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FROM SCRIBBLES TO SKILLS: AN ACTION RESEARCH ON EFFECTIVE METHODS FOR IMPROVING CALLIGRAPHY AND HANDWRITING PERFORMANCE AMONG ELEMENTARY SCHOOL STUDENTS IN DIBRUGARH DISTRICT, ASSAM

Silpi Sikha Borah

ABSTRACT

Handwriting remains a foundational skill in primary education, yet many students struggle with legibility, alignment, size consistency, and letter formation. This action research study examined the effectiveness of a structured, four-week intervention combining calligraphy practice, sensory-motor coordination patterns, Brain Gym exercises, and correct writing apparatus to improve calligraphy handwriting performance among 25 Class 3 students (aged approximately 8–9 years) at Dikom Vidyapith L.P. School, Block Panitola, Dibrugarh District, Assam, India. Using a pre-test/post-test design with a rubric (maximum score = 20; passing ≥ 13), students' performances before and after the intervention were assessed. Findings showed a statistically significant improvement: pre-test mean score = 11.2 (SD = 2.3), post-test = 16.4 (SD = 1.9), $t(24) = -12.87$, $p < .001$. The proportion of students passing increased from 28% to 88%. Improvements were greatest in letter formation, legibility, and baseline alignment. The study suggests that systematic practice, correct tools, and perceptual-motor training can substantially improve handwriting performance within a short time. Implications for teachers, parents, and school policy are discussed, with recommendations for further research.

KEYWORDS: Calligraphy Handwriting, Elementary School, Brain Gym, Sensory-Motor Coordination, Handwriting Rubric, Legibility

INTRODUCTION

Handwriting is a fundamental skill in early childhood education and continues to be highly relevant in today's classrooms, despite the growing influence of digital technology. It is not merely a motor task but a multidimensional process that combines fine motor coordination, visual perception, memory, and cognitive planning. For young children, particularly in elementary school, the ability to write fluently and legibly is directly linked to literacy development, academic achievement, and self-confidence. Studies in developmental psychology and neuroscience have shown that handwriting engages unique neural circuits that are essential for reading and writing development. Children who master handwriting at an early stage are

often better equipped to express their thoughts fluently in writing and to succeed in tasks that demand both comprehension and composition. In contrast, poor handwriting skills can lead to frustration, disengagement, and reduced participation in classroom activities.

In the Indian educational context, handwriting continues to play an especially important role. Teachers in both urban and rural schools routinely assess not only the correctness of students' responses but also the clarity, neatness, and organization of their written work. Calligraphy handwriting, which emphasizes consistency in strokes, letter formation, alignment, and aesthetics, is viewed as both a functional necessity and a marker of academic discipline. However,

many students struggle with calligraphy. Common problems include inconsistent letter size, irregular spacing, poor baseline alignment, incorrect pen grip, and misuse of lined notebooks. Such difficulties are often rooted in the absence of systematic practice, lack of proper tools, or insufficient guidance from teachers and parents. As a result, children may develop ineffective writing habits that hinder not only their academic progress but also their overall confidence in written communication.

The significance of addressing handwriting difficulties cannot be underestimated. While traditional teaching methods often emphasize rote copying of alphabets or passages, these methods rarely address underlying motor or perceptual deficits. Furthermore, the increasing emphasis on curricular content often leaves little time for focused handwriting instruction. Without targeted interventions, students risk carrying handwriting difficulties into higher grades, where academic demands are greater. This situation underscores the need for structured, evidence-based methods that integrate proper calligraphy practice with exercises aimed at enhancing sensory-motor coordination and cognitive engagement. Approaches such as Brain Gym, which use movement-based exercises to stimulate neural connections and improve fine motor control, have shown promise in supporting handwriting development. When combined with guided practice using proper writing apparatus and feedback from teachers, such interventions may yield significant improvements within a relatively short time.

Against this backdrop, the present study was conducted as an action research project among Class 3 students of Dikom Vidyapith L.P. School in Dibrugarh District, Assam. The research sought to evaluate the impact of a four-week intervention program designed to improve calligraphy handwriting through a combination of structured practice, Brain Gym exercises, and sensory-motor activities. The study also aimed to assess the role of proper apparatus—such as gel pens and four-line notebooks—in supporting the learning process. By measuring students' handwriting performance before and after the intervention, the study sought to contribute to the growing body of evidence on effective strategies for enhancing handwriting skills

in elementary education.

