

Structural Analytic Synthetic Instruction With Letter Cards for Second-Grade Beginning Reading: A Classroom Action Study

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ABSTRACT

Beginning readers require coordinated knowledge of letters, syllables, words, and meaningful sentences, but conventional teacher-centred practice may provide insufficient manipulation and guided reconstruction of print. This classroom action study examined changes in the beginning-reading performance of 20 second-grade students at SDN 08 Tilamuta, Indonesia, during Structural Analytic Synthetic (SAS) instruction supported by letter cards. A baseline observation was followed by two cycles of planning, action, observation, and reflection. Students progressed from complete sentences to words, syllables, and letters, then reconstructed the elements into complete forms. Performance was rated for voice clarity, fluent reading, and reading confidence on a four-point rubric. Individual ratings were reanalysed with descriptive statistics, Friedman tests, Wilcoxon signed-rank tests with Holm adjustment, Kendall effect sizes, Cochran Q, and exact McNemar tests. The composite mean increased from 6.65 at baseline to 7.20 in Cycle I and 9.15 in Cycle II, $\chi^2(2) = 26.92, p < .001$, Kendall $W = .673$. The proportion meeting all three criteria increased from 40% to 60% and 80%. Most improvement occurred between Cycles I and II; the baseline-to-Cycle I composite comparison was not statistically significant after adjustment. The findings indicate meaningful local improvement after iterative refinement, but the stated 90% mastery target was not reached. Causal claims remain limited by the absence of a comparison group and unreported measurement reliability.

Keywords: *beginning reading; classroom action research; elementary education; letter cards; Structural Analytic Synthetic method; word recognition*

1. INTRODUCTION

Beginning reading is the point at which children learn to coordinate spoken language with an alphabetic writing system. Successful instruction must support letter-sound knowledge, blending, word recognition, fluency, and the construction of meaning. Research on reading acquisition shows that explicit attention to print and sound relationships is necessary, but isolated drills are insufficient unless students also encounter meaningful language and apply the learned units in connected text (Castles et al., 2018; Duke & Cartwright, 2021; Ehri, 2020).



Lower-primary students differ substantially in prior literacy exposure, confidence, attention, and speed of word learning. Students who cannot reliably analyse and recombine written units may read haltingly, avoid public reading, and struggle to access content in other subjects. Teachers therefore need a sequence that makes linguistic structure visible, provides repeated guided practice, and allows immediate diagnosis of where a breakdown occurs.

The Structural Analytic Synthetic method, commonly abbreviated SAS in Indonesian literacy education, begins with a meaningful complete sentence. During the structural phase, students encounter the sentence as a whole. During the analytic phase, the sentence is separated into words, syllables, and letters. During the synthetic phase, those elements are recombined into syllables, words, and the original sentence. The approach seeks to connect meaningful context with explicit analysis of print structure. Letter or word cards can make this process concrete because students physically arrange and rearrange units rather than merely listen to an explanation (Damayanti et al., 2024; Nursuci & Kaltsum, 2022).

The present study addressed a specific problem in Grade II at SDN 08 Tilamuta, Boalemo Regency. Initial observation indicated that 12 of 20 students had not reached the classroom reading criterion. Students were more attracted to drawing and colouring than reading, instruction relied heavily on teacher explanation and textbooks, and many students read with low volume, interruptions, or hesitation. SAS instruction with pictures and letter cards was introduced to increase active manipulation of print and to provide a staged route from sentence meaning to sublexical structure and back.

Previous Indonesian studies generally report positive outcomes from SAS, sometimes combined with letter or word cards (Alvi & Basri, 2023; Kawanti et al., 2025; Munawati et al., 2024; Silfiah et al., 2021). However, many classroom reports remain descriptive, merge instructional activity with reading competence, and do not analyse repeated ordinal observations from the same students. The source thesis also contained discrepancies between individual checkmarks and printed aggregate totals. This article strengthens the evidence by auditing the student-level matrix, separating component scores from mastery status, applying repeated-measures tests, and explicitly evaluating whether the prespecified success target was achieved.

