The Use of Tune-and-Action Strategy to Enhance the Alphabet Knowledge of Learners with Intellectual Disabilities in Self-Contained Classroom

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ABSTRACT

Foundational alphabet knowledge is often acquired slowly by learners with intellectual disabilities, creating persistent barriers to decoding and later reading development. This study examined whether a tune-and-action strategy could enhance alphabet knowledge among learners with intellectual disabilities in a self-contained classroom. A quantitative single-group pretest-posttest design was used with 15 learners aged 7–12 years at Ozamiz City Central School during School Year 2025–2026. The teacher-administered, 40-item Alphabet Knowledge Test assessed letter recognition, sound production, uppercase-lowercase matching, and letter-sound association across five vowels and five continuous consonants. During regular literacy blocks, target letters were presented through repetitive tunes or chants, visual letter cards, and corresponding body movements. Mean total scores increased from 15.73 (SD = 5.01) to 24.33 (SD = 9.55), a statistically significant difference, $t(14) = -4.646$, $p < .001$; Cohen's $d_z = 1.20$, with an estimated 95% CI for the mean gain of 4.63–12.57 points. Aggregate correct responses increased most in letter recognition (+53), followed by sound production (+35), letter-sound association (+27), and uppercase-lowercase matching (+14). Disability classification was significantly and inversely associated with posttest performance (rho = -.824, $p < .001$). The non-significant profile findings are statistically inconclusive because of the small sample and low power, not evidence of uniform effectiveness across learner groups; no multiplicity correction was applied. Exact Cronbach's alpha, the three-expert content validity index, Wilcoxon signed-rank statistic, classification-disaggregated gain statistics, and intervention dosage could not be independently recomputed from the source manuscript because the learner-level dataset and validation/fidelity records were not included. The findings therefore support the strategy as promising but preliminary, with interpretation limited by the single-site, uncontrolled design and absence of delayed retention assessment.

Keywords: Alphabet knowledge, Intellectual disabilities, Multisensory instruction, Special education, Tune-and-action strategy

INTRODUCTION

Alphabet knowledge—the ability to recognize letter forms, name letters, connect uppercase and lowercase forms, and associate letters with their sounds—is a central foundation of beginning reading.

Learners with intellectual disabilities frequently experience limitations in attention, working memory, processing speed, and generalization. These characteristics can delay the acquisition and retention of early literacy skills and make conventional visual-verbal instruction insufficient. Research nevertheless shows that learners with significant cognitive disabilities can develop meaningful reading competencies when instruction is explicit, systematic, repeated, and adapted to their communication and cognitive profiles (Browder et al., 2006). Early alphabet instruction therefore remains relevant beyond the age at which typically developing learners are expected to master letter names and sounds.

Multisensory instruction offers one way to make abstract alphabetic relationships more concrete. The tune-and-action strategy combines auditory input through a short tune or chant, visual input through letter cards, and kinesthetic input through a consistent gesture or movement. Repetition across these modalities may provide

several retrieval cues and sustain participation among learners who have difficulty attending to print-only tasks. Evidence supporting explicit phonics, phonemic awareness, and multimodal literacy instruction suggests that integrating letter forms, sounds, rhythm, and movement can strengthen early reading outcomes (Torgesen et al., 1994; Schmidt & Vrabel, 2019; Stevens et al., 2022).

The study was anchored primarily in Adams's (1990) account of phonemic awareness, Ehri's (1995) phases of word-reading development, and the instructional principle that information presented through complementary modalities may increase engagement and retention. In Ehri's early phases, learners move from dependence on visual cues toward increasingly stable use of letter-sound relations. A tune-and-action routine is intended to support this transition by repeatedly pairing a visible letter with its name, sound, and a memorable action. The approach is also consistent with Philippine policies requiring responsive, differentiated, and inclusive curriculum delivery for learners with disabilities (Department of Education, 2009, 2019, 2021).

Although phonics and multisensory interventions are well established in early literacy research, fewer classroom studies have examined a structured music-and-movement routine for learners with intellectual disabilities in Philippine self-contained settings. Evidence is also limited regarding whether learner characteristics influence response to such instruction. This study addressed that contextual gap by examining changes in four dimensions of alphabet knowledge and testing whether post-intervention performance varied according to learner profile.

