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Observed Changes in Fine Motor Coordination in Elementary School Students ThroughDuring Bola Serimbang: A Traditional Indonesian Ball-and-Stones Game

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ABSTRACT

Background: Fine motor coordination supports children's early writing, self-care, and precise object manipulation, yet it may receive limited structured practice in elementary physical education. This study described changes in fine motor coordination during Bola Serimbang, a traditional Indonesian ball-and-stones game. **Methods:** Classroom action research following the Kemmis and McTaggart model was implemented over three cycles and nine meetings with 63 first-grade students (34 girls and 29 boys) at SD Negeri 2 Kebun Lama, Langsa City. Ten progressive game stages emphasized grasping, controlled release, tossing, catching, and stone manipulation. Fine motor performance was assessed using a four-indicator observation rubric. The practical success criterion was at least 70% of students reaching Developing as Expected (BSH) or Very Well Developed (BSB). **Results:** The cycle summary tables indicated that the proportion reaching BSH or BSB increased from 47.62% (30/63) at the end of Cycle I to 57.14% (36/63) in Cycle II and 85.71% (54/63) in Cycle III. At the end of Cycle III, 25.40% reached BSH and 60.32% reached BSB, while no students remained in the Undeveloped category. **Conclusions:** Within this single-group classroom action research, higher end-of-cycle category distributions were observed during progressively changing tasks. Bola Serimbang may offer a low-cost, culturally relevant activity for elementary physical education, but source-record verification and controlled, blinded studies are needed before causal effectiveness can be established.

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INTRODUCTION

Fine motor coordination refers to the ability to synchronize small-muscle movements, particularly those of the hands and fingers, with visual information to perform precise and controlled actions (Shi et al., 2025). This capacity supports academic and daily living activities such as writing, drawing, cutting, fastening clothes, and manipulating small objects (Mardiansyah et al., 2023). During the early elementary years, manual control and fine motor proficiency generally improve with age, although substantial individual variation remains among typically developing children (Flatters et al., 2014; Gaul & Issartel, 2016). Coordination training in children aged approximately five to seven years also indicates that structured practice can support age-sensitive motor development (Gutschow et al., 2025). Direct interaction with objects provides concrete opportunities to practise visually guided hand movements; developmentally appropriate opportunities for precise hand-eye activity therefore remain important during this period (Flatters et al., 2014; Gaul & Issartel, 2016; Ghorbanzadeh et al., 2024).

Although nationally representative prevalence estimates are limited, Indonesian and international studies indicate substantial variation in children's motor competence and identify groups who require additional practice (Mardiansyah et al., 2023; Utami et al., 2025). Difficulties with manual control may be visible in everyday school tasks such as maintaining a functional pencil grasp, cutting, fastening clothing, or manipulating small objects (Gaul & Issartel, 2016). Greater screen-media exposure can displace or alter opportunities for hands-on fine motor activity, although the relationship should not be interpreted as simple causation (Martzog & Suggate, 2022). In addition, physical education often emphasizes locomotor and object-control activities more than systematic

manual-dexterity practice, while teachers report limited knowledge of culturally appropriate motor-learning activities (Adi et al., 2022).

In Indonesian elementary schools, game-based activities are commonly used to develop locomotor, balance, and object-control competence, but fine motor stimulation may be less systematically represented (Suryadi et al., 2024). Preliminary classroom observations at SD Negeri 2 Kebun Lama, Langsa City, showed that several students had difficulty maintaining a functional pencil grip, fastening their clothing, and completing drawing or cutting tasks. These observations identified a local instructional need; they were not compared with a standardized, norm-referenced fine motor test and therefore should not be interpreted as a clinical diagnosis or a population-level developmental deficit. Normative research demonstrates that fine motor proficiency changes with age and varies between children, reinforcing the need for age-sensitive interpretation (Flatters et al., 2014; Gaul & Issartel, 2016). The school's physical education teacher also reported that fine motor activities were rarely prioritized because they were perceived as less active and harder to integrate into lessons.

Structured play can provide repeated practice, immediate feedback, problem solving, and peer support within an age-appropriate activity. Research indicates that physical activity and ball-based practice can support motor competence and visuomotor coordination, although outcomes vary by task, population, and assessment method (Adi et al., 2022; Alberty & Cillik, 2023; Mardiansyah et al., 2024; Shi et al., 2025; Voloshina & Panasenko, 2022).