The study aimed to determine how voice clarity, fluent reading, reading confidence, and overall rubric performance changed across baseline, Cycle I, and Cycle II. It also examined whether the proportion meeting the component criteria increased and whether the final outcome reached the stated 90% classroom target.

2. LITERATURE REVIEW

2.1 Beginning Reading as Coordinated Word Recognition and Meaning Construction

Beginning reading requires several processes that develop together. Children must learn how written symbols represent language, blend sublexical units into pronounceable forms, store recurring words in memory, and connect those words with sentence meaning. Ehri (2020) explains that systematic attention to grapheme-phoneme relations supports the formation of stable word representations. Castles et al. (2018) similarly



argue for instruction that is developmentally informed and integrates decoding with rich language and comprehension.

The active view of reading emphasises that reading performance also depends on motivation, engagement, self-regulation, and bridging processes that connect word recognition and comprehension (Duke & Cartwright, 2021). Confidence is therefore educationally relevant, but it should not be treated as a substitute for reading accuracy or comprehension. A defensible classroom assessment distinguishes affective readiness from technical performance.

2.2 Structural Analytic Synthetic Instruction

SAS combines whole-to-part analysis with part-to-whole reconstruction. The meaningful sentence gives an initial semantic frame, the analytic stage directs attention to internal orthographic units, and the synthetic stage requires learners to rebuild the sequence. This design can make errors observable. A child may recognise the complete sentence but fail to segment a word, identify a syllable, or reassemble letters in the correct order.

Empirical studies in Indonesian settings have associated SAS with improved early reading. Silfiyah et al. (2021) reported higher beginning-reading performance after SAS implementation. Nursuci and Kaltsum (2022) documented the staged use of SAS in a second-grade classroom. More recent experimental and action studies have also reported gains when SAS is combined with word or letter cards (Alvi & Basri, 2023; Kawanti et al., 2025; Sabila & Wachidah, 2025). These studies support feasibility, but their context-specific designs require cautious generalisation.

2.3 Letter Cards as Manipulable Print Scaffolds

Letter and word cards externalise the units that students must analyse and combine. They reduce memory load, permit rapid correction, and turn segmentation and blending into visible actions. Studies of word-card media have found improved early reading performance, particularly when cards are integrated into teacher modelling and guided practice rather than used as isolated games (Mardiah et al., 2025; Saputri & Ratnasari, 2025). In the present study, the cards supported the SAS sequence rather than functioning as a separate intervention.

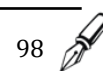
2.4 Research Gap

The contribution of this study is analytical and practice-oriented. It traces the same students across an initial condition and two reflective cycles, reports both ordinal score movement and criterion attainment, and distinguishes improvement from causal proof. It also tests the source conclusion against the stated 90% target. This distinction is important because action research can demonstrate local progress while still falling short of its operational success criterion.

3. RESEARCH METHOD

3.1 Design and Setting

The study used classroom action research with a baseline observation followed by two intervention cycles. Each cycle comprised planning, action, observation, and reflection. The design was appropriate for iterative improvement of classroom practice but did not



include random assignment or a comparison group. The study was conducted from November to December 2025 at SDN 08 Tilamuta, Piloliyanga Village, Tilamuta District, Boalemo Regency, Gorontalo Province, Indonesia. Baseline data were collected on 13 November 2025, Cycle I began on 17 November 2025 and was described as two meetings, and Cycle II was conducted on 4 December 2025.

3.2 Participants

Participants were all 20 students in the target Grade II class, including 8 boys and 12 girls. Whole-class inclusion reflected the action-research purpose. No probability sampling was used, so the findings represent this classroom and should not be treated as population estimates.

3.3 Intervention Procedures

At baseline, reading instruction was observed before SAS was introduced. Students read in front of the class under the prevailing lecture-and-assignment approach. The baseline assessment indicated difficulty reading complete sentences fluently, separating sentences into smaller units, and recombining letters or syllables into correct words.