Research on rhythm, chant, and movement provides a complementary rationale for the strategy. Musical rhythm and language share temporal patterning, and rhythm perception has been associated with phonological awareness and related language skills (Pino et al., 2023). Musical-activity studies have reported improvements in phonological awareness, particularly when singing, rhythmic listening, and coordinated movement are used to focus auditory attention and sound analysis (Bolduc, 2009; Skubic et al., 2021). Rhythm routines may make the timing and repetition of speech sounds more salient, while chant provides a predictable verbal frame and movement supplies an embodied cue for retrieval. These mechanisms are plausible supports for learners who benefit from repeated, multimodal, and highly structured instruction, although evidence from learners with intellectual disabilities and Philippine self-contained classrooms remains limited.

The literature also cautions against treating music or movement as a substitute for explicit alphabetic instruction. The strongest instructional rationale for tune-and-action is therefore its integration of rhythm and movement with visible print, direct modeling of letter sounds, guided practice, corrective feedback, and cumulative review. This framing positions the strategy as a structured supplement to explicit literacy instruction rather than as a stand-alone music intervention.

Objective of the Study

The study aimed to determine the effectiveness of the tune-and-action strategy in enhancing alphabet knowledge among learners with intellectual disabilities at Ozamiz City Central School during School Year 2025-2026. Specifically, it described the participants' demographic profile; compared pretest and posttest performance in letter recognition, sound production, uppercase-lowercase matching, and letter-sound association; tested the significance of the overall pretest-posttest difference; examined relationships between learner characteristics and posttest performance; and used the findings as the basis for a differentiated intervention plan.

METHODOLOGY

Research Design

A quantitative single-group pretest-posttest design was used. The assessment comprised four components: letter recognition, sound production, uppercase-lowercase matching, and letter-sound association. The available source files describe the pretest and posttest inconsistently—one section refers to the same assessment, whereas another refers to a parallel posttest—and the original forms and item map were not supplied. Form identity and equivalence therefore cannot be established from the available records and must be

verified before publication. The within-participant structure permitted examination of change over time in the small, intact self-contained class. Because the design did not include a comparison group or random assignment, the observed change is interpreted as evidence associated with the intervention rather than definitive proof that the strategy alone caused the gains.

Participants and Research Setting

The study was conducted at Ozamiz City Central School-Special Needs Education Center, Division of Ozamiz City, Philippines. The center serves learners across several disability categories and provides specialized and inclusive educational support. Fifteen learners with intellectual disabilities enrolled in one self-contained class participated through purposive total enumeration. All identified learners completed the assessments and intervention activities, yielding a 100% participation rate. Participants were 7-12 years old; six were male and nine were female. Seven learners were classified as having mild intellectual disability, six as moderate, and two as profound based on school assessment records.

Instrument

The study employed a researcher-made alphabet knowledge and phonemic-awareness assessment tool developed with reference to the structure and skill domains of the Heggerty assessment. Although the Heggerty assessment covers the complete alphabet, the present study focused on a deliberately selected set of ten target letters—Aa, Ee, Ii, Oo, Uu, Mm, Ss, Rr, Ll, and Ff—to align the assessment with the five-week implementation period of the Tune-and-Action Strategy. The target set consisted of five vowels and five consonants, thereby ensuring representation of both letter categories while maintaining a feasible instructional scope. Two letters were introduced per week, with previously introduced letters incorporated into cumulative review and assessment activities. The resulting instrument was therefore researcher-made and context-specific, rather than a direct administration of the complete Heggerty assessment.

The disability classifications reported in this article were obtained from the learners' school assessment records. At the beginning of the school year, the learners' cognitive functioning and IQ estimates were assessed using the SAGES-2:K–3 by a special education teacher who had received training and was licensed or otherwise authorized to administer the instrument. The resulting assessment records were used by the school assessment team as part of the basis for determining and documenting the learners' intellectual-disability classifications. The available records do not specify the adaptive-behaviour measure or the precise DSM-5/AAIDD classification protocol used in conjunction with the IQ assessment. Accordingly, the classifications should be understood as school-record classifications based on the beginning-of-year SAGES-2:K–3 assessment and the school assessment team's documentation. The questionnaire included mild, moderate, severe, and profound categories; however, the final analytic sample consisted of learners classified as mild (n = 7), moderate (n = 6), and profound (n = 2). No learner classified as severe was represented in the sample. The relevant assessment records and classification procedures should be cited or made available for verification in the final submission. Three experts in special education and literacy reviewed the instrument for content appropriateness, clarity, and alignment with the study objectives.

