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The Effect of the Sinar Memancar Game Medium on the Dance Movement Ability of Children Aged 4–5 Years

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ABSTRACT

Background: Dance supports young children's gross motor development and artistic expression, but dance learning often lacks innovative, play-based media. This study examined the effect of the Sinar Memancar game medium on dance movement ability.

Methods: A one-group pretest–posttest design involved all nine children aged 4–5 years in Group A of PAUD Nurul Amal, Bandung, assessed with a valid nine-item observation checklist (reliability = 0.93).

Results: Mean scores rose from 21.67 to 25.22 (gain 3.56; 95% CI [1.52, 5.59]); t(8) = 4.02, p = .004, Cohen's d = 1.34. Eight of nine children improved in rhythm, coordination, flexibility, and confidence.

Novelty: This study introduces the Sinar Memancar game medium, which embeds dance learning in a music-and-visual movement game, and evaluates it with effect sizes and individual-level change.

Conclusion: The medium is a promising alternative for early childhood dance learning; controlled studies with larger samples are needed.

KEYWORDS

dance movement; game-based media; gross motor skills; early childhood; pre-experiment.

Introduction

Early childhood is a period of rapid physical, cognitive, linguistic, social-emotional, and artistic development in which children are highly responsive to environmental stimulation (Pradipta 2017). Developmentally appropriate practice therefore emphasises active, play-based learning that matches children's characteristics and needs (NAEYC 2020). Play is not only enjoyable but also a primary means through which young children develop motor, cognitive, and social skills (Yogman et al. 2018).

Dance is one of the most effective forms of stimulation in this period. It requires balance, strength, flexibility, and coordinated movement synchronised with rhythm, and it trains both psychomotor skills and emotional and rational intelligence (Nusir 2019; Rohmatun, Najib, and Faisal 2025). Through dance, children learn to express themselves, remember movement sequences, concentrate, and appreciate beauty (Djibran and Pamungkas 2023), while also becoming acquainted with their cultural heritage (Yudhaningtyas, Hartini, and Afifah 2022). Dance and movement-with-song activities support the integration of logic, ethics, and aesthetics in children's learning (Azizah et al. 2024). Developmentally, the period between four and six years is when fundamental locomotor, non-locomotor, and manipulative

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movement patterns are refined, and these patterns can be optimised through rhythmic movement activities (Gallahue, Ozmun, and Goodway 2012; Vanogasi 2016).

The effectiveness of dance learning, however, depends strongly on the pedagogical approach. Young children learn through direct, multisensory experience, and sensory engagement supports cognitive, social, and physical learning (Haryadi 2025). Previous studies show that structured movement games, traditional dances, creative dances, and local-wisdom videos can improve young children's coordination and gross motor skills (Sola, Oka, and Ngura 2021; Haida, Samsidar, and Daulay 2023; Wigaringtyas and Katoningsih 2023; Sari and Juniasih 2025). Game-based media more broadly create active, enjoyable, and meaningful learning experiences (Arzaqi and Rahayu 2025).

Initial observation in Group A of PAUD Nurul Amal, Bandung, indicated that several children had difficulty following musical rhythm, coordinating body movements, and performing dance movements confidently. Dance learning offered children few opportunities to learn movement through engaging and challenging play, which limited their motivation and participation. The Sinar Memancar ("radiating rays") game medium was introduced to address this condition by embedding dance movements in a structured, visually stimulating movement game accompanied by music. To date, no study has examined the effect of this medium on children's dance movement ability.

This study therefore aimed to examine the effect of the Sinar Memancar game medium on the dance movement ability of Group A children at PAUD Nurul Amal. The findings are expected to contribute to dance pedagogy in early childhood education and to offer teachers an engaging, developmentally appropriate alternative medium.

Methods

Design and Participants

This study employed a quantitative pre-experimental one-group pretest–posttest design (Figure 1), in which a single group was observed before treatment (O_1), received the treatment (X), and was observed again after treatment (O_2) (Shadish, Cook, and Campbell 2002). Saturated sampling was used, so the entire population of Group A at PAUD Nurul Amal, Bandung, participated: nine children aged 4–5 years (five boys and four girls) in the even semester of the 2025/2026 academic year.

