



EFFECTIVENESS OF OCCUPATIONAL THERAPY INTERVENTION IN IMPROVING HANDWRITING SKILLS AMONG PRIMARY SCHOOL STUDENTS IN SOUTH CHENNAI

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Abstract: This study involves Primary School Students (6yrs – 11yrs) with Handwriting Difficulties and find out the effectiveness of Occupational Therapy Intervention in improving Handwriting Skills with objectives of evaluating the effectiveness of Occupational Therapy Intervention among primary school students and interpreting the effect of Occupational Therapy intervention with respect to grades (1st to 5th). The students were selected based on the selection criteria. Parents of each student were explained about the benefits and obtained a parental consent from them in accordance with the guidelines of the Institutional Ethics Committee. The pre-test was done using case record proforma and Evaluation Tool of Children's Handwriting. The five participants (one from each grade) participated in a 4 weeks intervention program – Tailor made Occupational Therapy Intervention Protocol for Handwriting skills. After completion of four weeks of interventions the Post test score was obtained from the participant. There was a significant improvement in Handwriting skills post 4 weeks of \ (12 sessions) of Effective Occupational Therapy Tailor-Made Individualised Intervention protocol for Handwriting skills to the study participants who were from Grade one to Grade five. The results of the study concluded that the participants had significant improvement following four weeks of (3 sessions per week) Effective Occupational Therapy Tailor-Made Individualised Intervention protocol based on their grades in improving Handwriting Skills among primary school students (Grade one to Grade five)

I. INTRODUCTION

1.1 Handwriting

Handwriting – refers to the physical skill of writing. For students in primary school, learning to write is an essential skill. Writing is a tool for communication; it offers a way to express ideas, emotions, and thoughts. 34% of kids in India struggle with their handwriting. An academic day is not complete without handwriting. Handwriting issues affected 67% of Boys and 33% of Girls. Legibility, performance, as well as physical and emotional well-being, were the main factors impacted.

1.2 Impact of Handwriting Difficulties in School

Children in Primary school need to be able to write legibly. The act of writing is a complex activity that calls for both executive and visual processing. The academic work of writing, which is a functional use of handwriting, enables communication and will help students finish their assignments. Handwriting issues have an impact on the academic abilities a student develops during the school day. 24 to 58% of educational tasks include handwriting, making it a crucial skill. Due to low quality, legibility, and handwriting difficulties, students' grades may be affected. The student will have difficulty taking notes in class because of his or her slow writing pace.

1.3 Factors Affecting Handwriting

Illegible handwriting is a sign of a handwriting problem, regardless of whether it is caused by internal reasons, external influences, or both. Legibility is influenced by several factors, including letter formation, alignment, spacing, slant, and size. Legibility is assumed to be influenced more by how individual letters are formed than by any other element. Another problem is writing speed, since kids with handwriting issues frequently take longer to write or cannot finish their written assignments on time. Speed is typically less important than how easily a child's script may be understood. Legibility – defined as a letter or word that is recognizable out of context at first glance.

1.4 Handwriting Domains

We can identify which tasks the child might be struggling with and address those tasks in the intervention plan by evaluating the different handwriting domains. Some of the domains are listed below.

- The motor engram, letter formation, letter and number sequencing, letter and number case consistency, and writing the alphabet in both lowercase and uppercase letters with numbers also demands the child to remember.

- Copying is the ability to reproduce characters from a comparable script model, either from manuscript to manuscript or from cursive to cursive.
- Writing dictated words, names, addresses, and telephone numbers is a skill children will need at school and at home.
- Composition is the generation of a sentence or paragraph by the child demonstrated by writing a poem, a story, or a note to a friend.

1.5 Occupational Therapy for Handwriting

The focus of Occupational Therapy is the patient's occupation. Activities of Daily Living, Education, Play, and Social Participation will be the children's occupations. Reading, writing, listening, calculating, and performing practical tasks make up most of a child's work in the domain of education for school-aged children.

