

Development and Preliminary Psychometric Evaluation of a Tamil Learning Battery for Primary School Students (Grades I–V)

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ABSTRACT

The identification of Learning problems requires culturally and linguistically appropriate assessment tools, particularly in multilingual educational contexts such as India. The present study reports the development and psychometric pilot evaluation of a Tamil-specific learning assessment battery designed for primary school students (Classes I–V). A pilot sample of 37 Tamil-medium students was assessed across five academic domains: Reading, Comprehension, Writing, Spelling, and Arithmetic. Descriptive statistics and domain-level difficulty indices were computed within a Classical Test Theory framework to examine developmental sensitivity and item functioning. Results indicated progressive grade-wise improvement in Reading, Writing, and Spelling, supporting developmental validity. Comprehension and Arithmetic domains demonstrated ceiling tendencies in upper grades, suggesting the need for increased item complexity. Estimated difficulty indices ranged from moderate to easy across domains. Findings provide preliminary support for content adequacy and developmental alignment of the battery. Implications for large-scale standardization and psychometric validation within the Indian context are discussed.

Keywords: *Learning Disability, Tamil-medium assessment, pilot validation, classical test theory, educational assessment, India*

Specific Learning Disability (SLD) is a neurodevelopmental condition characterized by difficulties in academic skills, including reading, writing, spelling, and arithmetic, despite average intellectual functioning and educational opportunity (American Psychiatric Association, 2022). The diagnostic framework provided in the Diagnostic and Statistical Manual of Mental Disorders emphasizes standardized academic assessment and evidence of functional impairment.

In India, SLD has gained increasing recognition in both educational and clinical settings. The Rehabilitation Council of India (2015) provides operational guidelines for assessment and certification. However, one of the major challenges in Indian SLD assessment lies in linguistic diversity. Many standardized academic assessment tools are either English-based

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or direct translations, which may not adequately capture the learning characteristics of regional languages.

Tamil, as a Dravidian language with an alpha syllabic writing system, presents distinct phoneme–grapheme correspondence patterns and morphological structures. Research suggests that literacy acquisition is influenced by orthographic depth and script structure (Goswami, 2002). Therefore, assessment tools developed for alphabetic languages cannot be assumed to possess construct equivalence in Tamil-medium contexts.

Despite the increasing prevalence of SLD identification in India—estimated between 5% and 15% in school populations (Sharma et al., 2016)—there remains a scarcity of standardized Tamil-medium diagnostic tools for early primary grades. The development of culturally grounded instruments is critical to ensure diagnostic accuracy and prevent misclassification.

Pilot testing constitutes a foundational step in psychological test construction (Anastasi & Urbina, 1997). Within the Classical Test Theory (CTT) framework, item difficulty and score distribution analysis provide preliminary evidence of construct alignment and developmental sensitivity (Crocker & Algina, 2008). The present study reports the pilot evaluation of a Tamil-specific SLD assessment battery designed for Classes I–V.

METHOD

Participants

The pilot sample consisted of 37 Tamil-medium students enrolled in Classes I–V. Participants were selected through purposive sampling from mainstream schools. The sample included representation across grade levels to examine developmental progression patterns.

Instrument Development

The Tamil learning Assessment Battery was constructed following step by step test development procedures:

1. Curriculum mapping based on the Tamil Nadu State Board syllabus, as know as Samacheer Kalvi, and ennum ezhuthum.
2. Focus group discussions with primary school teachers
3. Expert review by psychologists and special educators
4. Pilot administration

The battery comprised five academic domains:

- Reading (Maximum Score = 10)
- Comprehension (Maximum Score = 5)
- Writing (Maximum Score = 5)
- Spelling (Maximum Score = 10)
- Arithmetic (Maximum Score = 5)

Items were grade-specific and aligned with expected academic competencies.

Data Analysis

Descriptive statistics (Mean, Standard Deviation, Minimum, and maximum) were computed for each domain across grades.

The difficulty index (p-value) was estimated using the formula:

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Interpretation guidelines:

- 0.00–0.30 = Difficult
- 0.31–0.70 = Moderate
- 0.71–1.00 = Easy

RESULTS

Table 1: Domain-wise descriptive statistics across classes I to V

Class	Domain	M	SD	Min	Max
I	Reading	6.50	3.27	2	10
	Comprehension	2.67	2.50	0	5
	Writing	2.50	1.87	0	5
	Spelling	4.83	3.76	1	9
	Arithmetic	4.67	0.52	4	5
II	Reading	6.71	3.87	1	10
	Comprehension	3.57	2.15	0	5
	Writing	3.71	1.60	2	5
	Spelling	6.43	3.87	2	10
	Arithmetic	5.00	0.00	5	5
III	Reading	8.00	2.27	4	10
	Comprehension	4.75	0.46	4	5
	Writing	4.00	1.20	2	5
	Spelling	7.50	2.56	4	10
	Arithmetic	4.13	0.99	3	5
IV	Reading	7.13	2.42	4	10
	Comprehension	4.63	0.52	4	5
	Writing	4.25	0.71	3	5
	Spelling	7.88	1.73	5	10
	Arithmetic	4.00	0.76	3	5
V	Reading	8.75	2.05	5	10
	Comprehension	4.63	0.74	3	5
	Writing	4.50	0.93	3	5
	Spelling	8.13	3.14	1	10
	Arithmetic	4.50	0.76	3	5

