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Multisensory and Explicit Instruction vs. Conventional Methods: A Case Study of Dyslexia Interventions in Pakistan

Kanwal Saleem¹ and Tehreem Arshad^{1*}

1. University of the Punjab

Abstract

The study sought to assess the efficacy of interventions targeting dyslexic challenges as compared to conventional school instructions in Pakistan. The intervention approach employed explicit instructional techniques and a multisensory methodology. Seven children, aged 7-12 years, diagnosed with dyslexia were purposively selected for participation in the research. Random assignment placed participants into either an experimental or waitlist control group. Both groups were administered pre- and post-intervention assessments using Weschler Individual Academic Test-III. The intervention protocol adopted for this study was the Alpha to Omega program, encompassing comprehensive reading, spelling, and writing instruction based on phonemic awareness skills. Non-parametric statistical tests revealed that the intervention yielded significant improvement in word reading, pseudoword decoding, spelling, and oral reading accuracy among the experimental group, although the oral reading rate did not exhibit substantial improvement. These findings highlight the significance of providing targeted therapeutic interventions for dyslexic children in Pakistan, contrasting with conventional school-based instructional approaches.

Keywords: dyslexia, explicit instructions, multisensory approach, conventional school instructions, spellings, word reading, oral word fluency, reading accuracy

* Correspondence to:

Ms. Kanwal Saleem, MS in Clinical Psychology, University of the Punjab & Ms Tehreem Arshad, Associate Professor, University of the Punjab Email: nur.ashabienna@das.org.sg

INTRODUCTION

Learning difficulties, including challenges in reading and writing, significantly impact children's academic performance, self-esteem, and motivation (Baiti et al., 2024; Nachshon et al., 2019). Specific learning disorders, distinct from issues caused by lack of practice or cognitive deficits, are classified in the DSM-5 (American Psychiatric Association, 2013) into three subtypes: dyslexia (reading difficulties), challenges in written expression, and dyscalculia (math difficulties). Dyslexia, the most common learning disorder, impairs word decoding, reading accuracy, fluency, spelling, and comprehension ability due to atypical brain processing of graphic symbols (Nordqvist, 2017).

Dyslexia affects a substantial portion of the global population. The International Dyslexia Association reports that approximately 10–20% of individuals are impacted, meaning about one in five people has dyslexia (Elias, 2021). Earlier estimates by Siegel (2006) suggested a prevalence of 5–10%, but more recent research indicates that between 3–12% of students may experience dyslexia (Feng et al., 2024; Sunil et al., 2023). In Pakistan, a study found that 33% of students in both private and public schools in Lahore, Punjab, displayed dyslexia or other co-occurring learning difficulties (Ashraf & Najam, 2020). Given its widespread prevalence and significant impact, the implementation of effective interventions is crucial to support those affected.

Early intervention plays a crucial role in reducing academic challenges, low self-esteem, and emotional difficulties (Hosokawa et al., 2024). Conventional teaching approaches frequently fall short, resulting in frustration and feelings of social exclusion (Naqvi et al., 2023). Providing timely support can help prevent mental health issues such as anxiety and depression, promote resilience, and empower dyslexic children to achieve their full potential (International Dyslexia Association, 2017).

Interventions for Dyslexia

Research supports the effectiveness of evidence-based interventions in improving early reading skills over traditional methods (Cho et al., 2021; Galuschka et al., 2014; Gersten et al., 2017; Snowling & Hulme, 2011; Wanzek et al., 2018). Two primary dyslexia intervention approaches exist: top-down and bottom-up. The top-down method focuses on meaning-to-sound training, strengthening language skills before breaking down sentences into smaller units (Hellend et al., 2011; Meri et al., 2020). Conversely, the bottom-up approach builds reading and spelling from sounds to meaning using phonics-based techniques. Regardless of approach, explicit instruction and multisensory strategies are crucial (International Dyslexia Association, 2017).

