

A Quasi-Experimental Study of Letter-Sound and Sight-Word Recognition among School Students with Dyslexia

Gayathiri M^{1,*}, Bhimappa Rangannavar²

¹Research Scholar, Central University of Tamil Nadu, Thiruvavur.

²Associate Professor, Central University of Tamil Nadu, Thiruvavur.

*Corresponding Email: gayathirim1107@gmail.com

HOW TO CITE: ABSTRACT

Gayathiri M, Bhimappa Rangannavar (2026), A Quasi-Experimental Study of Letter-Sound and Sight-Word Recognition among School Students with Dyslexia

International Journal of Special Education, 41(21s), 1081 - 1090

Dyslexia is a specific knowledge difficulty that is often associated with the development of accurate also fluent word reading skills. Word reading includes both letter-sound recognition and sight-word recognition. Students must be able to recognize familiar words quickly and have solid letter-sound relationships. The present study examined letter-sound and sight-word recognition of school students with dyslexia using a quasi-experimental research design with eighty students: forty students in the experimental group and forty students in the control group. A pre-test and post-test control group design was used. The experimental group was provided with structured teaching strategies to enhance word-reading skills, whereas the control group received conventional instructional practices. Letter-sound and sight-word skills were measured prior to and following the intervention. Letter-sound and sight-word scores were analyzed in separate analyzes of covariance (ANCOVA) with the respective pre-test score as the covariate. For letter-sound, the adjusted posttest scores were 14.095 for the control group and 17.355 for the experimental group. The ANCOVA indicated a significant difference between groups, $F(1, 77) = 116.499$, $p < .001$, $\eta^2 = .602$. The adjusted post-test means for sight words were 5.853 for the control group & 6.622 for the experimental group. The ANCOVA also revealed a statistically prove with significant difference, $F(1, 77) = 15.191$, $p < .001$, $\eta^2 = .165$. Results suggest that the structured instructional approach was associated with significantly greater adjusted post-test performance in both letter-sound and sight-word recognition. This paper highlights the importance of teaching specific aspects of word reading to students with dyslexia.

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.

Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license

(<http://creativecommons.org/licenses/by/4.0/>).

Keywords: Dyslexia, Letter-sound recognition, Sight-word recognition, Word reading, Quasi-experimental study, Reading intervention

Introduction

Reading is a complex cognitive and linguistic process that requires learners to coordinate many skills, such as knowledge of the alphabetic system, sound-symbol relationships, word recognition, vocabulary, fluency, and comprehension. Dyslexia can affect students' ability to read wordings accurately and fluently, which can negatively impact their learning in all subject areas. Thus, systematic and explicit instruction is especially important for pupils with persistent reading difficulties. The ability to recognize individual letters and sounds, and the ability to recognize whole words on sight are two key aspects of learning to read words. Letter-sounds recognition is children who are able to identify letters and recognize what sound that letter makes. This information is the key to unlocking unfamiliar words. If students have difficulty making consistent letter-sound associations, they may have difficulty blending sounds, decoding words, and forming accurate word-reading habits. Sight-word recognition is the capacity to instantly and accurately identify common words without having to consciously sound out each letter. Some common words are automatically recognized through repeated exposure and practice. Quickly recognizing familiar words can reduce cognitive load when reading and support reading fluency. Research on reading intervention has shown that systematic reading instruction improves reading results for pupils with or at risk for dyslexia. Hall and colleagues (2023) systematically reviewed and meta-analyzed fifty-three intervention studies involving 6,053 students & found significant positive possessions of reading instructions on reading outcomes. The review also identified word-reading and spelling outcomes as among the intervention outcomes. Interventions targeting specifically sight-word acquisition have also been studied. Phipps et al. (2022) examined strategic incremental rehearsal with students identified with specific learning incapacities in reading who were receiving special schooling services and found gains in sight-word reading following intervention. Hence, it can be valuable to look into particular

facets of word recognition rather than viewing it as a general construct in terms of where the students are struggling and how they react to instruction. Specifically, the present study deals with letter-sound recognition and sight-word recognition in school students with dyslexia.