Among the various forms of play, traditional games offer several educational advantages: they are embedded in local culture, require little equipment, involve repetitive and progressively challenging actions, and can motivate children to participate (Aliriad et al., 2024). Indonesian research also emphasizes the cultural value of sustaining traditional games and arts within education (Martadi & Sampurno, 2025; Wibowo et al., 2023). Nevertheless, modernization and uneven teacher familiarity may limit their systematic use in formal school settings.

One such traditional game is Bola Serimbang (also known regionally as bola bekel or bola batu). The game uses a small rubber ball and five to six stones or metal jacks. A player tosses the ball and completes a predetermined action with the stones before catching the descending ball. The ten stages increase in difficulty through picking, scattering, hand flipping, and combined movements (Razali, Sofyan, et al., 2025). Within motor-development taxonomies, tossing and catching are object-control or manipulative actions, whereas controlled grasp, release, and stone pickup emphasize fine manipulation and manual dexterity (Gaul & Issartel, 2016; Suryadi et al., 2024). Bola Serimbang therefore integrates broader object control with visually guided finger precision rather than representing a purely fine motor task.

Despite its apparent suitability for manual-coordination practice, Bola Serimbang has received limited evaluation as a structured elementary physical education activity. To examine this claim, targeted exact-phrase searches were conducted in Google Scholar and scholarly web indexes through 18 August 2026 using combinations of 'Bola Serimbang,' 'bola bekel,' 'fine motor,' 'first grade,' and 'classroom action research.' The exact searches returned no directly matching classroom action research on first-grade fine motor outcomes; broader searches identified related traditional-game studies focused mainly on gross or manipulative motor competence, motivation, culture, and social development (Aliriad et al., 2024; Erianjoni et al., 2025; Hartati et al., 2022; Utami et al., 2025). Because this was a targeted rather than systematic review, the contribution is framed cautiously as addressing a limited evidence base rather than establishing an absolute absence of prior research.

The present study used three classroom action research cycles to examine whether observed fine motor coordination improved during a progressively structured Bola Serimbang intervention. A secondary objective was to describe teacher and student activity and the reflections that informed each subsequent cycle. The predefined practical criterion was that at least 70% of students would reach Developing as Expected (BSH) or Very Well Developed (BSB) by the end of Cycle III. Given the absence of a comparison group and blinded assessment, the study evaluates within-class descriptive change and instructional feasibility rather than a definitive causal effect.

METHOD

A. Study Design

This study employed Classroom Action Research following the Kemmis and McTaggart model (Lynch et al., 2025). Each of the three cycles comprised planning, action, observation, and reflection, with three meetings per cycle. Planning specified the game stages, equipment, grouping, and assessment focus; action involved delivery of the scheduled Bola Serimbang stages; observation combined rubric scoring with descriptive notes; and reflection used the available observation summary to identify difficulties and adjust guidance in the next cycle.

The cycle summaries describe Cycle I as Stages 1-4 with close teacher guidance, Cycle II as Stages 5-7 with reduced supervision and repeated demonstration, and Cycle III as Stages 8-10 with greater independence in small groups. The reported reflection points were recurring hesitation during controlled scattering and stone pickup, a temporary plateau during Cycle II, and remaining hand-flip errors during Cycle III. These descriptions should be checked against the contemporaneous observation and reflection records before resubmission.

B. Participants and Setting

The study was conducted at SD Negeri 2 Kebun Lama, a public elementary school in Langsa City, Aceh Province, Indonesia, between July and August 2025. The school serves a predominantly lower-middle socioeconomic community. A total of 63 first-grade students participated: 34 girls (54.0%) and 29 boys (46.0%), aged 6-7 years (mean age 6.8 +/- 0.4 years). Inclusion criteria were active first-grade enrollment, attendance of at least 80% during the intervention, no diagnosed physical disability affecting hand function, and parental consent. The intact class received the intervention, so random assignment and a control group were not feasible. The classroom teacher delivered the intervention and also served as one of two raters, creating a specific risk of expectancy bias. Simultaneous dual rating and a structured rubric were used to improve consistency, but these procedures could not eliminate bias and are treated as limitations.

C. Intervention: The Bola Serimbang Traditional Game

Bola Serimbang (also known regionally as bola bekel) is a traditional Indonesian ball-and-stones game. The equipment consists of one small rubber ball (diameter 2–3 cm) and five to six small stones or metal jacks (approximately 1–1.5 cm each). The game involves tossing the ball upward and, while it is airborne, performing a series of hand movements with the stones before catching the ball. The intervention comprised ten progressive stages (Table 1), each designed to target specific fine motor skills: grasping, hand–eye coordination, finger speed, grip strength, and bilateral coordination. Each stage was introduced sequentially; students could only progress to the next stage after completing the previous one.