The descriptive results indicate progressive increases in mean scores across grades in Reading, Writing, and Spelling domains. Standard deviations were higher in lower grades, reflecting developmental variability.

Table 2: Difficulty Index Analysis

Class	Reading	Comprehension	Writing	Spelling	Arithmetic
I	.65	.53	.50	.48	.93
II	.67	.71	.74	.64	1.00
III	.80	.95	.80	.75	.83
IV	.71	.93	.85	.79	.80
V	.88	.93	.90	.81	.90

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Domain-Level Interpretation

As presented in Table 2, domain-level difficulty indices (p-values) demonstrated systematic variation across grade levels.

- In the Reading domain, p-values increased from .65 in Class I to .88 in Class V, indicating a transition from moderate to easy difficulty levels consistent with expected developmental progression.
- Comprehension demonstrated moderate difficulty in lower grades (Class I: $p = .53$), but high p-values were observed from Class III onward ($p \geq .93$), suggesting potential ceiling effects and reduced discrimination capacity in upper primary levels.
- Writing scores reflected a progressive increase in p-values across grades (.50 to .90), indicating gradual mastery of written expression skills.
- Spelling exhibited moderate to easy difficulty levels across grades, with p-values ranging from .48 to .81, suggesting adequate but declining item challenge in higher grades.
- Arithmetic demonstrated predominantly high p-values, particularly in Class II ($p = 1.00$), indicating minimal score variability and limited discriminative efficiency. According to Classical Test Theory principles, optimal item discrimination is typically observed when difficulty indices fall within the mid-range (.30–.70). Therefore, the elevated p-values in upper grades suggest the need for increased item complexity to enhance psychometric sensitivity.

DISCUSSION

The pilot findings provide preliminary psychometric evidence supporting developmental sensitivity of the Tamil SLD Assessment Battery. Progressive increases in Reading, Writing, and Spelling scores across grade levels are theoretically consistent with literacy development models.

However, elevated difficulty indices in Comprehension and Arithmetic suggest restricted item variability in upper grades. According to Classical Test Theory principles (Crocker & Algina, 2008), optimal discrimination occurs when p-values are within mid-range levels (.30–.70). High p-values reduce discrimination capacity and may compromise diagnostic precision.

The observed ceiling effects likely reflect insufficient cognitive demand in higher-grade items. Future revisions should incorporate:

- Inferential comprehension questions
- Multi-step arithmetic problem-solving
- Increased linguistic complexity in reading passages

The pilot data, although limited by a small sample size, provide foundational evidence of content validity and grade alignment. Large-scale standardization is required to establish reliability coefficients, normative data, and diagnostic cut-offs.

Implications for Indian Context

This study contributes to the growing need for region-specific SLD assessment tools in India. Tamil-medium students often face diagnostic disadvantages due to a lack of standardized instruments. The development of linguistically grounded tools enhances equitable educational assessment practices.

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The battery holds potential for use in:

- School-based appropriate screening
- Clinical psychoeducational evaluation

Limitations

The present pilot study has certain methodological limitations. First, the sample size was relatively small ($N = 37$), which limits the generalizability of the findings and restricts the stability of difficulty estimates. Second, item-level discrimination indices were not computed during the pilot phase, thereby limiting detailed evaluation of item functioning. Third, internal consistency reliability coefficients (e.g., KR-20 or Cronbach's alpha) were not estimated at this stage, as the primary objective was preliminary item screening.

Future research should involve larger and more representative normative samples to strengthen psychometric robustness. Comprehensive item analysis, including discrimination indices, should be conducted to evaluate item effectiveness. Internal consistency reliability should be estimated using KR-20 for dichotomous scoring formats. Additionally, construct validity should be examined through inter-domain correlations and criterion-related validation procedures. For diagnostic applicability, sensitivity and specificity analyses are recommended to determine appropriate screening cut-offs.

CONCLUSION

The Tamil Learning Assessment Battery demonstrates promising preliminary psychometric characteristics. Developmental trends observed across grades support construct alignment. Targeted revisions in the Comprehension and Arithmetic domains are recommended before full-scale validation. The study represents an important step toward culturally responsive learning assessment in Tamil-medium educational contexts.

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Conflict of Interest

The author(s) declared no conflict of interest.

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