

IMPACT OF THE ICONOWRITE WRITING TOOL ON HIGHER SECONDARY STUDENTS EXPERIENCING LEARNING DISABILITIES IN TIRUVALLUR DISTRICT

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ABSTRACT

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This study examined the impact of the Iconowrite writing tool on Grade 9 students at Siragu Montessori School, Thiruvallur District, with a focus on learners with learning disabilities. Using experimental mixed-method research design, the study was conducted over a three-month period with 40 students divided into a control group and an experimental group. Data was collected through a 21-item diagnostic questionnaire and analyzed using quantitative and qualitative techniques. Findings revealed that students with learning disabilities experienced greater challenges in writing skills and confidence; however, the use of Iconowrite contributed to improvements in writing performance, engagement, and self-confidence. The study concludes that Iconowrite is an effective assistive tool for enhancing writing outcomes in inclusive educational settings.

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1. INTRODUCTION:

Writing is an essential skill for communication and academic success. However, many students, especially those with learning disabilities, face challenges in handwriting, spelling, and written expression. To address these difficulties, innovative teaching approaches are needed. ICONOWRITE is a creative language learning methodology that combines writing, visualization, observation, and expression to improve comprehension, memory, and engagement. Along with this, Penship Notebooks provide structured handwriting activities using creative patterns such as wavy, zigzag, spiral, and dome formations to enhance fine motor skills and handwriting fluency. Together, these approaches create a multisensory learning environment that promotes creativity, confidence, and literacy development. The present study examines the effectiveness of ICONOWRITE and Penship Notebooks among Grade 9 students, particularly learners with learning disabilities, in improving writing skills and academic engagement.

1.1 Need and significance for the study

Students with learning disabilities often face difficulties in writing tasks such as spelling, grammar, sentence formation, and organizing ideas effectively. These challenges can affect their academic performance, confidence, and participation in classroom activities. Since conventional teaching methods may not always address the diverse needs of such learners, there is a growing need for innovative approaches that make learning more accessible, engaging, and inclusive.

The Iconowrite writing tool is an innovative educational intervention that combines visual symbols, structured prompts, and interactive learning features to support writing development. By helping students organize their thoughts, improve vocabulary, and understand language structures more effectively, Iconowrite has the potential to enhance writing skills among learners with disabilities. Therefore, the present study aims to examine the impact of the Iconowrite tool on the writing abilities of students with learning disabilities and to explore its usefulness as an inclusive teaching strategy.

1.2 Statement of the Problem

The present study entitled “**Research on the Impact of the Iconowrite Writing tool on higher secondary students experiencing learning disabilities in the Tiruvallur District**”

1.3 Objectives of the study

To keep your study focused, you might want to categorize your goals into quantitative (measurable) and qualitative (experiential) outcomes:

- **Skill Acquisition:** Measuring the delta in spelling accuracy, grammatical precision, and structural organization before and after using the tool.
- **Psychological Impact:** Evaluating shifts in student confidence, reduced "writing anxiety," and overall motivation.
- **Practical Utility:** Assessing how easily the tool integrates into the existing Tiruvallur school curriculum and the level of support teachers require

The objectives of this study are structured to provide a comprehensive evaluation of the Iconowrite tool from multiple perspectives, including academic performance, cognitive development, behavioral adjustment, and socio-demographic influence. By comparing Control and Experimental Groups, analyzing pre-test and post-test differences, and examining inter-variable relationships, the study aims to generate meaningful insights into the effectiveness of Iconowrite as an innovative instructional tool for improving writing skills and promoting inclusive education among Grade IX students.

1.4 Hypothesis of the Study

- There is no difference in emotional factors. The alternative hypothesis in Experimental group has higher anxiety.
- There is no significant difference between the mean post-test scores of the control group and the experimental group.
- There is no significant difference in the achievement test scores of students with respect to gender.
- There is no significant difference between subject skill development and academic adjustment scores between the control group and the experimental group.

2. Review of Literature

The present research investigates the effectiveness of **Iconowrite (visual learning tool)** and **Penship Ideas (structured writing and reflective learning tool)** in enhancing multiple aspects of learning among Class 9 ICSE students. The study is designed around **nine interrelated dimensions**, which together represent the academic, cognitive, emotional, social, and behavioural development of learners.

Dimension 1 Writing Skill Improvement & Writing skill Adjustment

The study highlights the need for continuous assessment, practice, and innovative teaching methods to support students in overcoming their writing challenges and achieving academic success. The teacher in the class can't adopt different methods to teach a unit. With the time constraint, the teacher completes the syllabus, adopting a few methods to teach different units. But fails to concentrate the slow learners. This situation has been taken as the problem of the study.