In Cycle I, the teacher introduced a picture related to the lesson topic, activated prior knowledge, displayed words or simple sentences, and modelled reading. Students then analysed words into syllables and letters with letter cards and reconstructed the units into words and sentences. Reflection identified continued difficulty among several students, incomplete mastery of the sequence, and a need for more intensive guidance.

Cycle II retained the structural, analytic, and synthetic phases but strengthened motivation, teacher guidance, opportunities to manipulate cards, and feedback. The lesson topic was the Indonesian language unit “Characteristics of My Family.” The cycle ended with individual reading and rubric assessment.

3.4 Measures and Data Quality

The outcome tables rated three components: voice clarity, reading without halting, and reading confidence. Each component used four ordered categories: 1 = Poor, 2 = Fair, 3 = Good, and 4 = Very Good. A score of at least 3 represented component attainment. Overall mastery required the student to meet the criterion on all three components. The composite score ranged from 3 to 12.

The thesis also described a reading task involving recognition of letters, construction of syllables and words, and reading of simple sentences. However, the reported student-level outcome matrix did not separately score accuracy, decoding errors, speed, or comprehension. Moreover, the method section referred once to punctuation mastery, whereas the results tables used confidence. The present analysis followed the actual repeated results tables and treats confidence as an affective-performance component, not a direct measure of decoding.

A data audit found minor inconsistencies between individual checkmarks and printed aggregate totals, especially for confidence at baseline and Cycle II. The primary analysis used the individual student rows, aligned by fixed row order because some initials varied slightly across tables. This approach preserves the most granular available evidence and makes the discrepancy explicit.



3.5 Data Analysis

Descriptive statistics included means, standard deviations, medians, and proportions scoring at least 3. Friedman tests evaluated change across the three repeated occasions, and Kendall W quantified effect magnitude. Significant global tests were followed by two-sided Wilcoxon signed-rank tests for baseline versus Cycle I, Cycle I versus Cycle II, and baseline versus Cycle II. Holm adjustment controlled familywise error, and matched-pairs rank-biserial correlation described pairwise magnitude. Cochran Q and exact McNemar tests evaluated repeated binary criterion attainment. The alpha level was .05. Analyses were performed in Python using SciPy and statsmodels.

3.6 Ethical Considerations

The source documented coordination with the Grade II teacher and school-based data collection. It did not report an institutional ethics approval number or detailed written parental consent and child assent procedures. No approval or consent information is therefore invented. Student identities were represented by initials, and this article reports aggregate findings. Any existing permission and consent documentation should be provided to the journal during submission if requested.

4. RESULTS

4.1 Descriptive Development

The descriptive pattern shows limited movement after the first cycle and a larger shift after the second. Voice clarity and fluent reading means increased from 2.20 at baseline to 2.40 in Cycle I and 3.00 in Cycle II. Confidence increased from 2.25 to 2.40 and 3.15. The composite mean rose from 6.65 to 7.20 and 9.15. Individual-row mastery across all three components increased from 8 students at baseline to 12 in Cycle I and 16 in Cycle II.

Table 1

Descriptive Changes in Beginning-Reading Ratings Across Measurement Occasions

Component	Occasion	M	SD	Median	Score >= 3, n (%)
Voice clarity	Baseline	2.20	0.77	2	8 (40.0)
	Cycle I	2.40	0.82	3	12 (60.0)
	Cycle II	3.00	1.12	3	16 (80.0)
Fluent reading	Baseline	2.20	0.77	2	8 (40.0)
	Cycle I	2.40	0.82	3	12 (60.0)
	Cycle II	3.00	1.12	3	16 (80.0)
Reading confidence	Baseline	2.25	0.79	2	9 (45.0)
	Cycle I	2.40	0.82	3	12 (60.0)
	Cycle II	3.15	1.04	3	17 (85.0)
Composite	Baseline	6.65	2.30	6	8 (40.0)*
	Cycle I	7.20	2.46	9	12 (60.0)*



Component	Occasion	M	SD	Median	Score ≥ 3 , n (%)
	Cycle II	9.15	3.15	9	16 (80.0)*

Note. Ratings used a four-point ordered scale: 1 = Poor, 2 = Fair, 3 = Good, and 4 = Very Good. Criterion attainment was defined as a score of at least 3. *Composite mastery required a score of at least 3 on all three components. Values were recalculated from individual student rows.