Need of the Study

Pupils with dyslexia often require explicit and systematic support to develop initial reading skills, particularly letters- sound knowledge and word recognition. Letter-sound knowledge is important for decoding unfamiliar words and evolving accurate reading skills. Sight-word recognition helps students read familiar words extra automatically, thereby improving reading accurateness and fluency. Research evidence indicates that targeted reading interpositions can improve reading outcomes among students with or at risk for dyslexia. Middle-school students may continue to knowledge basic word-reading problems despite progressing to advanced academic content, making foundational instruction important. Hence, examining letter-sound knowledge and sight-word recognition separately can help identify specific areas of improvement associated with battered instructional methods.

Review of Related Literature

Hall (2023) conducted a systematic review of literature and meta-analysis of fifty-three intervention studies involving 6,053 students by or at risk for dyslexia students. The study examined intervention research conducted between 1980 and 2020. The findings showed a statistically significant positive overall effect of instruction on norm-referenced reading outcomes. Word reading and spelling were among the reading outcome domains examined. The researchers also reported that intervention dosage and reading outcome domain moderated intervention effects. These findings provide support for examining specific word-reading outcomes when evaluating instructional interventions for students with dyslexia.

Letter-sound knowledge represents an essential component of alphabetic reading because students must understand how written symbols correspond to speech sounds. Explicit instruction in letter-sound relationships can help students develop the knowledge needed for decoding. The systematic review by Hall et al. (2023) indicates that intervention studies for students with or at risk for dyslexia frequently include word-reading instruction and foundational reading skills. Their findings provide a broader empirical basis for examining specific word-reading outcomes following intervention.

Sight-word recognition involves the accurate and increasingly automatic recognition of familiar words. Students who struggle with reading may benefit from repeated, systematic practice with high-frequency or targeted words. Phipps, Robinson, and Grebe (2022) evaluated Strategic better Rehearsal for sight-word acquisition among three students with specific education disabilities in reading. Their multiple-baseline study reported increases in sight-word reading following intervention, and all participants correctly read at least twenty-one of twenty-five targeted words at a Five -week maintenance assessment. The study provides evidence that targeted and systematic practice can support sight-word acquisition among students with reading disabilities.

Austin et al. (2022) compared word-reading instruction alone with instruction connecting word reading and word meaning between fourth- and fifth-grade students with dyslexia. Following twelve instructional sessions, the study reported significant improvements in word-reading accuracy and fluency for the integrated instructional condition. This finding reinforces the value of structured instruction directed toward word-reading development and supports the importance of examining word-level outcomes in students with dyslexia.

Research Gap

Although previous studies have examined reading interventions, sight-word

acquisition, and broader word-reading outcomes, there remains a need for studies that separately examine letter-sound recognition and sight-word recognition within the same quasi-experimental investigation. The present study addresses this need by examining these two specific components separately and comparing adjusted post-test performance among experimental and control groups.

Variables of the Study

Independent Variable

Structured Teaching Strategies

The experimental group received planned and structured instructional activities designed to strengthen word-reading skills.

Dependent Variables

- Letter-Sound Recognition
- Sight-Word Recognition

Covariates

- Letter-sound pre-test score
- Sight-word pre-test score

The corresponding pre-test score was used as a covariate in each ANCOVA analysis.

Aim of the Study

The main aims of the study was to examined the differences in letter-sound and sight-word recognition between students with dyslexia who received structured teaching strategies and those who acknowledged conventional instruction.

Objectives of the Study

The study was designed to:

- ✓ Control the pre-test and post-test students' performance of the experimental and control groups in letter-sound recognition.
- ✓ Determine the pre-test and post-test students' performance of the experimental and control groups in sight-word recognition.
- ✓ Compare the adjusted post-test letter-sound scores of the experimental and control groups after controlling for to the letter-sound pre-test scores.

- ✓ Compare the adjusted post-test sight-word scores of the experimental and control groups after controlling for the sight-word pre-test scores.
- ✓ Determine the magnitude of the group differences using partial eta squared.

Research Hypotheses

Hypothesis 1:-There is no, significant difference among the experimental and control groups in adjusted post-test letter-sound recognition scores after controlling for pre-test letter-sound scores.

