

# Executive Function Training As An Adjunct To Multimodal Teaching In School Going Children With Learning Disabilities

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## Abstract

Background of the study: Learning disabilities are a group of neurological or brain-based problems that affect one or more ways that a person takes in, stores or uses information. It is a term that refers to a group of disorders in listening, speaking, reading, writing and mathematics. According to a study published in 2018, one percent to nineteen percent of school going children in India have LD. Thus, often neglected, learning disabilities require considerable concern in India. Where multimodal teaching strategies are commonly practice in special education schools, role of executive function training as an adjunct to conventional therapy is yet to be established. Evidence of relationship between the learning disabilities and executive functions is however already available in literature.

Aims and Objectives: This study aims at finding the role of executive function training as an adjunct to multimodal teaching on the performance of school going children with learning disability.

Methods-A total of 30 students aged between 4-9 years selected as per the criteria, participated in the training program. Executive function therapy along with multimodal teaching was given to experimental group for three weeks, alternate day. Control group was however given multimodal teaching only. Children academic performance was further re-evaluated to find any significant change.

Conclusion-Executive function training as an adjunct to multimodal teaching was an effective intervention for school-going children with difficulty in reading, and writing disorder.

**Keywords:** Dyslexia, Executive Dysfunction, Multimodal Teaching, Learning disability, Executive Function Training.

## INTRODUCTION

Dyslexia is a learning disability characterized by difficulties recognizing spoken sounds and understanding how they connect to letters and words (decoding). Dyslexia, often known as reading impairment, affects the parts of the brain that process language. People with dyslexia often have normal intellect and eyesight. Tutors in customized education programs may help most dyslexic youngsters

succeed in school. Learning disabilities are arranged of neurological or brain-based issues that disrupt one or more of a person's information-gathering, storage, and usage processes (1). It is a word for a group of problems with hearing, speaking, reading, writing, and math. According to a 2018 study, 1% to 9% of school-aged children in India suffer with LD (2). Multimodal teaching is when students are taught topics through a variety of media such as information, photos,

illustrations, audio, and other forms of communication (2). However, there is already evidence in the literature that there is a link between learning difficulties and executive functioning. Visual, auditory, reading, writing, and kinesthetic modalities are all used to teach an idea in multimodal learning. This goal is to increase teaching quality by matching information delivery to the student's preferred learning style. Students are exposed to different learning styles (15). Multimodal can learn faster, deeper, and retain more of what they learn, according to The Gordon Kelley Academic Success Center. Students learn best when educators use different learning methods at the same time, according to research (16). Multimodal learning offers an engaging learning environment, which encourages students to participate more actively (16).

## Methodology

A total of 300 students were screened for learning disabilities in special school using a three-stage screening procedure. The first stage comprised of the teacher identifying at-risk student. In the second stage, teachers assessed at-risk students using Specific Learning Disability-Screening Questionnaire (SLD-SQ). The third stage comprised of assessment of the screen positive students using Brigance Diagnostic Inventory (BDI) part of NIMHANS Index of Specific Learning Disabilities for identifying the cases of LD. Then each student's academic performance and grades were evaluated subjectively from their respective teachers before giving intervention. Scores were documented from each student on GLAD scale.

Thirty subjects aged between 4 to 9 years were finally included in this study. The sample was recruited by convenient sampling method from Primary school (Tughalpur, Greater Noida), Prajana school, Sunrise learning preschool and Early learning center (Sector 116, Gr. Noida), Dolphin public school, Srijan world school (Sector Gamma2). Participants were divided into two groups i.e., control group and the experimental group. Inclusive criteria were age between 4 to 9 years old children, difficulty in reading, writing, poor schooling, poor learning, with normal hearing, who scored below average. Exclusion criteria were age above

9 years, with a history of head injury, neurological deficits (CP, ADHD, AUTISM), disturbance of emotional conduct, sensory impairment, and Children who scored average or above average. Dependent variables were age, gender, grade, and executive function, Academic performance, GLAD and Independent variables were executive function training multimodal teaching. The study period was between November 2020 to March 2021. The executive function training was administered on the experimental group through 12 training sessions spread across 4 weeks. 3 sessions per week for 60 minutes. It included Yoga – 3 Days in a week. The 30 minute routine consisted of physical postures (Asana), voluntary breathing (pranayama), relaxation techniques, reciting Hymes from traditional yoga texts. Subjects were also made to do Pranayam- sectional breathing, thoracic breathing, Diaphragmatic breathing, kapalbhati, bhastrika. For nearly 10 minutes, subjects were asked to perform Wisconsin card sorting - it was basically sets of cards based upon right and wrong feedback. After correctly matching card according to feature i.e., colour (red, green, yellow) form (+, - signs) or number (1,2,3,4. . .). It occurred for 6 time or until 128 cards were completed. Also, they were instructed to make drawings and draw fingers of hands, rings of fingers by pencil, or by different colours (red, blue, green, yellow) on paper.

## Data Analysis

The IBM statistical package for social sciences (SPSS) software version 21 was used to conduct the statistical analysis. The study included 30 school-aged children (girls and boys) ranging in age from 4 to 9 years. Children's physical characteristics, such as age and gender, were descriptively summarized. For the dependent variables, an independent test was used to check between-group analysis, and a paired t-test was utilized to examine within-group analysis for pre- and post-intervention scores for both groups.

## Results

This chapter deals with the results of data analysis of Group A (Executive function

training) and Group B (Multimodal teaching (control group). These two groups were analyzed on grade level assessment device in school-going children (girls and boys) aged from 4 to 9 yrs.