Explicit instruction ensures systematic, unambiguous teaching, progressing from simple to complex tasks (Vaughn & Fletcher, 2021). Archer and Hughes (2011) identify 16 key

elements, including logical sequencing, step-by-step demonstrations, guided practice, frequent feedback, and cumulative review. Sucena et al. (2021) found that combining explicit phonemic awareness instruction with guided reading significantly improved at-risk first graders' reading skills. Similarly, Denton et al. (2014) demonstrated that students receiving explicit instruction outperformed those in guided reading alone in phonemic decoding, fluency, and comprehension. These findings underscore the vital role of explicit instruction in supporting dyslexic learners.

The multisensory approach engages visual, auditory, and kinesthetic senses to help children learn skills and concepts. Initially introduced by Orton-Gillingham for children with learning disabilities, it emphasizes adaptability, individualization, and problem-solving (Zairin & Nordin, 2023). Various intervention programs, such as the Barton program, Alphabetic Phonics, and Lindamood Phoneme Sequencing, effectively support dyslexic individuals through multisensory techniques (Bisplinghoff, 2015; Stevens et al., 2021). Extensive research supports its effectiveness. Valde (2024) found significant reading and spelling improvements using an Orton-Gillingham-based curriculum in public schools. Oluoch-Suleh and Ombara (2023) reported similar benefits for students with and without learning disabilities. Obaid (2013) demonstrated statistically significant improvements in sixth graders' math skills when visual, auditory, and kinesthetic modalities were integrated. These findings highlight the multisensory approach's role in enhancing learning outcomes for individuals with dyslexia.

First Intervention Study for Dyslexia in Pakistan

In Pakistan, research on learning disabilities has traditionally focused on the development and validation of screening tools. Studies such as those by Ashraf and Najam (2014), Khan and Awan (2016), and Aftab et al. (2017) have focused on creating culturally relevant diagnostic checklists for identifying learning difficulties in areas such as general learning, Urdu language, and mathematics. More recently, attention has shifted toward the importance of providing academic support to students with learning challenges. For example, Qureshi et al. (2024) emphasized the value of targeted interventions, demonstrating that such strategies can equip students with effective reading techniques for use in classroom settings.

Despite these advances, a significant gap remains in the implementation and evaluation of intervention programs for students with dyslexia. Awareness about learning disabilities continues to be limited in Pakistan, and many teachers often raise concerns about students' academic performance without fully understanding the root causes. Consequently, parents are frequently left confused and uncertain about how to support their children, with many resorting to excessive tutoring—a solution that often worsens the child's frustration and diminishes self-esteem.

Addressing this gap, the present study is among the first in Pakistan to evaluate the effectiveness of explicit, multisensory instruction aimed at improving phonemic awareness and sight word reading skills in children with dyslexia, specifically in the English language. Given that dyslexia impairs reading proficiency across various subjects—including English, Urdu, mathematics, and social sciences—there is a critical need for evidence-based teaching strategies that go beyond traditional methods. This research not only contributes to the growing body of work advocating for intervention-based support but also highlights the significance of alternative instructional approaches in fostering academic success and emotional well-being among children with dyslexia. By focusing on English—a core component of the national curriculum—the study underscores the transformative potential of structured, multisensory learning techniques in enhancing the educational outcomes of dyslexic students and guiding future educational practices in Pakistan.

Research Question

This study sought to answer the following research question:

1. Does the provision of explicit instructions and a multisensory approach result in improvements in phonemic awareness, thereby enhancing word reading, pseudoword reading, spelling ability, oral reading accuracy, and oral reading rate in children with dyslexia?

MATERIALS & METHODOLOGY

Participants:

The participants for this study were selected using a non-probability purposive sampling technique. All participants were recruited from various therapeutic centres operating in Lahore, Pakistan, specifically for the research purposes of this study.