4.2 Repeated-Measures Inference

All global Friedman tests were statistically significant and showed large stage-related effects. Pairwise results refined this conclusion. The baseline-to-Cycle I change was small: it reached the adjusted .05 threshold for clarity and fluency but not for confidence or the composite score. In contrast, every Cycle I-to-Cycle II comparison and every baseline-to-Cycle II comparison was significant after Holm adjustment. The improvement was therefore concentrated in the reflective refinement implemented in Cycle II rather than in initial exposure alone.

Table 2

Repeated-Measures Tests and Pairwise Comparisons

Outcome	Friedman chi-square	p	Kendall W	Holm-adjusted Wilcoxon p: B-I / I-II / B-II	r _{rb} B- II
Voice clarity	26.00	< .001	.650	.046 / .001 / < .001	1.00
Fluent reading	26.00	< .001	.650	.046 / .001 / < .001	1.00
Reading confidence	25.53	< .001	.638	.180 / < .001 / < .001	1.00
Composite score	26.92	< .001	.673	.066 / .001 / < .001	1.00

Note. B = baseline; I = Cycle I; II = Cycle II; r_{rb} = matched-pairs rank-biserial correlation. Pairwise probability values were adjusted within each outcome using the Holm procedure.

4.3 Criterion Attainment and Target Evaluation

Criterion attainment increased across the sequence. The final rates were 80% for clarity, 80% for fluent reading, 85% for confidence, and 80% for meeting all three components. Cochran Q tests confirmed changes in binary status over time. Exact paired comparisons were significant for baseline versus Cycle II, but the smaller four-student increments between adjacent occasions did not reach significance. Most importantly, the final all-component mastery rate of 80% remained below the prespecified 90% success target.

Table 3

Criterion Attainment Across the Action-Research Sequence

Criterion	Baseline	Cycle I	Cycle II	Cochran Q	p	Exact McNemar p: B-I / I-II / B-II
Voice clarity	40.0%	60.0%	80.0%	12.00	.002	.125 / .125 / .008
Fluent reading	40.0%	60.0%	80.0%	12.00	.002	.125 / .125 / .008
Reading confidence	45.0%	60.0%	85.0%	10.89	.004	.375 / .063 / .008



Criterion	Baseline	Cycle I	Cycle II	Cochran Q	p	Exact McNemar p: B-I / I-II / B-II
All three components	40.0%	60.0%	80.0%	12.00	.002	.125 / .125 / .008

Note. The source thesis stated a 90% success target. The final proportion meeting all three component criteria was 80%; therefore, the prespecified target was not attained. Printed aggregate rows differed slightly from individual checkmarks for confidence, so the individual rows were used for the primary analysis.

4.4 Cycle Reflection

Cycle I revealed that students were interested in manipulating the letter cards, but some could not yet complete the analytic and synthetic sequence independently. The second cycle increased guidance, motivation, and direct practice. The larger Cycle II gains are consistent with this refinement. Four students nevertheless remained below the all-component criterion, indicating a continuing need for targeted small-group or individual support.

5. DISCUSSION

5.1 Interpretation of the Change Pattern

The results support a cautious conclusion of meaningful local improvement associated with the two-cycle SAS programme. The analytical sequence gave students repeated opportunities to connect a meaningful sentence with words, syllables, and letters, while the synthetic sequence required reconstruction. Letter cards made these relationships visible and manipulable. Such activities are compatible with evidence that beginning readers benefit from explicit attention to orthographic units and repeated application in meaningful language (Castles et al., 2018; Ehri, 2020).