Yarima, Babangida (2016) in her study says that; an extensive reading on the cognitive process is associated with the improvement of writing skills. A study by Smith (45) states that students who received remedial instruction demonstrate significant improvement in writing quality. Yarima, Babangida (2016) in her study says that; an extensive reading on the cognitive process is associated with the improvement of writing skills.

Dimension 2: Overall Satisfaction and Behavioral Adjustment

Research studies consistently highlight the importance of motivation, engagement, and self-regulation in student learning outcomes. Fredricks, Jennifer A. et al. (2004) proposed that student engagement consists of behavioral, emotional, and cognitive dimensions, all of which contribute significantly to academic success. Their findings suggest that engaged learners show higher participation, deeper understanding, and better academic performance.

3. Research Methodology

This study employed an experimental mixed-method research design to investigate the effectiveness of the ICONOWRITE methodology and Penship Notebooks in improving the writing skills of Grade 9 students at Siragu Montessori School, Thiruvallur District.

Quantitative data were analyzed using descriptive statistical techniques, while qualitative responses were examined through thematic analysis to identify emerging patterns and experiences.

The mixed-method approach investigates the nature of learning difficulties and the strategies employed by students to manage them, excluding commonly diagnosed conditions such as dyslexia, dysgraphia, and ADHD.

A qualitative thematic analysis was conducted on responses collected from control and experimental groups. The research focuses on comparing two groups of students exposed to the Iconowrite model under different instructional conditions.

3.1 Sample of the Study

The sample consists of **40 students**:

- **Group I (Control Group):** 20 students
- **Group II (Experimental Group):** 20 students

Both groups were exposed to the Iconowrite model with different instructional intensities.

Sampling Technique- The study adopted a **Purposive Sampling Technique**.

Students were selected based on:

- Availability in Grade 9 classrooms
- Representation of mixed ability learners
- Presence of learning difficulties (for comparative analysis)
- Willingness to participate

3.2 Tools used for the study

- **Personal Data Collection and Pilot Study:** For the present study, personal and demographic data were collected from 40 participants using a structured information schedule. Variables such as age, gender, parental education and occupation, income, locality, and residential status were recorded to support group classification and comparative analysis. A pilot study was also conducted with 20 students to test the feasibility and reliability of the research instruments. Based on the pilot feedback, minor revisions were made to improve the clarity and effectiveness of the tools before the main study.
- **Assessment questionnaire with Individual attention one to one conversation:** The study used multiple tools, including individual attention and one-to-one conversations, to collect quantitative and qualitative data. A 21-

item diagnostic questionnaire identified students' writing difficulties and learning experiences. Pre-test and post-test assessments across 10 subjects (500 marks total) measured academic progress before and after the intervention. A 30-item Likert scale questionnaire and adjustment test were also administered to assess learning engagement, writing skills, confidence, and emotional adjustment.

The tools were validated through expert review in education and language pedagogy. Reliability was ensured through standardized instructions, uniform administration, and consistent scoring procedures.

3.3 Used statistics

The suggested statistical tools for testing various hypotheses include the Paired Sample t-test for comparing pre-test and post-test measurements to assess improvement. For comparing groups, such as experimental versus control groups, the Independent Sample t-test is recommended. When examining differences based on gender, a Two-way ANOVA is appropriate. For income level comparisons among low, middle, and high income groups, a One-way ANOVA should be used.

4. Analysis and Interpretation of the data

Hypothesis I: There is no difference in emotional factors. The alternative hypothesis in Experimental group has higher anxiety

Table 1 Inferential analysis't' test interpretation results

Dimension	p-value	Result
Writing Behaviour	< 0.05	Significant difference
Writing Challenges	< 0.01	Highly significant
Cognitive Factors	< 0.01	Highly significant
Emotional Factors	< 0.01	Highly significant
Technology Comfort	> 0.05	Not significant
Support Needs	< 0.01	Highly significant

The findings indicate that students in the experimental group initially faced greater difficulties in writing-related skills such as handwriting, spelling, idea organization, and confidence compared to the control group. Following the ICONOWRITE and Penship Notebook intervention, noticeable improvements were observed in writing engagement, task completion, and interest in learning activities. Emotional and cognitive factors were found to significantly influence performance, with reduced anxiety and increased confidence reported after the intervention. While both groups showed similar levels of technology comfort, significant differences were evident in writing challenges, cognitive processing, emotional responses, and support needs. Overall, the results suggest that ICONOWRITE-based instructional strategies positively support writing development, engagement, and confidence among learners with diverse educational needs in inclusive classroom settings.

Hypothesis II: There is no significant difference between the mean post-test scores of the control group and the experimental group.