The inclusion criteria were as follows:

- (a) Students falling within the age range of 7-12 years,
- (b) Students who had received a formal diagnosis of Specific Learning Disorder with impairment in reading (dyslexia) as defined by Nourbakhsh et al. (2013),
- (c) Students who scored 7 or above on The Bangor Dyslexia Test (Miles, 1997),
- (d) Students who had not previously undergone treatment for their condition, as outlined by Nourbakhsh et al. (2013).

Exclusion criteria were also applied, and participants meeting any of the following criteria were excluded from the study:

Table 1. Demographic Characteristics of the Sample (N=7)

Variables	Frequency (f)	Percentage (%)
Gender		
Boys	3	42.9
Girls	4	57.1
Age		
7 years	3	42.9
8 years	1	14.3
9 years	1	14.3
11 years	1	14.3
12 years	1	14.3
Grade		
1	3	42.9
3	2	28.6
5	2	28.6

- (a) Students with impaired hearing or sight, following Helland et al. (2011),
- (b) Students with intellectual disabilities, as per the criteria outlined in DSM-V (Helland et al., 2011),
- (c) Students with any other neurological issues, including a history of seizures or Attention-Deficit/Hyperactivity Disorder (ADHD), following the guidelines of Helland et al. (2011). All participants' demographic characteristics, including frequency and percentages, are explained in Table 1.

All participants had been formally diagnosed with dyslexia through a comprehensive standardized assessment procedure, which also included the assessment of their IQ levels and screening for comorbid conditions. The participants underwent screening using the WIAT-III and the Bangor Dyslexia Test. Those who scored below 85 standard scores on WIAT-III subscales, including word reading, pseudoword decoding, spelling, reading accuracy, and reading fluency, and scored 7 or above '+' on The Bangor Dyslexia Test, were selected for participation in the study. Prior written consent was obtained from the parents of the children with dyslexia, who were thoroughly briefed on the research procedures. The participants (n=7) were then randomly assigned to two groups: the experimental group (n=4) and the wait-list control group (n=3). The experimental group received intervention, and one-on-one sessions were conducted with

each participant for approximately 6 weeks, with sessions lasting 30-50 minutes and occurring 2-3 days per week on average (totalling 12 hours of therapy per child). The participant on wait-list control group were on waiting and will get therapy after the experimental group. Following the completion of 12 hours of therapy for each child in the experimental group, post-assessments were administered to both the experimental and waitlist control groups, assessing word reading, pseudoword reading, oral reading fluency, and spelling using the WIAT-III. Given the small sample size and the violation of normality assumptions, non-parametric tests such as the Mann-Whitney U and Wilcoxon signed-rank test were deemed appropriate for statistical analysis.

Measures

Assessment Tools

Wechsler Individual Achievement Test-third edition (WIAT-III): The Wechsler Individual Achievement Test-third edition developed by the Psychological Corporation in 2009 played a pivotal role in this study. The WIAT-III is a standardized assessment tool employed for both screening and pre-post-intervention purposes. The reliability of the WIAT-III is well-established, with test-retest reliability falling between .83 and .97, and inter-rater reliability ranging from 98% to 99% (Vaughan-Jensen et al. 2011). Standard scores on the WIAT-III typically range from 85 to 115. For this research, the scores on oral reading accuracy, oral reading fluency (word reading and pseudoword decoding), and spelling were considered, and students scoring at or below 85 on standard scores were selected for participation in the intervention. Permission was obtained from the authors to use the WIAT-III for research purposes.

The Bangor Dyslexia Test: The Bangor Dyslexia Test, developed by Miles in 1997, served as another valuable tool in this study. This screening tool is designed to identify dyslexic features in individuals ranging in age from 7 years to adulthood. Unlike the WIAT-III, the Bangor Dyslexia Test does not directly assess spelling and reading skills (Reynolds & Caravolas, 2016). The test comprises 10 subtests, with scoring for each subtest categorized as + (indicating the presence of dyslexic symptoms), - (indicating the absence of dyslexic symptoms), or 0 (indicating a neutral response). While the author has established different scoring criteria for various age ranges, meeting the + score criteria on at least 7 subtests highlights the presence of dyslexic symptoms. The test was administered to each participant, and those who met the specified criteria were selected for inclusion in the research study.