The Cognitive Based Approach, the Multisensory Approach and the Task Oriented Approach are a few of the approaches utilized in Occupational Therapy intervention for Handwriting Difficulties. The Multi-Sensory Approach and the Motor Approach are the most often used approaches, according to prior studies.

In previous research, students who struggled with their handwriting and were in the second through fourth grades were included. They focused on determining whether the sensorimotor method made a distinctive contribution. Both the Sensorimotor Approach and the Task-Oriented Approach, they concluded, enhanced handwriting proficiency.

The interventions must be broad, integrating exercises and treatment methods from many therapeutic Approaches. To help the child develop effective coping mechanisms with his or her surroundings, many adaptive, compensating, and management techniques may be used.

The current study is to investigate the effectiveness of Occupational Therapy in improving Handwriting skills among primary schools' students in South Chennai.

II. OBJECTIVES

- To evaluate the effectiveness of Occupational Therapy Intervention among primary school students
- To interpret the effect of Occupational Therapy intervention with respect to grades (1st to 5th).

III. REVIEW OF LITERATURE

Kiran Sharma and Kaaynat Khan (2020) conducted a cross-sectional study. We discovered that 34% of kids experienced Handwriting challenges, as evaluated by the Handwriting proficiency screening questionnaire, in the study. This study discovered that handwriting issues were more common in boys than in girls.

Pooja Pankaj Mehta (2019) conducted a single-arm interventional study. Single arm of 10 children (9 boys and one girl), between 6 and 10 years of age, were recruited for the study using convenience sampling. The gender difference, with boys more affected than girls, was consistent with Indian prevalence and interventional studies.

Naomi Weintraub, Michael Yinon, Idit Bar-Effrat Hirsch, Shula Parush (2008) Conducted a Pre-test & Post-test Experimental study. This study compared the effectiveness of both Sensorimotor and Task-Oriented Programs. The intervention programs were divided into two that is Task-Oriented Approach and Sensorimotor combining Task-Oriented Approach. The study included 55 General Education Students who were enrolled in Second to Fourth grades and had handwriting difficulties were included. They specifically examined whether Sensorimotor approach had a unique contribution. In conclusion they have said that be it Sensorimotor or Task-Oriented Approach both improved handwriting performance. It is not clear which approach is more effective. In contrast both approaches with shared components proved to be effective.

Susan M. Diekema et al. (1998) investigated the test-retest reliability of the Assessment Instrument of Children's Handwriting-Manuscript Legibility (ETCH-M). Total letter legibility, total word legibility, and uppercase letter legibility were more stable than total numeral legibility and other individual task scores. While analyzing a child's Handwriting, it is crucial to remember that ETCH legibility scores are only one component of a full evaluation.

IV. METHODOLOGY

The study was approved by Institutional Ethics Committee for student's proposals (CSP/22/NOV/118/555), Sri Ramachandra Institute of Higher Education and Research (Deemed to be University).

4.1 Subject Recruitment

The participants were recruited from a school in South Chennai.

4.2 Site of Study

The study was carried out in the South Chennai School.

4.3 Study Design

Experimental Study Design

4.4 Period of the Design: 4 Weeks

4.5 Sample Size: 5 (ONE PARTICIPANT FROM EACH GRADE)

4.6 Sampling Method: Purposive Sampling.

4.7 Exclusion Criteria

- Children with any other co morbidities that are restricting the upper limb and trunk movement were excluded.

4.8 Procedure

- The students were selected based on the selection criteria. Parents of each student were explained about the benefits and obtained a parental consent from them in accordance with the guidelines of the Institutional Ethics Committee. The pre-test was done using case record proforma and Evaluation tool of Children's Handwriting.
- The five participants (one from each grade) participated in a 4 weeks intervention program – Tailor made Occupational Therapy Intervention Protocol for Handwriting skills. After completion of four weeks of interventions the Post test score was obtained from the participant.

4.9 Hypothesis

Alternative Hypothesis

There will be significant effectiveness of Occupational Therapy Intervention in improving Handwriting Skills among Primary School Students.

Null Hypothesis

There will be no significant effectiveness of Occupational Therapy Intervention in improving Handwriting Skills among Primary School Students.