Table 1. Game Stages, Activities, and Targeted Fine Motor Skills

Stage	Name	Description	Targeted Fine Motor Skill
1	Introduction	Holding, feeling the texture, tossing and catching a ball with one hand	Grip strength, initial hand–eye coordination
2	Pick One	Toss the ball, pick up one stone from the floor, and catch the ball	Speed and precision of finger movement
3	Pick Two	Toss the ball, pick up two stones simultaneously, catch ball	Bilateral coordination, grip capacity
4	Pick Three	Toss the ball, pick up three stones, catch the ball	Advanced grasping, coordination
5	Pick Four	Toss the ball, pick up four stones, catch the ball	Maximum grip strength, high-level coordination
6	Scatter One	Hold all stones, toss the ball, scatter one stone, catch the ball, then retrieve the scattered stone	Finger flexibility, controlled release
7	Scatter Two	Same as Stage 6 but with two stones	Increased difficulty in release and retrieval
8	Hand Flip (One)	All stones on the floor, toss the ball, flip the hand, pick up one stone, catch the ball	Wrist flexibility, complex coordination
9	Hand Flip (Two)	Same as Stage 8, but picking up two stones	Higher difficulty in coordination and speed
10	Combination	Combine multiple movements (e.g., flip hand, scatter one, pick two)	Adaptive coordination, integration of multiple skills

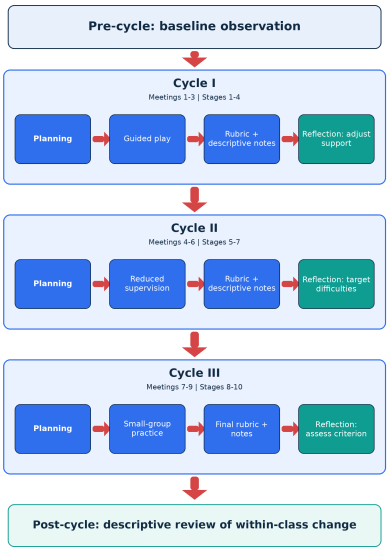

Figure 1. Classroom action research procedure across three cycles. Each cycle comprised planning, action, observation, and reflection.

The intervention comprised nine meetings across three cycles. Each meeting included a warm-up, demonstration and guided practice, game practice, and cool-down. Cycle I used close teacher guidance, Cycle II reduced supervision, and Cycle III emphasized small-group practice and greater independence. The exact dates, weekly distribution, and duration of the meetings should be reported from the contemporaneous teaching log. Figure 1 summarizes the research procedure across cycles.

D. Outcome Measures and Instruments

Fine motor coordination was assessed using an observation rubric adapted from the Indonesian early childhood learning-assessment guideline (Ministry of Education and Culture of the Republic of Indonesia, 2015) and informed by research on age-related manual control and fine motor proficiency (Flatters et al., 2014; Gaul & Issartel, 2016). Because the adapted rubric was not validated against a standardized fine motor instrument in this sample, it is described as structured rather than fully validated. The rubric evaluated four behavioral indicators:

1. Scattering stones – the ability to release stones from the hand in a controlled manner.
2. Gripping ball and stones – ability to hold the ball and stones with appropriate finger strength and positioning.
3. Catching the ball – ability to intercept the descending ball consistently.
4. Picking up stones – the ability to pick up stones singly or in multiples with precision and speed.

Each indicator was scored on a four-point ordinal scale: 1 = Undeveloped (BB), 2 = Beginning to Develop (MB), 3 = Developing as Expected (BSH), and 4 = Very Well Developed (BSB). Total scores ranged from 4 to 16 and were converted to percentages for descriptive reporting. The reported overall category was defined conservatively by the lowest of the four indicator scores: any score of 1 = BB; otherwise any score of 2 = MB; all four scores at least 3 with at least one score of 3 = BSH; and all four scores of 4 = BSB. Thus, compensation between indicators was not permitted. A student was classified as successful only when all four indicators were rated at least 3 (equivalent to at least 75% of the maximum score). The rubric was pilot-tested with five non-participant students, yielding Cohen's kappa = 0.82 between the two raters. Because this estimate was based on only five cases, it should be considered preliminary and imprecise rather than definitive evidence of reliability (Bujang & Baharum, 2017). At each observation point, the classroom teacher and researcher observed the scheduled task sequence and produced one consensus record per student after resolving rating differences. The teacher's dual role as instructor and assessor could introduce expectancy bias despite the structured rubric and second rater.