Intervention Protocol: The "Alpha to Omega: The A-Z of Teaching Reading, Writing, and Spelling" program (Hornsby et al., 1999) is a phonetic and linguistic approach aimed at improving phonemic awareness, designed specifically for teaching reading, writing, and spelling. It is a structured, cumulative, and multisensory program, tailored to meet the needs of individuals with dyslexia, drawing inspiration from the Orton-Gillingham

approach (Hornsby et al., 2006). This program includes both teacher and student handbooks, alongside worksheets and activities designed to facilitate learning. The researchers obtained permission from the program's authors to use it in their study. Throughout the intervention, various materials and "Alpha to Omega" handbooks were used in the learning process. These structured resources proved essential for improving phonemic awareness, thereby enhancing reading, spelling, and writing skills. Worksheets were incorporated to provide hands-on opportunities for reinforcing the concepts introduced in the lessons. Additionally, wooden phonics materials were used to visually and tactilely represent phonemes, helping students connect sounds to symbols. Coloured papers facilitated activities such as creating visual aids and engaging in multisensory learning tasks, while standard writing tools (pencils and erasers) were necessary for completing worksheets and other written exercises. Sketchbooks were used for drawing, writing, handwriting practice, and fine motor skill development. These materials collectively created a multisensory environment, which was specifically designed to address the unique learning needs of dyslexic students. The overall aim was to improve their reading, spelling, and writing abilities through an engaging, structured, and interactive approach.

Procedure

The study received all necessary approvals from the Departmental Doctoral Program Committee (DDPC), as well as permission from the authors of the WIAT-III, Bangor Dyslexia Test, and the "Alpha to Omega" program to administer assessments and implement the intervention.

Before the intervention, a comprehensive pre-assessment was conducted. This included collecting detailed background information from parents, such as birth history, developmental milestones, educational background, and family and medical history. Standardized assessments—the WIAT-III and the Bangor Dyslexia Test—were used to establish baseline scores for each participant. Seven children were randomly assigned to two groups: four to the experimental group and three to the wait-list control group. The experimental group participated in a six-week intervention, consisting of individualized, one-on-one sessions held 2–3 times per week, each lasting between 30 and 50 minutes, for a total of approximately 12 hours. The intervention employed explicit instruction through a structured, multisensory approach based on the "Alpha to Omega" program. Instruction focused on enhancing phonemic awareness and reading skills through various techniques, including phonics instruction, distinguishing between vowel and consonant sounds, decoding CVC and pseudowords, teaching rule-based and sight words, fluency drills, tracking games, word searches, the Fernald method, and air writing. Lessons were tailored to each child's pace, with progression dependent on demonstrated mastery. One participant who exhibited persistent letter reversals received additional targeted support.

Meanwhile, the wait-list control group continued with their regular schooling during the intervention period. Following the six weeks, post-assessments were administered to both groups to compare outcomes and evaluate the effectiveness of the intervention.

RESULTS

A comparative analysis was conducted to evaluate the effectiveness of explicit instruction and a multisensory approach on the reading skills of children with dyslexia. The analysis utilized assessment scores from both the experimental and wait-list control groups. Due to the small sample size, non-parametric statistical methods, including the Mann-Whitney U test, were employed to compare group differences in key reading-related areas such as word reading, pseudoword decoding, spelling, oral reading accuracy, and oral reading fluency following the intervention.

Descriptive statistics—including mean scores and standard deviations—were also examined to highlight score variations between the two groups. Pre-intervention data showed no significant differences between the experimental and control groups across all measured domains, indicating comparable starting levels in word reading, pseudoword decoding, spelling, and oral reading accuracy.