Hypothesis 2:-There is no, significant difference among the experimental and control groups in adjusted post-test sight-word recognition scores after controlling for the pre-test sight-word scores.

Operational Definitions

Dyslexia: For the study, dyslexia refers to students identified as having persistent difficulties in reading, particularly in word-reading-related skills, according to the identification procedures and criteria adopted for the study.

Letter Sound Recognition: Letter-sound recognition refers to the student's ability to recognize letters and identify their corresponding sounds. In the present study, it represents the student's performance on the letter-sound component of the word-recognition assessment.

Sight-Word Recognition: Sight-word recognition refers to the student's ability to recognize and read familiar or commonly encountered words accurately without relying exclusively on conscious letter-by-letter decoding.

Structured Teaching Strategies

Structured teaching strategies refer to the planned instructional activities provided to the experimental group to strengthen specific word-reading skills, particularly letter-sound and sight-word recognition.

Experimental -Group

The experimental group refers to the forty students who received the structured instructional intervention.

Control Group

The control group mentions to the forty students who continued with conventional instructional practices during the study period.

Methodology-Research Design:- The study implemented a quasi-experimental with pre-test-post-test, control group design.

The design involved 2 groups:

- ✓ Experimental Group – Forty students
- ✓ Control Group – Forty students

Both clusters were assessed before & after the intervention.

Design Representation

Experimental Group:- $O_1 \rightarrow X \rightarrow O_2$

Control Group:- $O_3 \rightarrow C \rightarrow O_4$

Anywhere:

- O_1 and O_3 = Pre-test
- X == Structured teaching intervention
- C = Conventional instruction
- O_2 and O_4 == Post-test

Participants

The sample consisted of **forty school students with dyslexia**.

Group	Number of Students
Experimental Group	Forty
Control Group	Forty
Total	Eighty

The participants were selected according to the sampling procedure adopted for the study.

Sampling Technique: Purposive sampling was used to identify students who seen the inclusion criteria related to the study.

Research Tools: The study used assessment measures for the two selected components of word recognition:

- **Letter-Sound Recognition Measure**
This component assessed students' ability to recognize letters and associate them with corresponding sounds.
- **Sight-Word Recognition Measure**
This component assessed students' ability to recognize and read selected familiar/common words.

This study considered only the scores from these two components.

Data Collection Procedure

The study surveyed a pre-test, intervention, and post-test procedure. First, the selected students were assessed using the letter-sound and sight-word measures. The pre-test established the baseline performance of both groups. The

Analysis and Interpretation

Letter-Sound Recognition

Table: 1 Summary of the One-way ANCOVA for familiar post-test letter sound scores between Dyslexic pupils belongs to the control and the experimental groups by considering their pre-test letter-sound scores as covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	η^2
Pre-test achievement	.164	1	.164	.091	.764	.001
Group	209.601	1	209.601	116.499	.001	.602
Error	138.536	77	1.799			
Total	20132.000	80				
Corrected Total	349.950	79				

a. R Squared = .604 (Adjusted- R Squared = .594)

Effect of Covariate - Pre-test Letter sound:

The F value is .091 and p value is .764 for pre-test letter sound mean scores as covariate for the post-test letter sound mean scores for the Dyslexic pupils belong to the control and the experimental groups. Here, the obtained *p*-value is higher than .05 level of significance. It indicates that, the pre-test letter

experimental group subsequently received the planned structured teaching intervention. The control group continued with conventional instructional practices. After completion of the intervention period, both groups were administered the post-test measures. The resulting data were analyzed statistically to determine whether differences existed among the experimental and control groups.

Statistical Technique

The data were analyzed using **Analysis of Covariance (ANCOVA)**.

ANCOVA was conducted separately for:

- Letter-sound recognition
- Sight-word recognition

The respective pre-test score was treated as the covariate to statistically control for initial differences between the groups.

The level of significance was fixed at **0.05**.

Partial eta squared (η^2) was used to indicate the magnitude of the group effect.

sound not explains a substantial amount of variance in the post-test letter sound scores, confirming that, the pre-test letter sound mean scores is not a covariate for post-test letter sound mean scores of Dyslexic pupils at .05 level of significance, $F(1, 79) = .091, p = .0010$.