V. DATA ANALYSIS

This study analyzed the effectiveness of Occupational Therapy Intervention in improving Handwriting Skills among Primary School Students using the Evaluation Tool of Children's Handwriting Scale (ETCH) for all the participants during intervention period (Pre-Test and Post-Test). The result interpretation was done using the SPSS software 16.0 Version.

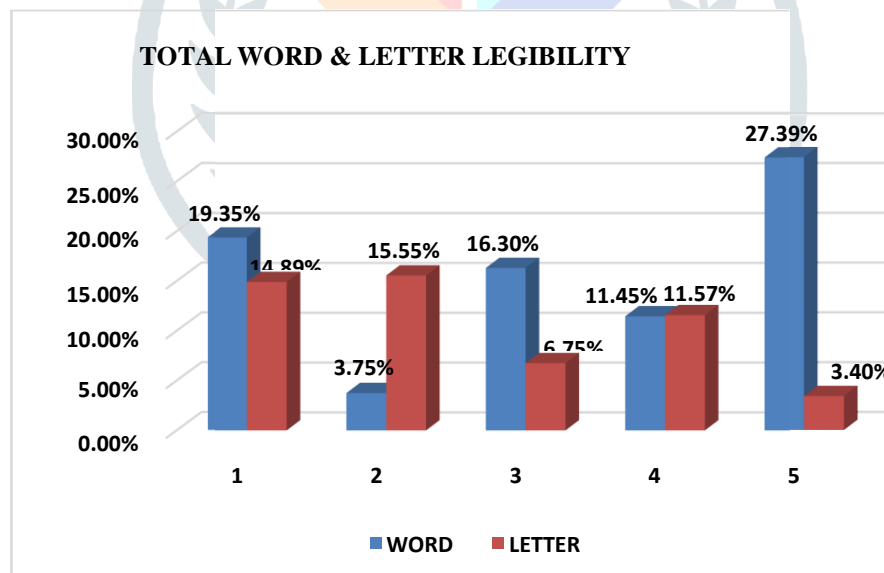
TABLE 1-CAMPARISON PRE-TEST AND POST-TEST WORD LEGIBILITY

PARTICIPANT	ETCH PRE-TEST	ETCH POST-TEST
GRADE 1	75	93
GRADE 2	77	80
GRADE 3	77	85
GRADE 4	85	96
GRADE 5	53	73
MEAN	73.40	86.80

TABLE 2 -COMPARISON OF PRE-TEST AND POST-TEST LETTER LEGIBILITY

PARTICIPANT	ETCH PRE-TEST	ETCH POST-TEST
GRADE 1	80	94
GRADE 2	76	90
GRADE 3	90	96
GRADE 4	84	95
GRADE 5	85	88
MEAN	83	92.60

GRAPH 1-TWL & TLL PRE-TEST POST-TEST SCORE DIFFERENCE PERCENTAGE



VI. Results

This study was done to find out the Effectiveness of Occupational Therapy Intervention in improving Handwriting skills among primary school students from South Chennai. The study was conducted from Grade one to Grade five with one participant from each Grade.

It is been observed from table 1, In accordance to the total word legibility during the pre-test, the scores among the 1st grade, 2nd grade, 3rd grade, 4th grade and 5th grade individuals were: **75,77,77,85** and **53** respectively. And the post-test scores among the 1st grade, 2nd grade, 3rd grade, 4th grade and 5th grade individuals were: **93,80,92,96** and **73** respectively.

It is been observed from table 2, In accordance to the Total Letter Legibility during the pre-test, the scores among the 1st grade, 2nd grade, 3rd grade, 4th grade and 5th grade individuals were: **80,76,90,84** and **85** respectively. And the post-test scores among the 1st grade, 2nd grade, 3rd grade, 4th grade and 5th grade individuals were: **94,90,96,95** and **88** respectively.

The overall analysis showed there is a significant improvement in handwriting skills in terms of Word Legibility and Letter Legibility.