Tune-and-Action Intervention

During regular literacy blocks, each target letter was presented through three coordinated elements: a visible letter card, a short repetitive tune or chant that named the letter and produced its sound, and a consistent body gesture representing the letter or a familiar word beginning with that sound. The teacher modeled each routine, guided the learners through repeated group and individual practice, and used simplified language and prompts appropriate to each learner's communication level. The routine was embedded daily in classroom literacy activities. Live instruction and audiovisual materials were used, and learner responses were monitored throughout implementation.

Intervention protocol. The thesis specifies that the tune-and-action routine was embedded in daily literacy classes, with sessions lasting approximately 15–30 minutes. It does not specify the total number of intervention weeks or the total number of sessions; therefore, cumulative instructional time cannot be calculated from the

available records. The final report should state the verified duration and session count from the teacher's intervention log. On the evidence available, dosage can be reported only as: frequency = daily during literacy classes; session length = 15–30 minutes; total weeks = not reported; total sessions = not reported; cumulative instructional time = not calculable.

Letter-introduction sequence. The target set comprised Aa, Ee, Ii, Oo, Uu, Mm, Ss, Rr, Ll, and Ff. Because the available thesis and article copies do not preserve the teacher's original lesson-by-lesson sequence, the five-week progression below is specified as a standardized sequence for reproducible implementation; it must not be represented as the historical sequence of the completed study unless it is confirmed by the teacher's lesson records. Two new letters were introduced per week, while all previously introduced letters were reviewed cumulatively in subsequent sessions. The sequence follows the general principles of systematic and explicit phonics instruction: introduce grapheme–phoneme correspondences in a planned progression, begin with a small set that can be practiced repeatedly, and prioritize sounds that can be sustained during early blending. The ordering is an adapted subset of commonly used systematic phonics progressions rather than a sequence prescribed uniquely by one author (National Reading Panel, 2000; Buckingham, Wheldall, & Wheldall, 2019).

Table A1. Proposed five-week letter-introduction sequence for reproducible implementation

Week	Letters Introduced	Instructional emphasis	Cumulative review
Week 1	Ss, Aa	Establish the routine; connect /s/ and short /a/ with print, voice, and action.	Ss and Aa
Week 2	Ii, Mm	Add short /i/ and continuous /m/; contrast new targets with Week 1 letters.	Ss, Aa, Ii, Mm
Week 3	Oo, Rr	Add short /o/ and continuous /r/; practice discrimination and sound production.	Ss, Aa, Ii, Mm, Oo, Rr
Week 4	Ee, Uu	Add short /e/ and short /u/ with explicit modeling and corrective feedback.	All eight preceding letters plus Ee and Uu
Week 5	Ll, Ff	Complete the target set with continuous /l/ and /f/; consolidate recognition, matching, production, and association.	All ten target letters

Data Gathering Procedure

Following approval from the school administration, the researcher reviewed the assessment materials and oriented the parents or legal guardians regarding the study's purpose, procedures, voluntary participation, and confidentiality safeguards. The researcher then coordinated the administration of the pretest, implementation of the Tune-and-Action intervention, administration of the posttest, and scoring of learner responses. This continuity of procedures supported consistency between assessment, instruction, and progress monitoring and enabled the researcher to provide responses and instructional adjustments appropriate to the learners' needs.

Learner responses were scored using the assessment criteria established for the four components of alphabet knowledge. Data were subsequently encoded, organized, and checked with the assistance of a statistician before analysis. The available records do not indicate the use of a blinded assessor, independent second scorer, inter-rater agreement, or adjudication procedure. In addition, the source documents refer to the posttest both as a parallel form and as the same four-component assessment. The original test forms and item correspondence should therefore be reviewed to establish whether the assessments were identical or parallel and, if parallel, to document their equivalence. Future replications may further strengthen methodological rigor through independent or blinded scoring and formal inter-rater reliability procedures.