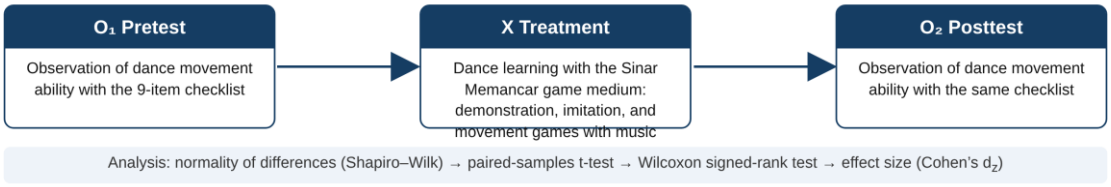


Figure 1. One-group pretest–posttest research design and analysis procedure

Intervention

In the treatment phase, dance learning was delivered through the Sinar Memancar game medium. The teacher introduced the medium, demonstrated dance movements, and invited children to imitate and then perform the movements within a movement game accompanied by music. Following the principle of guidance within the zone of proximal development (Vygotsky 1978), the teacher acted as a more knowledgeable other, providing demonstration, scaffolding, and positive reinforcement until children could perform the movements independently (Rahmawati and Sakti 2026).

Instrument

Data were collected through observation and documentation. The observation checklist consisted of nine items covering five indicators of dance movement ability: following rhythm, body coordination,

movement accuracy, flexibility, and courage in performing movements. Documentation (photographs and field notes) served as supporting data. Item validity was tested by item–total correlation; all items exceeded the critical value (r_{table} = 0.666 at α = .05), and the reliability coefficient was 0.93 (Table 1), indicating that the instrument was valid and reliable.

Table 1. Item validity and reliability of the observation instrument

Item	r count	Item	r count	Decision
1	0.793	6	0.848	Valid
2	0.824	7	0.919	Valid
3	0.828	8	0.711	Valid
4	0.672	9	0.896	Valid
5	0.758	–	–	Valid
Reliability coefficient	0.93			Reliable

Data Analysis

Descriptive statistics were computed for pretest, posttest, and gain scores. Because the paired t-test assumes normally distributed differences, normality was examined with the Shapiro–Wilk test, which is appropriate for small samples. Differences between pretest and posttest were tested with a paired-samples t-test at α = .05 (two-tailed). Given the small sample, the Wilcoxon signed-rank test was used as a non-parametric robustness check, and the effect size was expressed as Cohen's d_z, interpreted against conventional thresholds of 0.2 (small), 0.5 (medium), and 0.8 (large) (Cohen 1988).

Results

Descriptive Statistics and Assumption Testing

Table 2 shows that the mean dance movement score increased from 21.67 (SD = 5.36) at pretest to 25.22 (SD = 5.45) at posttest, a mean gain of 3.56 points. Pretest, posttest, and difference scores were all normally distributed (Shapiro–Wilk, p > .05), so the paired t-test was appropriate. The variances of the pretest and posttest scores were also comparable (F = 1.03, p = .96).

Table 2. Descriptive statistics and normality of dance movement scores (n = 9)

Score	M	SD	Min	Max	Shapiro–Wilk W	p
Pretest	21.67	5.36	10	27	0.874	.136
Posttest	25.22	5.45	13	32	0.889	.195
Difference	3.56	2.65	–1	7	0.951	.705

Hypothesis Testing

The paired-samples t-test showed a significant difference between pretest and posttest scores, t(8) = 4.02, p = .004, with a 95% confidence interval for the mean gain of 1.52 to 5.59 points (Table 3). The effect size was large (d_z = 1.34). The Wilcoxon signed-rank test confirmed this result (p = .012). The null hypothesis was therefore rejected: dance movement ability after the intervention was significantly higher than before it.

Table 3. Results of the paired-samples t-test and robustness check

Test	Mean gain	95% CI	t (df = 8)	p	Effect size
Paired-samples t-test	3.56	[1.52, 5.59]	4.02	.004	d_z = 1.34
Wilcoxon signed-rank test	–	–	–	.012	–

At the individual level, eight of the nine children improved, with gains ranging from 1 to 7 points, while one child (Child I) decreased by 1 point (Figure 2). The largest gains (6–7 points) were observed in Children C, F, and H, who had started at different levels. Child G, who had the lowest pretest score, improved by 3 points but remained well below the group mean, suggesting a need for more individualised support.

