of neurocognitive disorders.

The subject’s error patterns are consistent with the general characteristics of dyslexia, namely difficulty in processing visually similar symbols and weak phonological decoding skills (Nessy Learning, 2021). This condition is further exacerbated by limited literacy stimulation during early childhood, as the subject did not attend formal preschool and received instruction only from parents at home. In addition, the subject’s passive attitude in class and tendency not to ask questions led teachers to assume that basic literacy skills had been mastered, whereas the opposite was true. These findings underscore the importance of employing adaptive, needs-based pedagogical approaches, particularly for students with learning disorders such as dyslexia (Meliana et al., 2025).

During the Baseline-1 (A_1) phase, conducted over four sessions, the student’s reading performance remained low and stable, ranging from 46.48% to 50.27%. The subject showed minimal progress, with persistent difficulties in concentration, verbal interaction, and behavioral regulation, including excessive movement and limited task focus. Early sessions revealed poor symbol recognition and an inability to complete items independently. A slight improvement appeared in the fourth session, where four items were completed with teacher assistance, particularly on consonant-vowel-consonant-vowel (CVCV) patterns. Overall, the baseline results indicate that conventional, repetitive teaching methods were ineffective for the student’s dyslexia. The limited progress highlights the need for a structured multisensory intervention that simultaneously targets phonological awareness, visual discrimination, and behavioral engagement.

Consistent with findings in the literature, children with dyslexia generally experience stagnation in reading development when taught solely through traditional approaches. They require multisensory interventions that activate more than one sensory pathway to facilitate simultaneous phonological and visual processing (Fujita, 2024). Accordingly, the use of more varied and adaptive instructional strategies is crucial in supporting the literacy development of children with specific learning disorders such as dyslexia.

The first intervention phase (B) addressed the student’s low literacy identified in Baseline-1 by using an alphabet reading wheel as a multisensory learning aid. Conducted daily at SDN 001 Muara Ancalong, the tool featured three concentric circles displaying vowels, consonants, and syllable combinations, which the student rotated to form target words. Initial adaptation in session B-5 showed limited mastery, with only three items completed independently (58.91%). Gradual progress occurred over subsequent sessions: B-6 (61.62%) saw six items completed independently, B-7 (64.32%) eight items independently, and B-8 (67.02%) ten items independently. Across the phase, the student demonstrated increasing independence, mastery of syllable patterns, and adaptation to the interactive medium, reflecting consistent improvement in reading skills. This suggests that the student became increasingly accustomed to using the medium and was able to answer more items independently (e.g., from 3 independent responses in session 5 to 10 in session 8). The steady

improvement across sessions reflects positive adaptation. Similar findings were reported in another study, where the VAKT approach using the Alphabet Reading Wheel increased the average initial reading score of students with dyslexia from 57.45 (pre-intervention) to 84.42 (post-intervention) (Jannah & Ainin, 2025).

These findings are consistent with multisensory learning theory, which posits that multisensory methods (such as Orton-Gillingham) significantly improve phonemic awareness, decoding, and reading fluency in children with dyslexia compared to traditional approaches (Fujita, 2024). In practice, the subject began to recognize letter patterns more effectively and demonstrated greater confidence, resulting in a clear upward trend in intervention scores.

More specifically, the session-by-session data indicate a stable and linear upward trend, both in terms of achievement percentages and the number of items completed independently. In addition, there was a decrease in dependence on teacher assistance, accompanied by an increase in the variety of syllable patterns mastered, ranging from simple C-V structures to the more complex C-V-C-V patterns. These findings demonstrate that the alphabet reading wheel functioned effectively as a multisensory learning tool, particularly in integrating visual and kinesthetic aspects to facilitate the connection between phonemes and graphemes.

Nevertheless, in the final intervention session, 56.76% of items (21 out of 37) had not yet been mastered independently. This indicates that although positive progress was made, the student's achievement was not yet optimal. Extending the intervention duration or modifying the media design may therefore be necessary to achieve more comprehensive literacy outcomes. The alphabet reading wheel can thus be regarded as a potential strategy for addressing early literacy difficulties, particularly for students with passive characteristics and attention deficits.

Subsequently, Baseline 2 (A₂) was conducted after the first intervention (B) to assess retention of reading skills without further treatment. Observations showed consistent and stable improvement in literacy skills, suggesting that the alphabet reading wheel had a sustained impact on building reading foundations. This development was reflected not only in higher scores but also in greater independence in operating the medium and mastering more complex syllable patterns.

Comparatively, the average achievement in phase A₂ reached 73.09%, a significant increase from 46.87% in Baseline-1. Mastery of complex syllable patterns, particularly C-V-C-V, rose sharply to 100%, as reflected in the consistent reading of words such as *kaki*, *buka*, and *aku*. However, difficulties remained in about 45.9% of items (17 out of 37), mostly involving low-frequency syllables or less familiar words like *dahi* and *hobi*. This suggests that successful reading development through visual-kinesthetic media requires additional strategies to strengthen memory for unfamiliar vocabulary.

Overall, the A-B-A design showed a significant positive change in the subject's reading ability. The intervention phase (B) produced an average increase of +16.34% compared to Baseline-1 (from 46.62% to 62.96%). After the intervention was withdrawn, the average score in Baseline-2 continued to rise by +9.87% to 72.83%. The data trend in each phase was

upward: both the intervention and Baseline-2 phases showed 100% stability (all values within the trend range), while the initial baseline was slightly more variable (75% stable). There was no overlap between phases; A₁ values (42 to 50%) were clearly below those of B (58 to 67%), which were in turn separate from A₂ (71 to 75%). These data confirm that the multisensory medium effectively improved the subject's reading ability compared to the initial condition. This finding is consistent with the literature, which emphasizes that multisensory approaches foster adaptive and sustainable inclusive learning for children with dyslexia (Kunasegran & Subramaniam, 2024, p. 2939). The effectiveness of the Alphabet Wheel as a multisensory learning medium could also be explained through underlying psychological mechanisms. According to cognitive learning theory, the engagement of multiple sensory modalities, particularly visual and kinesthetic, enhances the mapping between phonemes and graphemes, thereby strengthening memory consolidation and facilitating letter recognition (Ain & Pervaiz, 2023).

Conclusion

The study concludes that implementing a multisensory approach using the alphabet reading wheel significantly improved the reading ability of a student with dyslexia at SDN 001 Muara Ancalong. Average scores increased from 46.87% during the initial baseline (A₁) to 62.96% during the intervention (B), and further to 72.83% in the final baseline (A₂), despite the withdrawal of the intervention. This improvement was accompanied by increased learning independence, rising from 20% to 65%, and better mastery of complex syllable patterns (C-V-C-V). The integration of visual, kinesthetic, and auditory stimuli through this simple medium effectively addressed the phonological and visual challenges characteristic of dyslexia, while also enhancing the subject's motivation and confidence. Although difficulties remained with low-frequency vocabulary and about 35% of items still required assistance, the findings confirm that multisensory approaches are an effective pedagogical strategy with potential for application in resource-limited areas to improve early literacy in children with dyslexia.

Recommendation

The study recommends multisensory approaches, such as the alphabet reading wheel, supported by teacher training and progress monitoring. It further suggests developing a digital version to extend accessibility in online and low-resource learning contexts.

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