VII. Discussion

In previous studies one protocol was used for all the grades and not all age groups were met, which makes this a unique study were based on the child's grade Occupational Therapy Tailor-Made Individualised Protocol was made for grades 1 to5. The intervention was

carried out for four weeks with three sessions per week and home programs were also included and was followed through the next session.

Preparatory activities in this study, which took up around 15 minutes per session (*American Occupational Therapy Association, 2002*) and focused on skills like postural control, bilateral coordination, stability, and fine motor ability as the foundation for enhancing daily occupations and tasks like handwriting, were given most consideration. Writing activities were performed after the precursor activities.

All five participants consistently used upper- and lower-case letters in the right ways. Spelling errors were significantly reduced. Throughout the writing assignment, most participants showed inattention, which got better in subsequent sessions. Their consistent attendance at Occupational Therapy Intervention after school and homework improved Handwriting. Also, it was noticed that all participants were more eager to try out new things and were open to explore, which led to the observed improvement in handwriting

VIII. Interpretation of Results Based on Grades

Calp (2013) highlighted the significance of tailoring the approaches and strategies to the participants. It increases the likelihood of effective outcomes with approaches and strategies tailored to the participants. Furthermore, it has been stated in the literature that the difficulty of writing derives from letter writing, which is the first stage of writing, and that this stage should be focused in order to avoid writing difficulties *Kodan, (2016)*.

Grade 1

From the analysis Grade 1 Student contributed to an increase in Letter Legibility which is 14.59%. This is illustrated by *kadan (2016)* the difficulty of writing derives from letter writing, which is the first stage of writing, and that this stage should be focused in order to avoid writing difficulties. In this study the preliminary activities contributed to Letter and then word through fine motor activities which consecutively showed a maximum increase in Word Legibility which is 19.35%. [17]

Grade 2

From the analysis Grade 2 Student contributed to an increase in Letter Legibility and Word Legibility which is 15.55% and 3.75%. This is illustrated by *Karlsdottir and Stefansson (2002)* on the development of handwriting from grade 1 to grade 5. These authors reported that handwriting quality increased rapidly during grade 1 and remained stable from grade 2 to grade 5, which supports this result.

Grade 3

From the analysis Grade 3 Student contributed to an increase in Word Legibility and Letter Legibility which is 16.30% and 6.75%. This is illustrated by *Karlsdottir and Stefansson (2002)* on the development of handwriting from grade 1 to grade 5. These authors reported that handwriting quality increased rapidly during grade 1 and remained stable from grade 2 to grade 5, which supports this result.

Grade 4

From the analysis Grade 4 Student contributed to an equal increase in Word and Letter Legibility which is 11.45% and 11.57%. This is illustrated by *Marie-France Morin (2012)* that Cursive students displayed more progress in word production than Manuscript/Cursive and Manuscript students and that the word production performances of Manuscript/Cursive students were significantly weaker than those observed in the other group. In this study the preliminary activities contributed to word through fine motor activities and then sentence which consecutively showed an equal increase in Word Legibility and Letter Legibility.

Grade 5

From the analysis Grade 5 Student contributed to an increase in Word Legibility which is 27.39%. This participant showed maximum improvement in word Legibility because the student is already well versed in terms of writing letter, so this participant has shown increased score in word legibility than letter legibility. This is supported by *Case Smith. J (2002)*.

The choice to include parents in their child's home programme was made with the understanding that they play a significant role in their children's life and may be valuable tutors for them. The parents' active participation in the intervention, during which they learned about the Intervention protocol and helped their child at home with the programme, appears to have improved the children's handwriting performance. This is supported by *Naomi Weintraub 2009* who found that parents have an impact in improving handwriting skills with the Occupational Therapist

This study supports that there was improvement due to Effective Occupational Therapy protocol in improving Handwriting Skills among primary school students. This result was obtained with four weeks of Occupational Therapy Tailor-Made Individualised Intervention (3 sessions per week) based on their grades.

IX. LIMITATIONS

- This study was done in a specific institution, thereby may not reflect the entire population.
- Short duration of intervention.