Post-intervention results revealed statistically significant improvements in the experimental group compared to the control group in word reading, pseudoword decoding, spelling, and oral reading accuracy. These findings support the effectiveness of the intervention in enhancing specific reading skills among dyslexic children. However, oral reading fluency did not show significant changes between or within groups at either the pre- or post-intervention stages. This suggests that the intervention, while effective in several domains, did not significantly impact fluency.

Descriptive statistics presented in Table 2 illustrate these trends, showing notable gains in word reading, pseudoword reading, spelling, and oral reading accuracy from pre- to post-assessment.

The hypothesis posited that the experimental group would show greater improvements in word reading, pseudoword reading, spelling, oral reading accuracy, and oral reading rate compared to the control group following the intervention. To examine these anticipated changes, the Wilcoxon signed-rank test was applied to assess differences in scores between the two groups before and after the intervention. The results revealed statistically significant improvements in word reading, pseudoword reading, and oral reading accuracy within the experimental group post-intervention, while the control group showed no substantial progress in these areas. Mean score differences between the two groups at both pre- and post-intervention stages further emphasized the positive effect of the intervention, with the experimental group demonstrating notable advancements, whereas the control group maintained consistent performance. Additionally, significant

Table 2. Mann-Whitney U Test Results at Pre and Post-Intervention Scores

Scales	Pre-Intervention (Experimental & Control)				Post-Intervention Pre-Intervention (Experimental & Control group)				
	M	SD	<i>U</i>	<i>p</i>	M	SD	<i>U</i>	<i>p</i>	η^2
Word Reading	9.85	6.76	2.5	.10	14.4	10.3	1.0	.03*	0.52
Pseudoword Reading	2.0	1.52	6.0	.50	8.28	9.08	.00	.01*	0.96
Spelling	9.71	2.28	3.5	.18	12.2	3.98e	1.0	.03*	0.77
Oral Reading Accuracy	66.5	9.94	2.5	.10	71.4	11.6	1.0	.03*	0.45
Oral Reading Rate	70.1	9.75	2.0	.07	70.8	14.3	2.0	.07	0.06

M=Mean, *SD*=Standard Deviation, *U*=Mann-Whitney *U* Test, **p*<.05

Table 3. Wilcoxon signed – Rank Test Results for Experimental and Control Group at Pre and Post-Intervention Scores

Scales	Experimental Group				Control Group			
	Pre- Intervention M (SD)	Post- Intervention M (SD)	<i>z</i>	<i>p</i>	Pre- Intervention M (SD)	Post- Intervention M (SD)	<i>z</i>	<i>P</i>
Word Reading	76.7(13.2)	85.5 (16.4)	-1.84	.03*	67.3(12.2)	67.6(14.7)	-.27	.39
Pseudoword Reading	71.2 (12.9)	88 (19.2)	-1.84	.03*	68.6(7.76)	69(11.2)	-.44	.32
Spelling	75.2 (10.9)	89.7(19.2)	-1.84	.03*	72.6(11.1)	74.6(12.7)	-1.34	.09
Oral Reading Accuracy	70.2(11.5)	78.2(7.93)	-1.82	.03*	61.6(5.85)	62.3(9.60)	-.44	.32
Oral Reading Rate	75.5(4.79)	78.5(10.4)	-.73	.23	56.3(3.21)	53.3(1.15)	-1.34	.09

M=Mean, *SD*=Standard Deviation, *z*=Wilcoxon signed – Rank Text, **p*<.05

improvements in spelling were observed in the experimental group, a change that was not seen in the control group at either stage. However, despite these improvements, oral reading fluency scores remained relatively stable for both groups. Interestingly, the control group exhibited a decline in oral reading rate at the post-intervention stage.

To analyse individual scores in both the experimental and control groups, raw word reading scores from the WIAT-III were compared at the pre- and post-intervention stages (refer to Table 4). The results revealed a significant improvement in word reading for the experimental group, which was attributed to the enhanced phonemic awareness and multisensory techniques employed during the intervention. On average, the experimental group showed an increase of 8 words in their word reading scores, while the control group showed a modest improvement of only 1.3 words.