Main Effect of Intervention/Treatment:

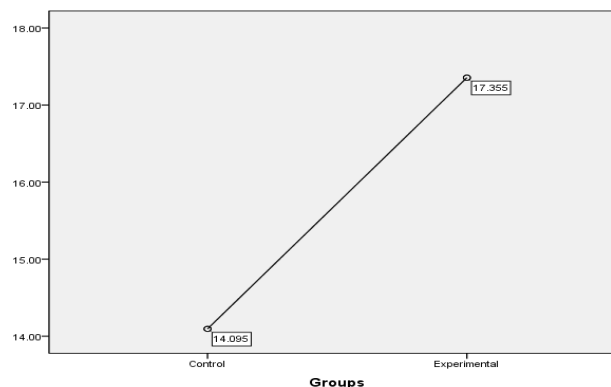
The F value is 116.499 and p -value is .001 for adjusted mean scores of letter sound scores of Dyslexic pupils belong to the control and the experimental groups. Hence, the null hypothesis is rejected and same also research hypothesis is accepted. It means there is a significant difference in the adjusted post-test letter sound scores between Dyslexic pupils belong to the control and the experimental group by considering their pre-test letter sound scores as covariate at .05 level of significance ($1, 97) = 116.499, p = .001, \eta^2 = .602$. The partial eta-squared i.e., $\eta^2 = .602$ indicate moderate effect size.

Further, the adjusted mean scores of the letter sound scores of control group is 14.095 and the adjusted mean scores of the letter sound of experimental group is 17.355. The adjusted mean scores of the letter sound scores of experimental group is significantly higher than, that of control group. It may hence, be said that, the pupils of experimental group taught through English language teaching approach accomplished significantly higher letter sound compare to the pupils of control group taught through predictable method. The detail of pre-test of the letter sound, post-test letter sound and adjusted mean scores are reported in the -following given table.

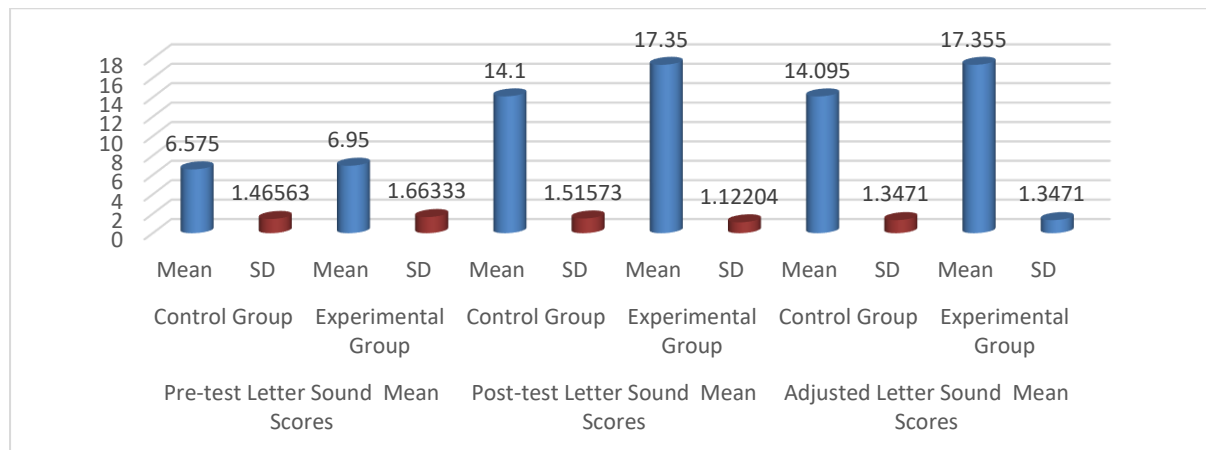
Table: 2 Descriptive Statistics for the pre-test, post-test and adjust letter sound mean scores of experimental group and control group

Group	N	Letter sound					
		Pre		Post		Adjusted -Mean Scores	
		Mean	SD	Mean	SD	Mean	SD
Control group	40	6.5750	1.46563	14.1000	1.51573	14.095	.213
Experimental group	40	6.9500	1.66333	17.3500	1.12204	17.355	.213

The above said table presents the pre-test and the post-test letter sound scores of control also experimental group. The adjusted mean scores are representing the post-test mean values after controlling for to the covariate, namely pre-test letter sound scores for the both groups. The mean comparison indicates means that, adjusted mean achievement scores of the experimental group ($M = 17.355$) is significantly greater than that of the control group ($M = 14.095$). Thus, findings of the study revealed that English language teaching skill strategy was more effective in progressing letter sound of Dyslexic students of experimental group than the, conventional method used in to the control group. The data also reported in to the falling figure.