LITERATURE REVIEW

Handwriting has been widely recognized as an essential skill that supports learning and academic achievement. Neuroscientific research provides strong evidence for the importance of handwriting in literacy development. James and Engelhardt (2012) found that handwriting experience in pre-literate children activates brain regions associated with reading and cognitive processing. This suggests that handwriting plays a unique role in reinforcing neural connections critical for early literacy skills. Similarly, Berninger et al. (2006) highlighted that difficulties in handwriting can negatively affect children's ability to produce written content and impact broader academic outcomes.

Systematic reviews of handwriting interventions reinforce the importance of structured programs. Engel et al. (2018), in their review of curriculum-based handwriting programs, reported that structured, evidence-based interventions consistently improved legibility and fluency in both preschool and primary school children. Their findings suggest that sustained and guided practice, rather than unstructured repetition, yields the most meaningful results. In another study, Skar et al. (2021) examined handwriting fluency in primary students and found that improved handwriting skills were closely linked with higher quality in overall writing, confirming the academic benefits of targeted handwriting interventions.

Interventions that combine handwriting practice with perceptual-motor training have been particularly effective. Howe, Roston, Sheu, and Hinojosa (2013) compared two groups of elementary students and found that those who received intensive handwriting practice showed greater improvements in legibility than students who engaged only in visual-motor activities. This aligns with findings by Johnson et al. (2024), who reported that visual-perceptual training, when integrated with handwriting instruction, enhanced both legibility and speed among children with writing difficulties. These studies highlight the importance of addressing not only the mechanical act of writing but also the sensory and motor foundations that support it.

In the Indian context, recent studies have drawn attention to the effectiveness of Brain Gym exercises. Shah and Vira (2025) demonstrated that Brain Gym significantly improved handwriting among children aged 7 to 12, particularly in terms of letter size, spacing, and legibility. Similarly, Sharma, Khan, and Begum (2023) compared Brain Gym with Body Activated Learning (BAL) programs, reporting that both interventions improved handwriting and posture, with BAL showing slightly greater benefits. These findings underscore the value of incorporating movement-based activities into handwriting instruction.

Other international studies have further emphasized the importance of integrating handwriting with broader cognitive and motor skills. Ray et al. (2022) evaluated a co-taught handwriting intervention in Australia and observed significant gains in handwriting fluency among kindergarten students. Marano et al. (2025) argued that handwriting continues to provide cognitive benefits over typing, noting that it improves reading fluency and comprehension by strengthening memory pathways. Collectively, this body of research suggests that handwriting interventions are most effective when they integrate structured practice with sensory-motor training, proper apparatus, and consistent teacher support.

Despite these advances, there remain notable gaps in the literature. Few studies have examined the impact of short-term but structured interventions in semi-urban or rural Indian schools, particularly in the northeastern states. Many existing studies are conducted in Western or metropolitan contexts, which may not directly apply to regions where resources, teaching practices, and parental involvement differ. The present study therefore aims to address this gap by implementing and evaluating a practical, context-specific intervention for improving calligraphy handwriting among Class 3 students in Assam.

METHODOLOGY

Research Design

This study employed an action research design, which is particularly well-suited for classroom-based interventions where the primary objective

is to identify a problem, implement a solution, and evaluate its effectiveness in real time. Action research allows the teacher-researcher to play an active role in designing and delivering the intervention while simultaneously observing its effects on student performance. The study followed a **one-group pre-test and post-test design**, in which students' handwriting performance was assessed prior to the intervention, subjected to a structured four-week program, and then reassessed to determine improvement. This approach provided direct insights into the effectiveness of the intervention strategy in the natural classroom environment.

Participants and Setting

The study was carried out in Dikom VidyapithLP School, located in Dibrugarh District, Assam, during the academic session of 2025–26. The sample consisted of 25 students from Class 3, including 15 boys and 10 girls, with an age range of 8–9 years. The participants represented a typical group of elementary school learners in a semi-urban Indian context, with mixed abilities and varied exposure to handwriting practice at home. Informed consent was obtained from school authorities, and the study was explained to the students in age-appropriate terms. Parents were also informed about the objectives of the study and encouraged to support their children in the home practice tasks assigned during the intervention.