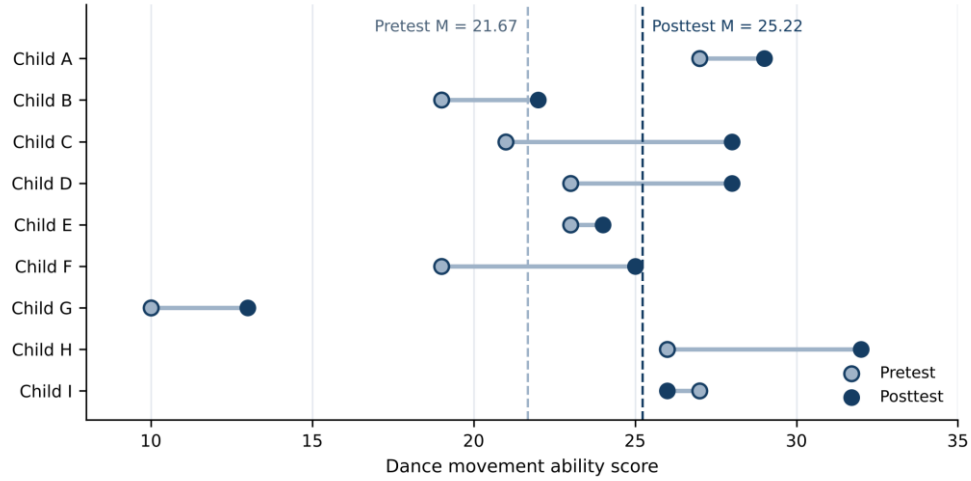


Figure 2. Individual pretest and posttest dance movement scores

Observations recorded during the sessions (Figure 3) indicated that children increasingly followed the rhythm, coordinated their head, arm, and leg movements, moved more fluidly, and showed greater courage when performing in front of their peers. Children were also more enthusiastic and engaged during the game-based sessions than during the pretest.



Figure 3. Learning activities during (a) the pretest, (b) the treatment with the Sinar Memancar medium, and (c) the posttest

Discussion

Play-Based Media and Motor Development

The findings indicate that the Sinar Memancar game medium was associated with a substantial improvement in dance movement ability. This is consistent with the characteristic of young children as learners through play. The medium offered physical activity, movement exploration, and direct interaction, and the game format encouraged children to move and follow instructions. These conditions help develop body coordination, balance, concentration, and gross motor skills, which form the foundation of dance (Nusir 2019). The result also aligns with Respati, Nur, and Rahman (2018), who found that a movement-and-song model adapting eurhythmics principles, integrating musical

experience with physical movement, helped children internalise rhythm and contributed to kinaesthetic intelligence, especially balance and flexibility.

Improved coordination enables children to perform complex, controlled tasks involving muscles and the nervous system. This finding is consistent with evidence that traditional dances, such as Tari Dongklak, train large-muscle coordination involving the synchronisation of head, arms, and legs (Wigaringtyas and Katoningsih 2023), and that local-wisdom dance videos help children imitate basic movements such as walking to rhythm and turning (Sola, Oka, and Ngura 2021). Creative dances that give children freedom of expression have likewise improved strength and flexibility (Haida, Samsidar, and Daulay 2023), and movement-play training has moved children from "not yet developed" to "very well developed" levels in traditional dance (Sari and Juniasih 2025).

The Role of the Teacher and the Learning Climate

The teacher's role as a more knowledgeable other was crucial in providing guidance within each child's zone of proximal development through demonstration and imitation (Vygotsky 1978; Rahmawati and Sakti 2026). This child-centred approach ensures that each movement is understood concretely before it is performed independently. Routine movement activities integrated with music not only improve physical skills but also build confidence and self-efficacy through appreciation from others (Julian, Fitriani, and Nuroniah 2024). Beyond motor gains, dance supports language and social-emotional development, as children follow instructions, enrich vocabulary through song lyrics, and interact with peers (Lubis et al. 2025). Group dance strengthens collaboration and empathy (Anhusadar 2016), and positive reinforcement such as praise sustains children's motivation (Haryadi 2025; Nugraeni and Arsih 2025). The present results are also consistent with Arzaqi and Rahayu (2025), who showed that game-based media increase children's engagement because they suit young children's active and exploratory learning style.

Limitations

Several limitations should be noted. The one-group pretest–posttest design has no control group, so maturation, practice effects from repeated observation, and teacher expectancy cannot be ruled out as alternative explanations (Shadish, Cook, and Campbell 2002). The sample was small and drawn from a single class, which limits generalisability. Instrument validity was estimated with the same small group, and observations were conducted by a single observer without inter-rater agreement. Finally, the heterogeneous individual responses, including a decrease for one child, suggest that the medium may need to be adapted to individual needs. Future studies should use quasi-experimental designs with comparison groups, larger samples, multiple trained observers, and follow-up measurements.

Conclusion

The Sinar Memancar game medium was associated with a significant and large improvement in the dance movement ability of Group A children at PAUD Nurul Amal, particularly in following rhythm, coordination, flexibility, and confidence. Through enjoyable and interactive activities, children became more active, enthusiastic, and confident in dance learning. The medium can therefore be considered a promising alternative for developing dance movement ability in early childhood. Teachers are encouraged to combine game-based media with demonstration, scaffolding, and positive reinforcement, and to provide additional support for children with lower initial ability. Controlled studies with larger samples are needed to establish its effectiveness.

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