Graph-1: Comparison of the adjusted letter sound scores of Dyslexic pupils belongs to the control with the experimental group



Graph:2- Comparison of the pre-test, post-test and, adjust letter sound mean scores of the experimental group with control group

Sight-Word Recognition

Table 3 Summary of the One-way ANCOVA for to adjusted post-test sight word scores between Dyslexic students belong to the control, and to the experimental group by considering their -pre-test sight word scores as a covariate

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	η^2
Pre-test achievement	.664	1	.664	.854	.358	.011
Group	11.800	1	11.800	15.191	.001	.165
Error	59.811	77	.777			
Total	3185.000	80				
Corrected Total	72.487	79				

a. R Squared = .175 (Adjusted R Squared = .153)

Effect of Covariate - Pre-test Sight Word:

The F value is .854 and p value is .358 for pre-test sight word mean scores as the covariate for post-test vision word mean scores for the Dyslexic students fit to the control and the experimental group. Here, than obtained *p*-value is higher than 0.05 level of significance. It indicates that to, pre-test sight word not describes a substantial percentage of variance in the post-test sight word scores, confirming that, pre-test sight word mean scores is not the covariate for post-test sight word mean scores of Dyslexic pupils at .05 level of significance, $F(1, 79) = .854, p = .358$.

Main Effect of Intervention/Treatment:

The F value is 15.191 and *p*-value is 0.001 for adjusted mean scores of sight word scores of Dyslexic selected students belong to the control and to the experimental group. Hereafter, null hypothesis is rejected and research hypothesis is accepted based on data. It means that , there is a significant difference in to the adjusted post-test sight word scores among Dyslexic pupils belong to the control and the experimental group by considering their pre-test sight word sores as covariate at 0.05 level of significance ($1, 97) = 15.191, p = .001, \eta^2 = .759$. The partial eta-squared i.e., $\eta^2 = 0.165$ indicate small effect size.

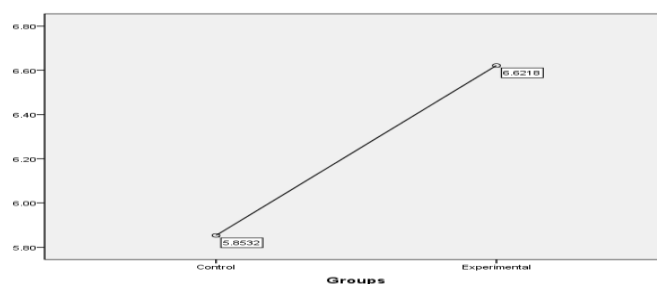
Further, the adjusted mean scores of sight word scores of control group is that 5.853 and the adjusted mean scores of the sight word of experimental group is 6.622. The adjusted mean scores of sight word scores of the experimental group are significantly grater than the control group. so therefore, above

said that, the students of experimental group taught through English language teaching strategy skilled significantly higher sight word compare to the pupils of control group taught through conventional method. The detail of pre-test sight word, post-test sight word and adjusted mean scores are reported in the following given table.