Table 1- *Demographic details of group A and group B*

Variables	Group1(N=15)	Group2(N=15)
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	Mean+SD	Mean+SD
AGE	7.80+_ .561	7.93+_ .594

There are demographic details of age in between group A and group B.

The Group A consisted of 15 Children with mean age years and mean duration 7.80+.561. The Group B consisted of 15 children with mean age and the mean duration 7.93+.594.

Table 2- *Comparison of pre and post intervention of group A*

Variables	Pre intervention scores		Post intervention scores		t- value	p-value
	Mean	SD	Mean	SD		
GLAD	32.31	4.584	33.30	4.690	-7.850	.000

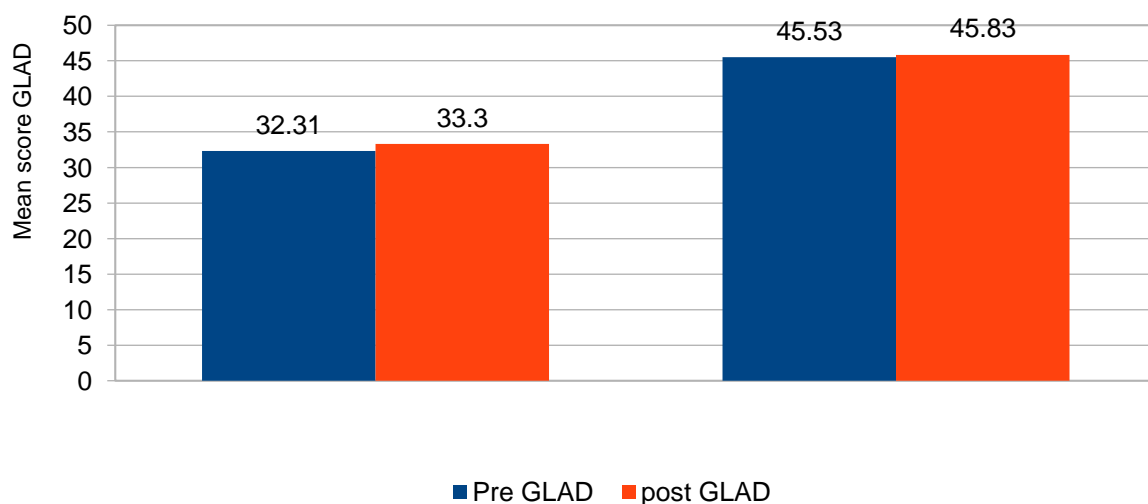
There is a comparison in between pre-intervention scores of the Glad scale and post-intervention score of GLAD scale of group A.

Table 3 – *Comparison of pre and post intervention scores of group B*

Variables	Pre intervention score		Post intervention score		t- value	p- value
	Mean	SD	Mean	SD		
GLAD	45.53	4.486	45.83	4.358	-2.553	.023

Group A

Group B



### Comparison of Pre- and Post-intervention scores of Group A

The comparison of pre intervention scores (Mean=32.31, SD=4.584) and post-intervention scores (Mean=33.30, SD=4.690) of GLAD of Group A showed significant difference ( $t = -7.850$ ,  $p = 0.00$ ).

### Comparison of pre- and post-intervention of Group B

The comparison of pre intervention scores (Mean=45.53, SD=4.486) and post-intervention scores (Mean=45.83 SD=4.358) of GLAD for Group B showed significant difference ( $t = -2.553$ ,  $p = .023$ ).

## Discussion

Executive function training resulted in significant gains in executive function in children who struggled with reading and writing, according to the results section. The difference between group as pre-intervention (Mean=32.31, SD=4.584) and post-intervention (Mean=33.30, SD=4.690) GLAD ratings ( $t = -7.850$ ,  $p = 0.00$ ) was significant ( $t = -7.850$ ,  $p = 0.00$ ). The difference between Group2's pre-intervention (Mean=45.53, SD=4.486) and post-intervention (Mean=45.83, SD=4.358) GLAD scores ( $t = -2.553$ ,  $p = .023$ ) was significant ( $t = -2.553$ ,  $p = .023$ ). Children's targeted cognitive skills improved significantly after cognitive retraining. There is a significant reduction in the time it takes to finish the activity and the number of errors made when it comes to attention (Malhotra S, Rajendra G, et al 2009) This experiment demonstrates a different hypothesis1. This study's findings are similar to those of Malhotra, Rajender, Sharma, and Singh (2009), who found a substantial improvement after testing the effectiveness of a manualized CR package for 36 hours over the course of 18 weeks. Rozario, Kapur, and Rao (1994) indicate that after testing the effectiveness of a remedial package with age ranges from 9 to 11 years, there is a considerable improvement (19).

Effect of executive function training within the group – pre- and post-assessments of groups A and B were conducted, with group A serving as the intervention group and group B as the

control group. In group A. There was a significant improvement after evaluating the efficiency of executive function training for four weeks, and there was also a significant improvement in group (24). Sadasivan(2009) conducted 40-minute study on the effects of phonological awareness and neuropsychological interventions in two groups of ten children with reading impairments aged 10 to 13. Both strategies were shown to be successful in improving reading accuracy. Furthermore, both interventions improved specific cognitions that were sustained over time (27). The difference in executive function training between groups A and B—there was a considerable improvement in executive function in children aged 4 to 9 who had trouble in reading and writing over a 4-week, 60-minute training session, with significant improvement in group A.

## Conclusion

Executive function training as an adjunct to multimodal teaching was an effective intervention for school-going children with difficulty in reading and writing disorders. It indicated improvement in the planning, organizing time, and increase flexibility and cognitive skills in children with learning disabilities.

## Limitation of the study

- The sample size was small to establish the effectiveness.
- The duration of the training could have been long to show the significant changes.

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