Research Instruments

To evaluate handwriting performance, a handwriting rubric was developed based on commonly accepted dimensions of calligraphy handwriting. The rubric had a maximum score of 20 points, distributed across six components:

- **Letter formation (5 points):** accuracy and consistency of letter shapes.
- **Legibility (5 points):** ease with which writing could be read by others.
- **Baseline alignment (3 points):** appropriate use of the notebook's lines to anchor letters.
- **Size consistency (3 points):** uniformity in letter height and proportion.
- **Pen grip and pressure (2 points):** correctness and comfort of pen holding, and balance of writing pressure.
- **Use of four-line notebook (2 points):** ability to

write within the given boundaries and maintain spacing.

A score of 13 or above was designated as a passing level, while scores below 13 indicated non-passing performance. In addition to the rubric, observation checklists were maintained to record students' grip, posture, use of apparatus, and attentiveness during practice. This triangulation of tools ensured that both quantitative and qualitative data could be collected.

Intervention Design

The intervention lasted for four weeks, with sessions integrated into the students' handwriting classes and extended into homework assignments. Each week was designed to build progressively on the previous one, ensuring a scaffolded learning approach.

- **Week 1:** Students were introduced to the fundamentals of proper handwriting, including posture, correct pen grip, and basic writing strokes. Demonstrations were carried out by the researcher on the blackboard, and students practiced drawing simple strokes such as sleeping lines and curved patterns. To reinforce finger strength and motor coordination, **Brain Gym activities** were introduced, such as tracing large strokes on the board and identifying points along the lines while maintaining proper grip. These activities aimed to improve sensory-motor control, which is foundational to handwriting.
- **Week 2:** Students practiced small lowercase letters that end on the baseline, such as *m, n, o, c, a, e, s, i, r, v, w, and x*. These letters were chosen for their relative simplicity and frequent use in English writing. Each letter was practiced repeatedly—first ten times, then fifteen times—to encourage muscle memory and consistency.
- **Week 3:** The focus shifted to letters with ascenders and descenders, such as *b, d, p, h, y, g, j, k, and l*. These letters required careful attention to ensure that ascenders reached the upper red line and descenders extended appropriately below the baseline. Students were encouraged to self-check their alignment and correct errors under the guidance of the researcher.
- **Week 4:** The final week served as a consolidation phase. Students wrote complete words and short sentences, integrating all the skills practiced in previous weeks. At the end of this week, a **post-**

test was administered using the same rubric as in the pre-test. This allowed for direct comparison of students' progress.

Data Collection Procedure

Data were collected in three stages. First, a **pre-test** was conducted at the start of the study, in which each student was asked to write a standardized passage in their four-line notebook. Their performance was scored using the rubric. Second, during the intervention period, continuous observations were made in both classroom and homework settings, with notes on pen grip, line alignment, and stroke accuracy. Finally, at the end of the fourth week, a **post-test** was administered with the same task and rubric. The consistency of pre- and post-test conditions ensured that improvements could be attributed to the intervention rather than external factors.

Data Analysis

The data analysis involved both descriptive and inferential methods. Descriptive statistics, including means, standard deviations, and frequency distributions, were calculated to provide a summary of overall performance and improvements. Students were also categorized into performance levels Poor, Average, Good/Pass, and Excellent to visualize shifts in categories across the pre- and post-test. Paired sample t-tests were conducted to determine whether the changes in rubric scores were statistically significant. Additionally, component-wise comparisons were made to identify which aspects of handwriting (e.g., letter formation, legibility, alignment) showed the greatest improvement. Graphs and tables were generated to provide a clear visualization of the results.