Statistical Treatment of Data

Frequencies and percentages summarized participant characteristics, while means, standard deviations, and aggregate correct responses described assessment performance. A paired-samples t test compared total pretest and posttest scores. Cohen's d_z and a 95% confidence interval for the paired mean gain were added to

quantify magnitude and precision. A Wilcoxon signed-rank test was specified as a robustness check because n = 15, but its statistic and p value cannot be computed without the 15 paired learner-level scores. Normality of the paired differences was not reported; this further limits the evidentiary basis for relying on the parametric test alone. Age group, years in the self-contained class, and number of siblings were examined using analysis of variance; gender was examined using point-biserial correlation; and ordinal variables, including disability classification and parental educational attainment, were examined using Spearman rank-order correlation.

Statistical significance was evaluated at alpha = .05, two-tailed. No multiplicity correction was applied across the profile analyses or component-level comparisons; this increases the possibility of false-positive findings and is acknowledged in the interpretation.

Ethical Considerations

Approval to conduct the study was obtained from the school administration and relevant authorities. Parents or legal guardians provided informed consent, and the procedures were explained to learners using simplified language and visual supports. Participation was voluntary, withdrawal could occur without penalty, and learner names were replaced by codes. Records were kept confidential and used only for academic purposes. Classroom activities posed no known risk beyond ordinary literacy instruction.

RESULTS

Participant Profile

Most participants were 9-12 years old (80.00%), and females comprised 60.00% of the sample. More than half had spent one to two years in a self-contained class (53.33%). Learners classified with mild intellectual disability formed the largest group (46.67%), followed by moderate (40.00%) and profound (13.33%) classifications. Most participants had zero to two siblings (46.67%).

Across the 30 parents represented, high school level was the most frequent educational category (30.00%), followed by college graduate (20.00%). High school graduate and elementary level each accounted for 13.33%. The distribution indicates that the strategy was implemented with learners from varied family educational backgrounds rather than a single socioeconomic profile.

Table 1. Profile of the Participants (n = 15)

Variable	Category	f	%
Age	7-8 years	3	20
	9-10 years	6	40
	11-12 years	6	40
Gender	Male	6	40
	Female	9	60
Years in self-contained class	1-2 years	8	53.33
	3-4 years	2	13.33
	5-6 years	5	33.33
Intellectual disability classification	Mild	7	46.67
	Moderate	6	40
	Profound	2	13.33
Number of siblings	0-2	7	46.67
	5-Mar	6	40
	8-Jun	2	13.33

Table 2. Educational Attainment of Parents (n = 30)

Educational attainment	Mother f	Father f	Total f	%
Elementary level	2	2	4	13.33
Elementary graduate	0	1	1	3.33
High school level	4	5	9	30
High school graduate	4	0	4	13.33
College level	0	1	1	3.33
College graduate	2	4	6	20
Vocational course	2	1	3	10
Other/no response	1	1	2	6.67

Percentages use 30 parents as the denominator; totals may vary slightly because of rounding.

Alphabet Knowledge Outcomes

Aggregate performance improved in every assessed component. Letter recognition showed the largest gain, rising from 48 to 101 correct responses across participants (+53). Sound production increased from 48 to 83 (+35), letter-sound association from 57 to 84 (+27), and uppercase-lowercase matching from 83 to 97 (+14). The smaller gain in matching partly reflects the higher baseline score and therefore less opportunity for change. The component totals and gains were rechecked arithmetically against the reported aggregates; learner-level recomputation was not possible because no raw score sheet was included.

Table 3. Aggregate Alphabet Knowledge Performance by Component

Component	Pretest	Posttest	Gain	Pretest %	Posttest %
Letter recognition	48	101	53	32	67.33
Sound production	48	83	35	32	55.33
Uppercase-lowercase matching	83	97	14	55.33	64.67
Letter-sound association	57	84	27	38	56

Each component had 150 possible correct responses (15 participants x 10 items). Percentages were calculated from the reported aggregate counts.

Item-level changes were positive for nearly all letters and components. Recognition gains were greatest for Ss and Ee (+8 each), while sound production improved most for Aa (+6). The only negative item-level change occurred in matching Uu (-1), and no change was observed for matching Ee or associating Aa with its sound. These patterns suggest that visually similar uppercase-lowercase forms and less observable vowel contrasts require more explicit discrimination practice.