E. Data Collection Procedures

Data were collected at baseline and during each of the nine meetings. Rubric scores and descriptive observation notes recorded student behaviour, engagement, errors, and support needs. At the end of each cycle, the teacher and researcher reviewed the available rubric summary and observation notes to inform planning for the next cycle. The cycle-specific procedures were as follows:

1. Pre-cycle (baseline): Students completed the initial observation before the intervention; the findings informed Cycle I planning.
2. Cycle I (Meetings 1-3): Planning covered Stages 1-4 and close guidance; action consisted of guided play; observation used the rubric and descriptive notes; and the cycle summary identified recurring difficulty in controlled scattering and stone pickup.
3. Cycle II (Meetings 4-6): Planning incorporated the Cycle I summary and Stages 5-7; action used reduced supervision and repeated demonstrations; observation described a temporary plateau and remaining precision difficulties; and the cycle summary prioritized peer-supported practice and preparation for hand-flip tasks.
4. Cycle III (Meetings 7-9): Planning introduced Stages 8-10; action emphasized small-group practice and greater independence; observation produced the final rubric summary and descriptive error notes; and the cycle summary assessed the 70% class criterion and remaining instructional priorities.

The observation notes were used only as descriptive session summaries. For reporting, observations were organized narratively around teacher guidance, student engagement and peer interaction, and recurrent execution errors. No formal qualitative coding, theme-saturation procedure, or independent inter-coder agreement analysis was performed; these observations are therefore not presented as a separate qualitative study. Photographs are not included in this submission.

F. Ethical Considerations

The study involved first-grade children. The available study record documents written parental consent before participation. Photographic material is not reproduced in this submission. The ethics committee or institutional-waiver identifier, the age-appropriate child-assent procedure, and the scope of consent for any photographic documentation must be confirmed from the original ethics record before resubmission.

G. Statistical Analysis

Data were analyzed descriptively using counts and percentages. Individual success required ratings of at least 3 on all four indicators; class-level success was calculated as:

$$P = (F / N) \times 100\%$$

where P = percentage of successful students, F = number of students meeting the four-indicator success rule, and N = total number of students (n = 63). The practical criterion was predefined as at least 70% of students meeting this rule by the end of Cycle III. Because this was classroom action research without a control group, inferential statistical tests were not applied. Meeting-level counts and percentages were arithmetically cross-checked against the reported denominator of 63, but the aggregate tables could not be independently reconciled to the original student-level worksheet during this revision. No missing data were reported. Data are presented in tabular form and were summarized using Microsoft Excel version 16.0.

RESULTS

A. Baseline (Pre-Cycle) Fine Motor Skills

Before the intervention, all 63 first-grade students were assessed using the observation rubric. At baseline, no student was classified as Developing as Expected (BSH) or Very Well Developed (BSB); 38 students (60.32%) were classified as Beginning to Develop (MB), and 25 (39.68%) as Undeveloped (BB). No baseline mean or standard deviation is reported because the student-level score file was not available for verification.

B. Cycle I Results

Cycle I comprised Meetings 1-3, during which students played Stages 1-4 under close teacher guidance. Combined BSH/BSB proportions increased across the three meetings (Table 2). By Meeting 3, 14 students (22.22%) reached BSH, 16 (25.40%) reached BSB, 19 (30.16%) remained at MB, and 14 (22.22%) remained at BB. The combined BSH/BSB proportion was 47.62% (n = 30), below the predefined 70% class criterion. Descriptive notes recorded recurring hesitation during controlled scattering and stone pickup; because indicator-level rubric results were not tabulated, these notes were not used to rank which indicator improved most.

Table 2. Distribution of Student Fine Motor Skill Levels Across Cycle I Meetings (n=63)

Category	Meeting 1 (n, %)	Meeting 2 (n, %)	Meeting 3 (n, %)
BB (Undeveloped)	27 (42.86%)	22 (34.92%)	14 (22.22%)
MB (Beginning to Develop)	14 (22.22%)	16 (25.40%)	19 (30.16%)
BSH (Developing as Expected)	8 (12.70%)	11 (17.46%)	14 (22.22%)
BSB (Very Well Developed)	14 (22.22%)	14 (22.22%)	16 (25.40%)
Successful (BSH+BSB)	22 (34.92%)	25 (39.68%)	30 (47.62%)

Note: BB = Belum Berkembang, MB = Mulai Berkembang, BSH = Berkembang Sesuai Harapan, BSB = Berkembang Sangat Baik.