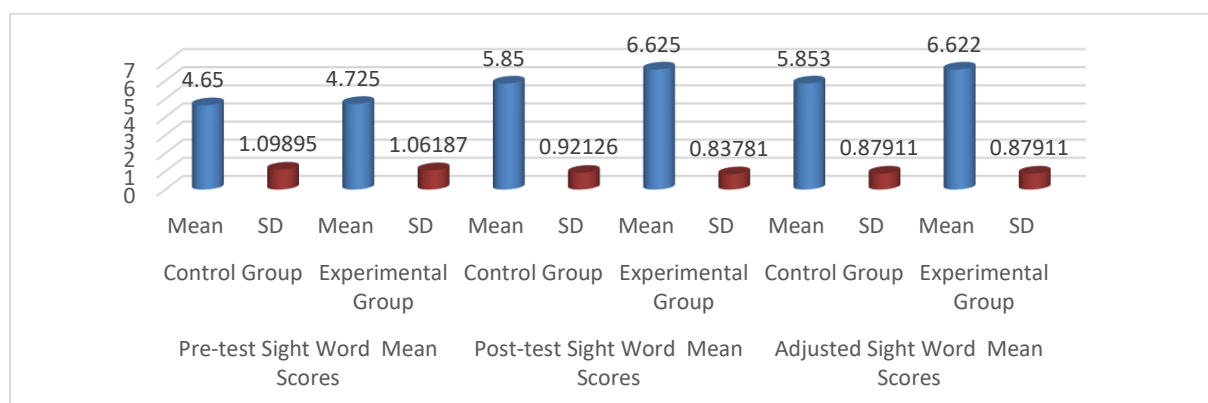
Table4: Descriptive Statistics for pre-test, post-test and adjust sight word mean scores of experimental group and control group as below table 4

Group	N	Achievement in Science					
		Pre		Post		Adjusted Mean Scores	
		Mean	SD	Mean	SD	Mean	SD
Control Group	40	4.6500	1.09895	5.8500	.92126	5.853	.139
Experimental Group	40	4.7250	1.06187	6.6250	.83781	6.622	.139

The above table detailed the pre-test and post-test sight word scores of the control and experimental group. The adjusted mean that scores represent the post-test mean values after controlling for the covariate, namely that pre-test sight word scores for both groups. The mean comparison indicates indicating that, adjusted mean achievement scores of the experimental group ($M = 5.853$) is significantly greater than that of the control group ($M = 6.622$). Thus, the findings of the study exposed that English language teaching strategy was more effective in enhancing sight word of Dyslexic pupils of experimental group than the conventional technique used in the control group. The all data also reported in the falling given figure.



Graph-3: Comparison of the adjusted sight word scores with Dyslexic students belong to the control also the experimental group



Graph:4 Comparison of the pre-test, post-test and adjust sight word mean scores of the experimental group with control group

Summary of Major Findings

Findings of the study

- ⇒ The experimental group's letter-sound mean increased from **6.950** at pre-test to **17.350** at post-test.
- ⇒ The control group's letter-sound mean increased from **6.575** to **14.100**.
- ⇒ After controlling for pre-test performance, the experimental group had a higher adjusted letter-sound mean (**17.355**) than the control group (**14.095**).
- ⇒ The difference between groups in adjusted letter-sound scores was statistically significant, $F(1, 77) = 116.499, p < .001, \eta^2 = .602$.
- ⇒ The experimental group's sight-word mean increased from **4.725** to **6.625**.
- ⇒ The control group's sight-word mean increased from **4.650** to **5.850**.
- ⇒ The adjusted sight-word mean was **6.622** for the experimental group and **5.853** for the control group.
- ⇒ The difference between groups in adjusted sight-word scores was statistically proved significant, $F(1, 77) = 15.191, p < .001, \eta^2 = .165$.

Discussion of Findings

The findings demonstrate statistically significant differences among the experimental and control groups in both letter-sound and sight-word recognition after adjustment for pre-test performance. For letter-sound recognition, the experimental group obtained a substantially higher adjusted mean than the control group. The ANCOVA result, $F(1, 77) = 116.499, p < .001$, indicates that the groups differed significantly after controlling for initial letter-sound performance. The effect size, $\eta^2 = .602$, indicates that the group factor accounted for a substantial amount of the adjusted outcome variance in this given sample. This finding is consistent with the broader intervention literature. Hall et al. (2023) found positive effects of reading interventions among students with or at risk for dyslexia and identified word reading as an important intervention outcome domain. For **sight-word recognition**, the experimental group also achieved a higher