Table 4. Word Reading Results of Experimental and Control Group at Pre and Post-Intervention Scores

	Word Reading Scale of WIAT-III	
Participants	Pre-intervention	Post-Intervention
Experimental Group		
Participant 1	20	25
Participant 2	4	9
Participant 3	15	20
Participant 4	12	29
Control Group		
Participant 1	1	2
Participant 2	5	5
Participant 3	12	13

In the analysis of pseudoword decoding scores, significant differences were observed between pre- and post-assessment results for the experimental group, highlighting substantial improvement following the intervention (see Table 5). Specifically, the experimental group demonstrated an impressive average increase of 11 words, indicating the effectiveness of the intervention in enhancing pseudoword decoding skills. In contrast, the control group's scores remained largely unchanged or showed slight decreases, with only a modest average improvement of 0.6 words on the post-assessment of this scale.

Table 5. Pseudoword Reading Results of Experimental and Control Group at Pre and Post-Intervention Scores

	Pseudoword Reading Scale of WIAT-III	
Participants	Pre-intervention	Post-Intervention
Experimental Group		
Participant 1	2	12
Participant 2	1	7
Participant 3	1	6
Participant 4	4	27
Control Group		
Participant 1	0	1
Participant 2	2	1
Participant 3	4	4

Table 6. Oral Word Fluency Results of Experimental and Control Group at Pre and Post-Intervention Scores

	Oral Reading Fluency of WIAT-III			
Participants	Pre-Intervention	Pre-Intervention	Post-Intervention	Post-Intervention
Experimental Group				
Participant 1	116	3:07	119	2:54
Participant 2	65	8:05	103	5:46
Participant 3	176	4:04	201	3:09
Participant 4	118	3:16	126	1:52
Control Group				
Participant 1	37	10:4	47	10:4
Participant 2	145	7:05	149	8:31
Participant 3	97	5:47	95	5:45

The Oral Reading Fluency scale scores indicated a significant improvement in the experimental group's ability to read words accurately and more quickly, which can be attributed to the explicit instruction and multisensory approach employed during the intervention (for detailed scores, see Table 6). In contrast, the control group showed minimal change, with reading times remaining constant or slightly increasing. However, a small increase in the total number of words read within the given time frame was observed at the post-assessment stage for the control group.

Significant differences in spelling scores between the experimental and control groups were observed at both pre- and post-intervention stages (see Table 7). In the experimental group, participants 1, 3, and 4 demonstrated notable improvements, each correctly spelling 5 to 7 additional words post-intervention. Participant 2 showed a more modest improvement, spelling 2 additional words correctly. In contrast, the control group exhibited minimal progress, with participants 1 and 2 each improving by just 1 word on the post-intervention spelling test. These results underscore the varying levels of spelling skill development among individual participants in both groups following the intervention.

Table 7: Spelling Result of Experimental and Control Group at Pre and Post-Intervention Scores

Participants	Spelling Scale of WIAT-III	
	Pre-intervention	Post-Intervention
Experimental Group		
Participant 1	13	17
Participant 2	8	10
Participant 3	10	15
Participant 4	11	17
Control Group		
Participant 1	6	7
Participant 2	9	10
Participant 3	11	10

DISCUSSION

The present study aimed to assess the impact of specific intervention strategies on dyslexia, particularly focusing on how these strategies enhance reading and spelling skills in comparison to traditional instructional methods typically used in schools. Dyslexia is the most common learning disability, yet many children diagnosed with this disorder often face limited progress when enrolled in tutoring centers that implement the same teaching approaches found in regular school curricula. Unfortunately, this lack of improvement often leads to frustration for both the children and their parents, with persistent academic struggles potentially damaging a child's self-esteem. The primary goal of this study was to raise awareness about effective dyslexia interventions in Pakistan, emphasizing the importance of seeking professional guidance for managing children's learning difficulties, rather than resorting to punitive measures for academic underperformance.