C. Cycle II Results

Cycle II covered Meetings 4-6 and introduced Stages 5-7 with reduced teacher supervision. The combined BSH/BSB proportion was 34.92% at Meetings 4 and 5 before increasing to 57.14% at Meeting 6. At the end of Cycle II, no students remained in BB; 27 (42.86%) were classified as MB, 14 (22.22%) as BSH, and 22 (34.92%) as BSB. Thus, 36 of 63 students (57.14%) reached BSH or BSB, still below the 70% criterion. The fall from 47.62% at Meeting 3 to 34.92% at Meetings 4 and 5 coincided with the introduction of more demanding Stages 5-7 and cautions against describing the full meeting-level trajectory as continuously progressive.

Table 3. Distribution of Student Fine Motor Skill Levels Across Cycle II Meetings (n=63)

Category	Meeting 4 (n, %)	Meeting 5 (n, %)	Meeting 6 (n, %)
BB (Undeveloped)	14 (22.22%)	11 (17.46%)	0 (0%)
MB (Beginning to Develop)	27 (42.86%)	30 (47.62%)	27 (42.86%)
BSH (Developing as Expected)	8 (12.70%)	11 (17.46%)	14 (22.22%)
BSB (Very Well Developed)	14 (22.22%)	11 (17.46%)	22 (34.92%)
Successful (BSH+BSB)	22 (34.92%)	22 (34.92%)	36 (57.14%)

D. Cycle III Results

Cycle III covered Meetings 7-9 and implemented Stages 8-10 with greater student independence in small groups. At Meeting 9, no student remained in BB; 9 (14.29%) were classified as MB, 16 (25.40%) as BSH, and 38 (60.32%) as BSB. The combined BSH/BSB proportion was 54 of 63 students (85.71%), exceeding the predefined 70% criterion. Within the cycle, the BSB count fell from 19 at Meeting 7 to 14 at Meeting 8 before rising to 38 at Meeting 9. This fluctuation may reflect changing task demands, but the aggregate data do not permit a student-level explanation.

Table 4. Distribution of Student Fine Motor Skill Levels Across Cycle III Meetings (n=63)

Category	Meeting 7 (n, %)	Meeting 8 (n, %)	Meeting 9 (n, %)
BB (Undeveloped)	0 (0%)	0 (0%)	0 (0%)
MB (Beginning to Develop)	17 (26.98%)	14 (22.22%)	9 (14.29%)
BSH (Developing as Expected)	27 (42.86%)	35 (55.56%)	16 (25.40%)
BSB (Very Well Developed)	19 (30.16%)	14 (22.22%)	38 (60.32%)
Successful (BSH+BSB)	46 (73.02%)	49 (77.78%)	54 (85.71%)

E. Overall Change Across Cycles

End-of-cycle category distributions increased across the three cycles. The combined BSH/BSB proportion was 47.62% (30/63) at the end of Cycle I, 57.14% (36/63) at the end of Cycle II, and 85.71% (54/63) at the end of Cycle III. BB decreased from 22.22% at the end of Cycle I to 0% at the ends of Cycles II and III, while BSB increased from 25.40% in Cycle I to 60.32% in Cycle III. Meeting-level change was not monotonic: combined success declined at the start of Cycle II, and the BSB count declined between Meetings 7 and 8. Because task difficulty also increased across cycles, these distributions represent performance within progressively changing tasks rather than repeated measurement under identical conditions. The end-of-cycle pattern met the practical class criterion but does not establish causation.

Table 5. Percentage of students in each fine motor skill category at the end of each cycle

Category	End of Cycle I	End of Cycle II	End of Cycle III
BB (Undeveloped)	22.22%	0%	0%
MB (Beginning to Develop)	30.16%	42.86%	14.29%
BSH (Developing as Expected)	22.22%	22.22%	25.40%
BSB (Very Well Developed)	25.40%	34.92%	60.32%
Successful (BSH+BSB)	47.62%	57.14%	85.71%

F. Teacher and Student Activities

Descriptive observation summaries indicated that teacher guidance was most intensive in Cycle I and focused on grip and movement sequence. Later summaries described fewer corrections, greater student confidence, and peer assistance during small-group practice. Recurrent errors included dropping the ball before completing stone pickup and difficulty with the hand-flip sequence. Because the notes were not formally coded and indicator-level frequencies were not systematically tabulated, these observations are presented as contextual descriptions rather than comparative outcome evidence.