X. RECOMMENDATION

- Further studies can be longitudinal studies over a longer period, comparing different approaches to remedial Handwriting Difficulty to a stratum population.
- Further studies can be done as randomized control trial.
- Further studies can be done using other Handwriting Evaluation tools with better reliability for numeral legibility.
- Besides Handwriting skill, further studies can be done considering measures like reading ability, academic success, motivation, and the child's self-esteem

XI. CONCLUSION

The present study aimed to find out the effectiveness of Occupational Therapy Intervention in improving Handwriting skills among Primary School Students from South Chennai. The results of the study concluded that the participants had significant improvement due to four weeks of (3 sessions per week) Effective Occupational Therapy Tailor-Made Individualised Intervention protocol based on their grades (1st – 5th) in improving Handwriting Skills from South Chennai. This study emphasized the need for more Occupational Therapy interventions among Primary School Students in improving Handwriting skills.

REFERENCES

1. Chu, S. (1997). Occupational therapy for children with handwriting difficulties: A framework for evaluation and treatment. *British Journal of Occupational Therapy*, 60, 514–520. <https://doi.org/10.1177/030802269706001202>
2. Piller, A., & Torrez, E. (2019). Defining occupational therapy interventions for children with fine motor and handwriting difficulties. *Journal of Occupational Therapy, Schools, & Early Intervention*, 12(2), 210-
3. Cole, A. (2022). Occupational therapy intervention to address handwriting deficit in elementary-aged school children: How to, how much, and how often? A scoping review. *Journal of Occupational Therapy, Schools, & Early Intervention*, 1-
4. Kiran Sharma |Kaaynat Khan "Prevalence and Pattern of Handwriting Difficulties among School Going Children" Published in *International Journal of Trend in Scientific Research and Development (ijtsrd)*, ISSN: 2456- 6470, Volume-4 | Issue-4, June 2020, pp.1378-1383, URL: www.ijtsrd.com/papers/ijtsrd31519.pdf.
5. Feder, K. P., & Majnemer, A. (2007). Handwriting development, competency, and intervention. *Developmental Medicine & Child Neurology*, 49(4), 312-317. <https://doi.org/10.1111/j.1469-8749.2007.00312.x>.
6. Cornhill, H., & Case-Smith, J. (1996). Factors that relate to good and poor handwriting. *The American Journal of Occupational Therapy*, 50(9), 732-739. <https://doi.org/10.5014/ajot.50.9.732>
7. Hayes, J., & Flower, L. (1986). Writing research and the writer. *American Psychologist*, 41, 1106–1113. [https://doi.org/10.1016/0747-5632\(92\)90018-A](https://doi.org/10.1016/0747-5632(92)90018-A).
8. Duff, S., & Goyen, T. A. (2010). Reliability and validity of the Evaluation Tool of Children's Handwriting–Cursive (ETCH–C) using the general scoring criteria. *The American Journal of Occupational Therapy*, 64(1), 37-46. <https://doi.org/10.5014/ajot.64.1.37>
9. Reliability and Validity of the Evaluation Tool of Children's Handwriting–Cursive (ETCH–C) Using the General Scoring Criteria <https://doi.org/10.5014/ajot.64.1.37>.
10. Brossard-Racine, M., Mazer, B., Julien, M., & Majnemer, A. (2012). Validating the use of the Evaluation Tool of Children's Handwriting–Manuscript to identify handwriting difficulties and detect change in school-age children. *The American Journal of Occupational Therapy*, 66(4), 414-421. <https://doi.org/10.5014/ajot.2012.003558>
11. The Effects of Manuscript, Cursive or Manuscript/Cursive Styles on Writing Development in Grade 2-Marie-France Morin, Natalie Lavoie, Isabelle Montésinos- Gele <https://doi.org/10.20360/G21S3V>.
12. Anneloes Overvelde, Wouter Hulstijn, Handwriting development in grade 2 and grade 3 primary school children with normal, at risk, or dysgraphic characteristics, Research in Developmental Disabilities <https://doi.org/10.1016/j.ridd.2010.12.027>.