Post test score with dimensions

Group Statistics					
	ID (cont.)	N	Mean	Std. Deviation	Std. Error Mean
ACADEMICADJUSTMENT	CONTROL GROUP	20	16.450	2.3725	.5305

	EXPERIMENTAL GROUP	20	16.050	2.2118	.4946
EMOTIONALADJUSTMENT	CONTROL GROUP	20	17.400	1.6670	.3728
	EXPERIMENTAL GROUP	20	16.750	1.7130	.3830
BEHAVIOURALADJUSTMENT	CONTROL GROUP	20	13.050	1.1459	.2562
	EXPERIMENTAL GROUP	20	12.550	1.7006	.3803
WRITING SKILLSADJUSTMENT	CONTROL GROUP	20	13.350	1.0894	.2436
	EXPERIMENTAL GROUP	20	12.300	1.9762	.4419
COGNITIVEANDMETACOGNI TIVESKILLS	CONTROL GROUP	20	21.400	1.4654	.3277
	EXPERIMENTAL GROUP	20	19.700	2.2734	.5084
SOCIALADJUSTMENT	CONTROL GROUP	20	4.050	1.0501	.2348
	EXPERIMENTAL GROUP	20	3.400	1.2312	.2753
MOTIVATIONANDREGULATI ON	CONTROL GROUP	20	18.150	1.1821	.2643
	EXPERIMENTAL GROUP	20	16.650	1.9808	.4429
CONFIDENCEANDINDEPEND ANCE	CONTROL GROUP	20	7.650	1.3870	.3101
	EXPERIMENTAL GROUP	20	8.100	1.5183	.3395
ENGAGEMENTINLEARNING	CONTROL GROUP	20	12.750	1.3328	.2980
	EXPERIMENTAL GROUP	20	12.350	1.3089	.2927
ADJUSTMENT SCORE	CONTROL GROUP	20	128.450	8.1980	1.8331
	EXPERIMENTAL GROUP	20	121.950	8.0425	1.7984

Students in the control group demonstrated significantly higher overall adjustment scores than those in the experimental group. Therefore, the null hypothesis stating that there is no significant difference between the mean adjustment scores of the control group and the experimental group was rejected. Though, statistically significant differences were observed in writing skills adjustment, $t(38) = 2.08$, $p = .044$, cognitive and metacognitive skills, $t(38) = 2.81$, $p = .008$, and motivation and regulation, $t(38) = 2.91$, $p = .006$. In these dimensions, the control group obtained significantly higher mean scores than the experimental group.

Hypothesis III There is no significant difference in the achievement test scores of students with respect to gender.

TABLE 3: DESCRIPTIVE Statistics for Achievement Scores by Gender

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	19	401.16	71.69	16.45
Female	21	420.29	71.23	15.54

The results show **no statistically significant difference** between male and female students, $t(38) = -0.846$, $p = .403$. While female students maintained a slightly higher numerical mean (420.29) compared to males (401.16), the difference of 19.13 points did not reach statistical significance. This indicates that by the end of the intervention, both genders performed at a statistically comparable level.

Hypothesis IV There is no significant difference between subject skill development and academic adjustment scores between the control group and the experimental group.

Table4: Dimension2: Subject Skill Development &Academic Adjustment between the control group and the experimental group.

Variables		Mean (M)	SD	df	t-value	Remark
Subject Skill Development		3.65	1.25	39	-38.67	Significant at $p < .001$
Academic Adjustment		16.25	2.27	39	-38.67	Significant difference

The paired-samples t test was conducted to compare subject skill development and academic adjustment scores between the control group and the experimental group. The results indicated that academic adjustment scores ($M = 16.25$, $SD = 2.27$) were significantly higher than subject skill development scores ($M = 3.65$, $SD = 1.25$). The difference was statistically significant, $t(39) = -38.67$, $p < .001$, with a mean difference of -12.60 . Additionally, a moderate positive correlation was found between subject skill development and academic adjustment, $r(38) = .44$, $p = .005$. A Pearson product-moment correlation was computed to examine the relationship between subject skill development and academic adjustment.

- $r(38) = .437$, $p = .005$

The results reveal a **moderate positive correlation**, indicating that students who perform better in subject skill development also tend to show higher levels of academic adjustment.

The findings of the study clearly indicate a statistically significant difference between subject skill development and academic adjustment among students.

- Academic adjustment scores were significantly higher than subject skill development scores.
- This suggests that students are able to adapt to academic environments more effectively than they develop subject-specific skills.

The moderate positive correlation further indicates that although both variables are related, they represent different aspects of student learning. Students who exhibit better subject skills also tend to adjust better academically, but the magnitude of these variables differs considerably.

From a group perspective:

- Both control and experimental groups contributed to the overall pattern.
- The findings imply that instructional strategies should not only focus on adjustment but also emphasize subject skill development.