adjusted mean than the control group. The significant ANCOVA result, $F(1, 77) = 15.191, p < .001$, indicates a statistically significant group difference. The effect size of $\eta^2 = .165$ indicates a meaningful group effect, although it was smaller than the observed effect for letter-sound recognition. The sight-word finding is also compatible with research demonstrating that targeted instructional procedures can improve sight-word acquisition between students with specific learning disabilities. Phipps et al. (2022) reported improved sight-word reading following strategic incremental rehearsal among three pupils receiving special education services for reading-related learning disabilities. The present results therefore suggest that the intervention was associated with improvement in both components examined in the study. However, because the study employed a quasi-experimental rather than randomized experimental design, the findings should be interpreted as evidence of an association between the instructional condition and post-test performance rather than definitive proof of causation.

Conclusion

The present quasi-experimental study examined two specific components of word recognition—**letter-sound recognition and sight-word recognition—among school students with dyslexia**. The results displayed statistically significant differences among the experimental and control groups for both outcomes after controlling for the respective pre-test scores. For letter-sound recognition, the experimental group obtained an adjusted mean of **17.355**, compared with **14.095** for the control group. The ANCOVA result was statistically significant, $F(1, 77) = 116.499, p < .001, \eta^2 = .602$. For sight-word recognition, the experimental group obtained an adjusted mean of **6.622**, compared with **5.853** for the control group. The ANCOVA result was also statistically significant, $F(1, 77) = 15.191, p < .001, \eta^2 = .165$. Thus, within the conditions of this study, students who received the structured

teaching intervention demonstrated higher adjusted post-test performance in both letter-sound and sight-word recognition than students in the control group. The findings emphasize the importance of addressing specific word-reading components through planned and systematic instruction when supporting students with dyslexia.

Educational Implications

The findings have several implications for educational practice.

- Explicit letter-sound instruction can be incorporated into reading support programs for students experiencing word-reading difficulties.
- Teachers can provide regular practice in letter-sound associations to strengthen students' accuracy and confidence.
- Sight-word practice can be systematically incorporated into classroom and remedial reading activities.
- Special educators can use repeated practice and structured review to promote more automatic recognition of familiar words.
- Assessment of reading difficulties should examine specific components of word recognition rather than relying only on an overall reading score.
- Schools can develop individualized reading support programs that address students' specific word-reading needs.

Limitations of the Study

References

- Austin, C. R., Vet all(2022). The relative effects of instruction linking word reading and word meaning compared to word reading instruction alone on the accuracy, fluency, and word meaning knowledge of 4th–5th grade students with dyslexia. *Scientific Studies of Reading*, 26(3), 204–222. doi:10.1080/10888438.2021. 1947294
- Bowers, J. S. (2020). Reconsidering the evidence that systematic phonics is more effective than alternative methods of reading instruction. *Educational Psychology Review*, 32, 681–705. doi:10.1007/s10648-019-09515-y
- Hall, C., et. All (2023). Forty years of reading intervention research for elementary students with or at risk for dyslexia: A systematic review and meta-analysis. *Reading Research Quarterly*, 58(2), 285–312. doi:10.1002/rrq.477
- National Reading Panel. -(2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Institute of Child Health and Human Development.
- Phipps, L., et .al. (2022). An evaluation of Strategic Incremental Rehearsal on sight word acquisition among students with specific learning disabilities in reading. *Journal of Behavioral Education*, 31, 281–297. doi:10.1007/s10864-020-09398-y

The findings should be taken in light of the following limitations:

- The study used a quasi-experimental design rather than random assignment.
- The sample consisted of 80 students, which may limit generalization beyond the study population.
- The present paper examined only two components of word recognition: letter-sound and sight-word recognition.
- The study did not examine the long-term maintenance of intervention gains.
- The findings are specific to the instructional and participant characteristics of the study.

Suggestions for Further Research

Future studies may:

- Conduct randomized controlled studies with larger samples.
- Examine the long-term retention of letter-sound and sight-word gains.
- Compare different instructional approaches for improving letter-sound recognition.
- Examine technology-assisted approaches for sight-word learning.
- Investigate the relationship between letter-sound recognition and reading fluency.
- Examine whether improvements in letter-sound and sight-word recognition transfer to reading comprehension.
- Conduct similar studies across different school settings and regions.