The study's findings indicated that explicit instruction combined with a multisensory approach notably improved key dyslexic traits, including low reading accuracy, pseudoword decoding, and poor spelling, in the experimental group after the intervention. According to the American Psychological Association (2013), dyslexia is characterized by difficulties in reading accuracy, fluency, and spelling, with some cases also involving reading comprehension issues. The intervention in this study was designed to specifically target these areas, and the results demonstrated that the experimental group showed significant improvements in reading accuracy and spelling at the post-intervention stage when compared to the control group.

Implementing dyslexia interventions has shown a significant improvement in areas of academic weakness, unlike reliance on conventional teaching methods. Zygouris et al. (2018) conducted a study to compare the scores of participants who received two distinct interventions with those who underwent traditional school instruction. Their findings indicated that participants in both intervention groups outperformed the traditionally instructed group in untimed word reading, phonemic decoding, and comprehension tasks. These results are consistent with the present study, where the experimental group participants showed enhanced scores in word reading, pseudoword reading, and spelling compared to the wait-list control group, which received no intervention. Similarly, Lovett et al. (2017) supported these findings, reporting that their intervention group, which received targeted therapy, outperformed peers in single-word reading, phonemic awareness, and letter knowledge compared to the group that did not receive therapy during the same period.

While a variety of global methods exist to address dyslexic traits, explicit instruction remains one of the most effective intervention strategies (Moats & Tolman, 2019; Vaughn & Fletcher, 2021). In dyslexia intervention, explicit instruction involves directly and thoroughly teaching each concept and skill to the child, ensuring complete clarity before

moving to the next (Denton et al., 2014; Grigorenko et al., 2020). In this study, explicit instruction was consistently applied to each participant in the experimental group using the "Alpha to Omega" program. The findings indicate that when concepts were taught at the participant's level of understanding and practiced until mastery, significant improvements occurred across various measures. These results align with previous research and reinforce the effectiveness of explicit instruction as a key intervention strategy for dyslexia.

According to the principles of explicit instruction, lessons must progress at an appropriate pace—not too fast or too slow. Simpler tasks should precede more complex ones, and repeated review is necessary to ensure understanding (Archer & Hughes, 2011; Denton & Al Otaiba, 2011). These principles were uniformly applied to all experimental group participants, despite initial performance disparities. As sessions advanced, it became clear that each child progressed at their own pace. This adaptable approach enabled children to master learned concepts according to their learning rates, ultimately resulting in substantial score improvements at the post-intervention stage.

The use of a multisensory teaching approach, which combines visual, auditory, and kinesthetic input, is a valuable method for enhancing memory and written language skills in dyslexic children (International Dyslexia Association, 2009). In the current study, participants were taught spelling using a multisensory approach, emphasizing kinesthetic engagement. The results highlight significant improvements in spelling scores at the post-intervention stage. This approach was particularly effective for addressing letter reversals, such as confusion between 'b & d' or 'w & m' (Köse et al., 2022; Smith, 2016). For example, participant 2 in the experimental group, who previously struggled with the 'b & d' reversal, benefited from combining auditory, visual, and kinesthetic inputs. Post-intervention assessments showed that the child no longer made reversal errors, indicating successful resolution of the issue through the multisensory strategy.

The main aim of this study was to evaluate the influence of improved phonemic awareness—achieved through explicit instruction and a multisensory approach—on foundational reading skills, including word reading, pseudoword decoding, and spelling proficiency. The findings align with previous studies, reinforcing the credibility of these methods. Notably, participants in the experimental group showed marked improvements in pseudoword reading and spelling skills, consistent with the findings of Berent et al. (2012) and Tilanus et al. (2016). Phonological and phonemic awareness are key predictors of reading ability, with deficits in these areas often linked to reading difficulties (Moats & Tolman, 2009; Nkurunziza, 2024). This study focused on enhancing phonemic awareness among participants, and the results confirm its positive impact on developing basic reading skills within the experimental group. These outcomes offer valuable insights into the role of phonemic awareness interventions in improving foundational reading and contribute to the broader understanding of dyslexia management.