The inferential results also show why cycle-by-cycle analysis matters. Initial implementation produced only modest composite change. The stronger improvement emerged after reflection and instructional adjustment. This pattern fits the logic of classroom action research, where the first cycle functions partly as an implementation test and the second responds to identified obstacles. It would be inaccurate to attribute the total improvement to the method name alone; teacher modelling, attention, repeated assessment, letter-card practice, and increased guidance were bundled within the intervention.

5.2 Relationship With Prior Studies

The direction of the findings agrees with prior reports of SAS-supported beginning reading in Indonesian primary classrooms (Alvi & Basri, 2023; Damayanti et al., 2024; Nursuci & Kaltsum, 2022; Silfiah et al., 2021). Studies combining SAS with word or letter cards likewise report improved participation and performance (Kawanti et al., 2025; Munawati et al., 2024; Sabila & Wachidah, 2025). The present reanalysis adds evidence about the timing of change and shows that descriptive improvement in Cycle I was not uniformly strong under paired statistical testing.

SAS should not be framed as a replacement for systematic decoding instruction. Its strongest rationale is integration: a meaningful sentence provides context, explicit analysis highlights written units, and reconstruction requires blending. Teachers should ensure that children attend to the letters and sounds themselves rather than guessing words from pictures or context.

5.3 Practical Implications

Teachers can implement SAS through a concise routine. First, present a short meaningful sentence linked to an illustration. Second, model accurate reading. Third, separate the sentence into words, syllables, and letters. Fourth, allow students to manipulate cards and reconstruct the sequence. Fifth, require individual reading so that group performance does not conceal difficulties. Feedback should identify the precise level at which an error occurred.

The four students who remained below criterion require more than whole-class repetition. Diagnostic follow-up should examine letter knowledge, phonological awareness, syllable blending, word accuracy, oral language, vision or hearing concerns, and anxiety during public reading. Small-group practice with easier items and immediate corrective feedback may be more useful than simply repeating the same whole-class task.

5.4 Methodological Limitations

The evidence has several limitations. The study involved one intact class without a control group, so maturation, repeated practice, teacher attention, and familiarity with the rubric may explain part of the change. The intervention was short, and the equivalence of reading materials across occasions was not established.

The three-item teacher-developed rubric lacked reported content validation, inter-rater reliability, and rater blinding. Confidence is not a direct reading skill, while reading accuracy, rate, and comprehension were not separately quantified. Source inconsistencies in labels, initials, and aggregate counts also reduce certainty. Future studies should use equivalent passages, explicit accuracy and comprehension measures, independent raters, reliability analysis, delayed follow-up, and a comparison condition when causal effectiveness is the research question.

6. CONCLUSION

Structural Analytic Synthetic instruction supported by letter cards was associated with improved beginning-reading ratings among 20 second-grade students at SDN 08 Tilamuta. Voice clarity, fluent reading, confidence, and the composite score increased across baseline, Cycle I, and Cycle II. The strongest gains occurred after the reflective improvement of Cycle II. Overall mastery increased from 40% to 60% and 80%, but the final outcome did not reach the stated 90% target. The findings support continued use of SAS as a structured classroom routine while four students receive targeted assistance. Because the study lacked a comparison group and a validated reliable reading measure, the results demonstrate local progress rather than definitive causal effectiveness.

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AUTHOR CONTRIBUTIONS

Veranika Maliwu: Conceptualisation, methodology, classroom implementation, observation, data curation, formal analysis, writing of the original draft, review, and editing. The author approved the final manuscript and accepts responsibility for its integrity.

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DATA AVAILABILITY

The de-identified classroom ratings supporting this article may be requested from the corresponding author, subject to school permission and applicable confidentiality requirements.

CONFLICTS OF INTEREST

The author declares no conflicts of interest related to this research, authorship, or publication.

GENERATIVE ARTIFICIAL INTELLIGENCE DISCLOSURE

OpenAI ChatGPT was used to assist English-language editing, manuscript restructuring, reference verification, and statistical reanalysis of the original de-identified score matrix. It was not used to create participants, raw observations, findings, or ethical approval information. The author reviewed the revised manuscript and remains responsible for its accuracy and integrity.

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