5. Discussion

The study demonstrates that the Iconowrite tool has a significant positive impact on students' academic achievement, writing skills, cognitive development, and emotional adjustment. Both experimental and control groups improved after the intervention, confirming the tool's effectiveness in enhancing learning outcomes, with students in the experimental group—especially those with learning disabilities—showing greater gains, highlighting Iconowrite as a valuable compensatory and supportive instructional aid. Significant differences across various dimensions, such as writing skill improvement and adjustment, cognitive and metacognitive development, and perceived usefulness and engagement, indicate that while the tool fosters academic and emotional benefits, further support is needed to advance long-term independent learning and confidence. Importantly, Iconowrite promotes inclusive education by minimizing disparities related to gender, locality, and socio-economic status, as evidenced by the lack of significant demographic differences, although variations in motivation and engagement suggest additional instructional strategies are necessary to enhance

learner autonomy. The strong correlation between usability and emotional adjustment underscores the critical role of user-friendly learning environments in improving student experiences. Overall, the findings affirm that Iconowrite is an effective educational intervention that enhances both academic and psychosocial outcomes while serving as an equalizing tool in diverse classroom settings.

6. Conclusion

The present study examined the effectiveness of the Iconowrite tool through pen-ship patterns on students' academic achievement, writing skills, cognitive development, motivation, and adjustment. The findings showed that the intervention positively improved writing skills, cognitive abilities, emotional adjustment, and classroom behaviour among students. The study also revealed that Iconowrite supports inclusive education by providing equal learning opportunities regardless of gender, locality, residential status, or socio-economic background. Although continued support is needed to strengthen motivation and independent learning, the overall results establish Iconowrite as an effective educational tool for enhancing academic performance and balanced learning outcomes.

According to Global data, screen time by the average child (12-14) has increased by about 31 minutes a day from 2013 to 2024, and the average family now spends over 40% of their waking hours in front of a screen (Average Screen Time Statistics, 2024). There are a variety of positive and negative aspects of the use of technology in family systems that are well documented in the literature. Too much and too early screen time, particularly in early childhood development, may impair socio-emotional development and reduce opportunities for physical and social interaction (Legorburu Fernandez et al., 2025). Detailed studies of children's social and relational behaviors using questionnaires and behavioral observation in laboratory settings consistently show that the frequent use of mobile touchscreen devices can negatively affect the quality and frequency of social interactions between children and parents, as well as the quality of the relationship between them and their children's socio-cognitive development (Konrad et al., 2024). Gender-specific studies in India, for instance, show that screen time is tied to delays in language development, and that the more children are exposed to screens, the less they are able to communicate (Bhutani et al., 2024). This is especially alarming when it happens during developmental periods when parent-child interaction is a key part of the child's cognitive and emotional development.

The 'family-ness' of digital practices such as Instagram posts, WhatsApp family groups and shared phone use during mealtimes are found to create complicated patterns of digital family bonding, but with unclear effects on quality of offline family interactions (Barnwell et al., 2024). In recent studies, maternal smartphone use has been shown to be highly correlated with child affect regulation problems and less emotional availability in mothers' interactions with children (Mikić et al., 2025). The idea of 'parental distraction' as technofence changes the nature and extent of family communication. There is empirical evidence of how technofence influences parental communicative input to young children (McDaniel & Radesky, 2018; Radesky et al., 2018). Mothers who use phones during observations speak 80% of utterances and 61% of nonverbal gestures less than the nonusing mothers do. Based on the results of the meta-analysis, this study found that there was a difference in the effect of parental technofence on externalizing and internalizing behaviors for mothers and fathers, as parental technofence was stronger for mothers than for fathers.

Among adolescents aged 15 to 19 years in Gujarat, there were strong associations between smartphone addiction and severe stress in the present Indian context, with odds ratio at 10.82 in comparison to the non-addicted adolescents (Yogesh et al., 2024). Good mental health, resilience, and high self-esteem are associated with fewer adverse effects of the use of social media, whereas loneliness and social isolation are associated with compensatory effects of social media use, which can create feedback loops within families (Bayraktar & Çelik, 2023). When analyzing the effect of parenting

styles and technology use patterns, it was found that authoritative parenting with warmth and suitable boundaries exhibited protective effects on problematic smartphones use (Yogesh et al., 2024). Family mealtime research offers unique and telling information on the impacts of technofence.

Radesky et al. (2018) note a relationship between mothers' use of mobile phones while feeding and less verbal interaction with children. Moreover, observational research in Kolkata suggests that there is a higher association between exposure to excess screens and communication delays than with typically developing children (Flynn et al., 2025). These links seem to be multifactorial: reduced parental responsiveness may have direct effects and the effects may also be indirect as a result of child behavioral problems which further impact on family relationships. Investigation into these complex pathways necessitates examination that is integrated and based on parental behaviors, child developmental outcomes, and family system dynamics.

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