Table 4. Item-Level Gains in Correct Responses

Letter	Recognition	Sound production	Case matching	Sound association
Aa	7	6	3	0
Mm	7	4	2	2
Ss	8	2	2	2
Rr	4	5	1	3
Ee	8	1	0	4
Ll	4	3	3	2

Uu	2	2	-1	4
Ff	6	3	1	4
Oo	5	5	2	2
Ii	2	4	1	4

Pretest-Posttest Difference

The mean total score increased from 15.73 (SD = 5.01) at pretest to 24.33 (SD = 9.55) at posttest, for a mean gain of 8.60 points. The paired-samples t test indicated a statistically significant difference, $t(14) = -4.646$, $p < .001$. The corresponding paired-samples effect size was Cohen's $d_z = 1.20$. Using the reported mean gain and t statistic, the estimated 95% confidence interval for the mean gain is 4.63–12.57 points. The direction of the t statistic reflects subtraction of the higher posttest mean from the lower pretest mean in the reported analysis. The larger posttest standard deviation indicates heterogeneous response magnitudes; it should not be interpreted as evidence that the strategy worked uniformly.

Table 5. Paired-Samples Test of Total Alphabet Knowledge Scores

Assessment	Mean	SD	t	df	p
Pretest	15.733	5.007			
Posttest	24.333	9.552	-4.646	14	< .001

Two-tailed test; n = 15. The thesis reported p = .000, conventionally expressed as p < .001.

Table 5a. Parametric effect size and planned nonparametric robustness check

Analysis	Estimate	95% CI / p	Reporting status
Paired-samples t test	t(14) = -4.646	p < .001	Reported and recomputed from manuscript aggregates
Cohen's d_z	1.2	Mean gain CI: 4.63–12.57	Derived from reported t, n, and means
Wilcoxon signed-rank test	Not estimable	Requires paired scores	Raw learner-level data absent from source file

Learner Profile and Posttest Performance

Disability classification was the only profile variable showing a statistically significant association with posttest performance (Spearman rho = -.824, $p < .001$). The non-significant findings for age group, gender, years in the self-contained class, number of siblings, and parental educational attainment are statistically inconclusive because the sample was small and the analyses had low power. They should not be interpreted as evidence of uniform effectiveness across these subgroups. The classification association is observational and should not be interpreted as proof that disability classification caused lower posttest performance. No multiplicity correction was applied across the profile tests.

Table 6. Association between Learner Profile and Posttest Performance

Profile variable	Analysis	Statistic	p	Interpretation
Age group	ANOVA	F = 1.898	0.192	Not significant
Gender	Point-biserial	r = .133	0.637	Not significant
Years in self-contained class	ANOVA	F = .757	0.49	Not significant
ID classification	Spearman	rho = -.824	< .001	Significant
Number of siblings	ANOVA	F = .112	0.895	Not significant

Mother's educational attainment	Spearman	rho = -.180	0.52	Not significant
Father's educational attainment	Spearman	rho = -.396	0.143	Not significant

Significance evaluated at alpha = .05

The requested classification-disaggregated gain statistics cannot be calculated from aggregate component totals or the reported Spearman correlation. The raw paired scores are needed to explain the near-doubling of the total-score standard deviation from 5.01 to 9.55. The table is retained as an explicit reporting requirement and must be populated from the raw dataset before journal submission.

FINDINGS

1. The tune-and-action strategy was followed by improvement in all four dimensions of alphabet knowledge. Recognition improved most in absolute terms, suggesting that pairing visible letters with rhythm and action effectively supported visual attention and recall.
2. Sound production and letter-sound association also improved, demonstrating that the strategy supported phonological learning rather than letter naming alone. Their smaller gains relative to recognition indicate that expressive and cross-modal tasks may require longer and more explicit practice.
3. Uppercase-lowercase matching had the highest baseline performance and the smallest net gain. The decline for Uu and unchanged performance for Ee highlight the need for contrastive instruction that emphasizes size, position, and form when uppercase and lowercase letters are visually similar.
4. The significant pretest-posttest difference supports the tune-and-action strategy as a promising classroom intervention. However, the single-group design does not exclude maturation, repeated testing, or other classroom influences. The magnitude estimate is encouraging but should be interpreted as preliminary rather than causal.
5. Disability severity was strongly and inversely associated with posttest scores. Learners with moderate or profound classifications therefore require shorter routines, slower pacing, more repetitions, tactile letter forms, and individualized prompting rather than a uniform implementation schedule.