The importance of explicit instruction in developing phonological skills for struggling readers is further validated by Al Otaiba et al. (2019). Their study integrated explicit instruction into the Reading Recovery program and compared its outcomes with two other intervention strategies. All groups improved in reading skills, but the group receiving explicit instruction showed superior development in phonemic awareness, a skill underdeveloped in dyslexic students taught using conventional methods. These findings are consistent with those of the present study, emphasizing the crucial role of explicit instruction in enhancing both reading and phonemic awareness.

Understanding the close link between spelling and phonemic awareness is essential. As Nkurunziza (2024) pointed out, phonemic awareness greatly enhances spelling, and working on spelling, in turn, strengthens phonemic awareness. This relationship is well-supported in research, particularly regarding spelling difficulties in dyslexic children, which often stem from phonological issues (Duranović, 2017; Łockiewicz, & Jaskulska, 2016; Palladino et al., 2016). Tilanus et al. (2016) demonstrated that phonic training significantly improved both spelling and reading in dyslexic children. In this study, the experimental group began with a phonics focus, later moving to phonemic awareness development. This sequence facilitated notable spelling improvements, as reflected in post-intervention mean score increases. These findings affirm that integrating phonics and phonemic awareness enhances spelling instruction, effectively improving spelling outcomes.

Reading fluency, defined as the ability to read text accurately and smoothly at a reasonable pace, is a key aspect of proficient reading (Paige, 2020). It is worth noting that reading rate tends to improve last in dyslexic readers. Even when accuracy improves significantly, reading speed may remain low—a feature that can persist into adolescence and adulthood and serve as a diagnostic indicator (Nagler et al., 2021). Tijms (2007) conducted two experiments examining the development of reading accuracy and speed during dyslexia treatment. The results showed that accuracy improved in the initial treatment phase, while reading rate improved later. Similarly, this study found that oral reading rate was the only area where the experimental group did not show significant gains post-intervention. The control group also showed no major improvement. These findings align with broader literature on dyslexia, highlighting the persistent challenge of enhancing reading rate, even as other reading skills improve. This underscores the need for further research and specialized interventions to support reading fluency in dyslexic individuals.

In summary, this study supports several key conclusions about dyslexia interventions: A) Evidence-based strategies result in notable improvements in word reading, pseudoword reading, oral reading accuracy, and spelling when compared to standard school instruction. B) Explicit instruction and multisensory approaches in developing phonemic awareness are especially effective for dyslexic learners. C) Explicit instruction allows children to progress at their own pace, while multisensory methods improve spelling and

reduce reversal errors. D) Dyslexic children tend to show quicker improvements in reading accuracy than in reading rate. These conclusions highlight the importance of evidence-based methods, explicit instruction, and multisensory approaches in supporting reading and spelling development in dyslexic children while also identifying specific challenges that warrant further intervention.

LIMITATIONS AND IMPLICATIONS

One of the primary limitations of the present study is its small sample size ($N = 7$), which restricts the generalizability and statistical power of the findings. While the intervention results are promising, they should be interpreted with caution and viewed as preliminary evidence rather than definitive conclusions.

Additionally, although the study emphasized developing phonemic awareness through explicit instruction, it did not employ a standardized test specifically measuring phonemic awareness. Instead, improvements were inferred from gains in pseudoword decoding, spelling, and reading accuracy – areas closely linked to phonemic skills. Future research should incorporate direct assessments of phonemic awareness to provide more conclusive evidence regarding its development and mediating role in reading acquisition.

Despite these limitations, the observed improvements across multiple literacy skills in the experimental group suggest that explicit instruction and multisensory approaches hold substantial potential in supporting children with dyslexia. These findings can serve as a foundation for larger-scale studies that address the current study's constraints and expand on its initial findings.

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