RESULTS

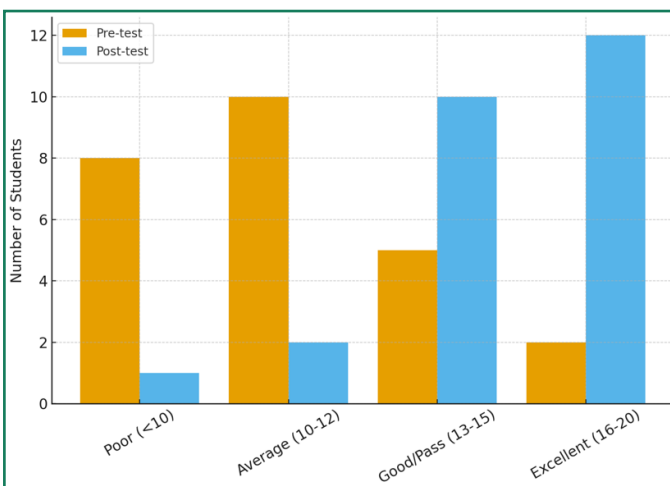
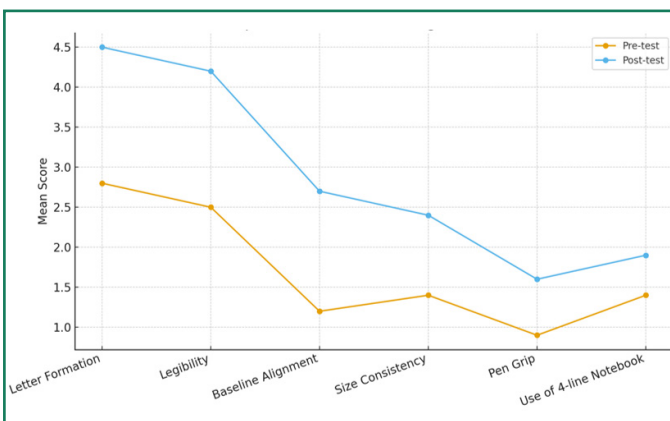
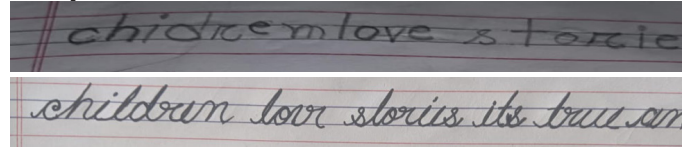
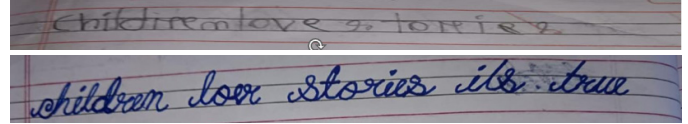
The pre-test mean score was 11.2 (SD = 2.3), while the post-test mean was 16.4 (SD = 1.9). The paired sample t-test confirmed a statistically significant improvement, $t(24) = -12.87$, $p < .001$, with a large effect size (Cohen's $d \approx 2.57$).

At baseline, only 7 students (28%) achieved passing scores, while after intervention, 22 students (88%) passed. Table 1 presents performance categories.

Table 1: Student Performance Categories Pre- and Post-Intervention

Category	Pre-test n (%)	Post-test n (%)
Poor (<10)	8 (32%)	1 (4%)
Average (10–12)	10 (40%)	2 (8%)
Good (13–15)	5 (20%)	10 (40%)
Excellent (16–20)	2 (8%)	12 (48%)

The largest gains were observed in letter formation (from 2.8 to 4.5) and legibility (from 2.5 to 4.2). Baseline alignment improved from 1.2 to 2.7. Figure 1 shows the distribution of performance categories, and Figure 2 illustrates component-wise improvements.

**Figure 1: Performance Categories Pre vs Post Intervention****Figure 2: Component-wise Handwriting Performance****Sample 1****Sample 2****Figure 3: Pre test and post test handwriting sample 1 and 2 respectively**

DISCUSSION

The findings demonstrate that structured calligraphy practice supported by Brain Gym and sensory-motor activities produces substantial improvements in handwriting among Class 3 students. Most notably, students improved in letter formation, alignment, and legibility, which are fundamental to overall readability. The dramatic increase in the proportion of students reaching passing scores suggests that the intervention was not only statistically effective but also educationally significant.

These findings align with previous research. Shah and Vira (2025) confirmed the effectiveness of Brain Gym for improving legibility, while Berninger et al. (2016) and Ray et al. (2022) highlighted the benefits of structured and co-taught handwriting interventions. The present study also reinforces the importance of proper apparatus, which was often neglected in pre-intervention practice.

However, three students remained below the passing level. Observational notes suggested weaker fine motor control and inconsistent home practice. Targeted remedial measures, such as one-on-one tutoring, extended practice time, and additional sensory-motor exercises, are recommended for such cases.

CONCLUSION

This action research established that a short, structured intervention can significantly improve calligraphy handwriting performance among elementary students. The majority of students shifted from failing or average categories to passing and excellent performance. The approach holds promise

for integration into the primary school curriculum, though future research should examine long-term retention and scalability.

the quality of primary grade students' writing. *Reading & Writing*, 35(2), 509–538. <https://doi.org/10.1007/s11145-021-10185-y>

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