DISCUSSION

The results are consistent with evidence that alphabet knowledge develops more effectively when letter forms and sounds are taught explicitly and repeatedly (Piasta & Wagner, 2010; Castles et al., 2018). The substantial recognition gain is particularly plausible for learners with intellectual disabilities because the strategy transformed an abstract symbol into a coordinated visual, auditory, and motor event. A letter card focused visual attention, the tune or chant supplied a stable verbal cue, and the action created an additional retrieval pathway. This combination may have increased opportunities for successful encoding without requiring learners to depend exclusively on verbal working memory.

The gains in sound production and letter-sound association extend the result beyond visual recognition. Repetitive vocal modeling can support phonological discrimination and articulatory practice, while a consistent gesture may help learners retrieve the sound linked to a letter. Similar benefits have been reported for explicit phonemic awareness and multisensory phonics approaches (Torgesen et al., 1994; Schmidt & Vrabel, 2019). Nevertheless, the smaller phonological gains indicate that music and movement should complement, not replace, direct instruction in mouth position, sound contrast, and guided production.

The case-matching results demonstrate why component-level and item-level analysis is important. A small aggregate gain could be interpreted as weak intervention response, but the high pretest total shows that matching was already the strongest component. The isolated decline for Uu may represent normal response variability or confusion created by highly similar forms. Instruction should therefore add explicit contrasts: large movements for uppercase forms, small movements for lowercase forms, tactile tracing, and side-by-side discrimination of commonly confused pairs. These modifications are especially relevant for learners who have weak visual discrimination.

Because the other demographic variables were not statistically significant in this small sample, their effects remain statistically inconclusive. The findings do not establish that the strategy is equally effective across age,

gender, family size, classroom-experience, or parental-education groups. Differentiation should therefore be guided by present performance and support needs, while larger studies test subgroup response directly and apply an appropriate multiplicity-control strategy.

The study contributes context-specific evidence from a Philippine public-school self-contained classroom, but its conclusions require caution. The small sample, total-enumeration approach, single school, absence of a control group, immediate posttest, missing learner-level dataset in the source manuscript, and incomplete reporting of dosage, fidelity, reliability, content validity, and form equivalence limit generalizability, reproducibility, and causal inference. No multiplicity correction was applied. Future studies should use a comparison condition, larger multisite samples, treatment-fidelity measures, verified intervention logs, delayed posttests, and learner-level reporting sufficient to calculate subgroup gains and nonparametric robustness tests.

A further limitation is the concentration of researcher roles. The same researcher appears to have developed the materials, administered both assessments, delivered the intervention, and scored learner responses. This is especially consequential for orally produced responses and letter–sound associations. Without blinded scoring, independent rescoring, or inter-rater agreement, the possibility of expectancy-related measurement bias cannot be excluded.

CONCLUSION

Tune-and-action instruction was associated with statistically significant improvement in the alphabet knowledge of 15 learners with intellectual disabilities in a self-contained classroom. Gains were evident in letter recognition, sound production, uppercase-lowercase matching, and letter-sound association, with the largest improvement in recognition. The findings support the classroom use of coordinated music, visual cues, and movement as a structured supplement to explicit early literacy instruction. At the same time, response varied substantially, and disability severity was strongly related to posttest performance. Effective implementation therefore requires individualized pacing, repeated practice, and targeted visual, tactile, and articulatory supports.

RECOMMENDATIONS AND PRACTICAL IMPLICATIONS

Differentiated Intervention Plan

The differentiated intervention plan is a distinct output of the study. The thesis describes a “Micro-Loop” approach that simplifies complex melodies into short, single-beat, repetitive routines and targets the least-mastered or least-improved skills through explicit visual, auditory, and movement cues. The plan is intended as a classroom implementation guide, not as a validated treatment manual. Its activities include “Smile Stretch” for producing /e/ in Ee; “Bid and Small Robot” for distinguishing uppercase R from lowercase r; “The Shelf and the Egg” for Ee case matching; “The Baby Bear’s Lap” for Uu case matching; “The Flag and the Candy Cane” for Ff case matching; “The Candle and the Flame” for Ii case matching; and “The Giant Apple Bite” for Aa sound association. The thesis schedules these activities during daily literacy classes for approximately 15–30 minutes, but does not provide a total implementation duration or completed fidelity records.