DISCUSSION

This classroom action research documented higher end-of-cycle category distributions during the Bola Serimbang sequence. The combined BSH/BSB proportion increased from 47.62% after Cycle I to 85.71% after Cycle III and exceeded the predefined 70% class criterion. However, the meeting-level trajectory included temporary declines, the task stages became progressively more difficult, and the single-group design does not permit a causal conclusion.

A. Comparison with Previous Studies

The observed pattern is broadly consistent with research showing that structured games and motor-learning activities can support children's motor competence and engagement (Aliriad et al., 2024; Mardiansyah et al., 2024). Related Indonesian studies have examined small-game locomotor models, sociocultural manipulative games, and broader game-based motor stimulation (Hartati et al., 2022; Suryadi et al., 2024; Utami et al., 2025). The present study differs by examining a ball-and-stones sequence that combines object control with visually guided finger manipulation and by documenting change across three classroom action research cycles. However, the evidence is descriptive and context-specific, so it should not be characterized as stronger causal evidence than controlled studies.

B. Key Findings and Interpretation

Descriptive notes repeatedly mentioned stone pickup, controlled scattering, and hand-flip coordination, but indicator-level rubric distributions were not available. The study therefore cannot identify which fine motor component improved most or quantify a shift from whole-hand to thumb-and-forefinger control. Transfer to handwriting, utensil use, clothing fasteners, or other functional tasks was not measured and remains a question for future research (Flatters et al., 2014; Gaul & Issartel, 2016).

The ten-stage progression moved from simpler grasping tasks to combined movements while teacher support was gradually reduced. The temporary fall in combined BSH/BSB at the start of Cycle II and the decrease in BSB between Meetings 7 and 8 may be related to increased stage difficulty, although the aggregate data cannot test that explanation. Because the same behavioural anchors were applied during different task demands, meeting-to-meeting scores should be interpreted as performance within a progression rather than strictly equivalent repeated measures. The shift from close guidance toward small-group practice is consistent with scaffolding (Wood et al., 1976), but support level was not experimentally manipulated.

C. Practical Implications

Bola Serimbang offers practical advantages for physical education in low-resource settings: minimal equipment, no specialized facility, cultural familiarity, and high observed engagement. The nine-meeting sequence can be incorporated as a focused manual-coordination activity alongside broader locomotor and object-control

instruction. Teachers should progress task difficulty cautiously, monitor individual responses, and avoid treating the classroom rubric as a diagnostic assessment.

D. Limitations

Several limitations must be acknowledged. First, the absence of a comparison group means that maturation, repeated testing, history, and other classroom influences cannot be separated from intervention-related change. Second, the classroom teacher delivered the intervention and served as one of the raters, creating expectancy and detection-bias risks that the second rater and consensus procedure could not eliminate. Third, Cohen's kappa was estimated from only five pilot cases and is statistically imprecise. Fourth, progressively changing task difficulty limits direct comparability across meetings. Fifth, the observation notes were summarized descriptively without formal qualitative coding or inter-coder agreement, and indicator-level rubric results were unavailable. Sixth, only aggregate category counts were available for this revision, preventing independent student-level auditing and analysis of individual trajectories. Seventh, participants came from one school, limiting transferability. Finally, no long-term follow-up, direct measure of handwriting or self-care transfer, or validation against a standardized fine motor assessment was included. Controlled studies with independent blinded assessors, verified student-level records, standardized outcomes, and follow-up assessment are needed.

CONCLUSION

During this three-cycle classroom action research, the reported combined BSH/BSB proportion increased from 47.62% at the end of Cycle I to 85.71% at the end of Cycle III. The non-monotonic meeting-level trajectory, progressively changing task demands, aggregate-only records, instructor involvement in scoring, and absence of a comparison group mean that the findings should be interpreted as descriptive within-class change rather than causal effectiveness. Bola Serimbang remains a low-cost, culturally grounded option for manual-coordination practice, but future studies should verify student-level data, use independent blinded assessment and standardized measures, and test retention and functional transfer.

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CONFLICTS OF INTEREST

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