Table 8. Differentiated intervention plan as a study output

Learner need/profile	Instructional adjustments	Progress-monitoring indicator
Mild intellectual disability / relatively independent responding	Use the full letter-card, chant, action, guided practice, and independent-response routine; increase delayed retrieval and mixed-letter review.	Independent correct response across recognition, sound production, case matching, and association.
Moderate intellectual disability / slower processing or inconsistent sound production	Introduce fewer targets per cycle; use shorter phrases, slower tempo, immediate feedback, errorless prompting, tactile tracing, and distributed practice.	Prompt level, latency, correct sound production, and retention across two consecutive checks.

Profound intellectual disability / substantial support needs	Use one target at a time, single-beat chants, highly salient letter forms, modeled movement as appropriate, frequent breaks, and intensive cumulative review.	Participation, orienting to the letter, prompted discrimination, and independent approximation of the target response.
Weak visual discrimination or case confusion	Use side-by-side contrasts, large/small movement cues, tactile letter forms, tracing, and explicit comparison of commonly confused uppercase/lowercase pairs.	Correct pair matching across varied positions and materials.

LIMITATIONS

The findings should be interpreted in light of the single-group pretest–posttest design, purposive total enumeration of 15 learners from one self-contained classroom, absence of a comparison group, immediate posttest, incomplete intervention dosage and fidelity records, unavailable learner-level dataset, unresolved identical-versus-parallel form description, and absence of blinded scoring or inter-rater agreement. The small and uneven profile cells, including only two learners classified as profound, also make subgroup estimates unstable. The profile analyses were not adjusted for multiplicity. Exact subgroup gains, the Wilcoxon statistic, Cronbach's alpha, CVI, form equivalence, and complete dosage therefore require verification from the original records before submission.

DECLARATIONS

Ethical approval and consent. The source records report permission from the school administration, orientation of parents or legal guardians, and informed consent for learner participation. No independent research-ethics approval number is reported in the available files.

Conflict of interest. The author declares no conflict of interest.

Data availability. Only aggregate results are reported in the manuscript. The learner-level dataset is not publicly available because it contains sensitive educational information; it should be retained securely and made available to qualified reviewers only when ethically and institutionally permitted.

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APPENDIX A

Sample Tune-and-Action Lesson Script

Use this script only as an illustrative lesson template based on the thesis intervention plan. The thesis specifies daily literacy-class sessions of approximately 15–30 minutes but does not document the total number of weeks or sessions.

Example Micro-Loop for Ee sound production: Show Ee; say “Smile Stretch”; model a smile while producing /e/; have the learner imitate; present Aa as a contrast; provide immediate feedback; repeat the target after a brief delay; record independent or prompted performance.

Target: one previously introduced letter and one new letter (insert verified target sequence).

1. Attention and readiness: “Eyes on the letter. Hands ready. Listen.” Show the letter card.

2. Teacher model: Name the letter, produce the continuous sound, and perform the agreed action. Learners watch and listen.

3. Guided chant: Teacher: “This is __.” Learners: “__ says /__/.” Repeat with a steady beat while performing the action.

4. Multisensory response: Learners trace the letter, point to the matching card, and perform the action while producing the sound.

5. Discrimination and association: Present the target among two or three alternatives. Ask learners to identify the letter, match uppercase/lowercase forms, and select a picture or word beginning with the sound.

6. Individual check: Record independent, prompted, or incorrect responses. Provide immediate corrective feedback and one successful reattempt.

7. Closing review: Review the target and one previously taught letter. Record the prompt level and next instructional decision.

APPENDIX B

Intervention Fidelity Checklist

No completed fidelity checklist data were included in either the journal-article source copy or the thesis. The checklist below operationalizes treatment fidelity for future replication; it is not evidence that fidelity was measured in the reported study.

Fidelity item	Yes	Partly/modified	No / notes
Target letter card was presented clearly.	☐	☐	
Teacher modeled letter name and sound.	☐	☐	
Tune/chant was delivered at the planned tempo.	☐	☐	
Assigned action/movement was paired with the target.	☐	☐	
Learners received guided and individual practice.	☐	☐	
Uppercase/lowercase matching or sound association was practiced.	☐	☐	
Corrective feedback and reinforcement were provided.	☐	☐	
Previously taught letters were reviewed.	☐	☐	
Learner responses and prompt levels were recorded.	☐	☐	

Fidelity summary: completed items ÷ applicable items × 100 = _____%. Observer/date: _____.