

Implementation of the Traditional Game “Challenge Marbles” as a Media for Cognitive and Fine Motor Stimulation of Children Aged 6–7 Years

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ABSTRACT

This study aims to determine how the implementation of the traditional game "Kelereng Campur" which has been modified can be used as a medium for cognitive stimulation and fine motor skills of children aged 6-7 years in the home environment. "Kelereng Campur" is an adaptation of the traditional marble game that has been modified by adding new rules, obstacles, and simple missions that require children's strategy and precision. The research method used is descriptive qualitative with 4 children aged 6-7 years who live in the environment around the researcher's house as subjects. The data collection technique was carried out through direct observation by the researcher of children's behavior while playing. The results of the observations showed that the children were very enthusiastic about participating in the game and were able to show developments in cognitive aspects, such as developing simple strategies and solving game challenges. In addition, children's fine motor skills also increased as seen from more coordinated finger movements, accuracy in directing marbles, and better eye and hand coordination. The game also encourages positive interactions between children, such as waiting for their turn and showing sportsmanship. In conclusion, the modified traditional game “Kelereng Campur” is effective as a medium for cognitive and fine motor stimulation for children aged 6-7 years, and can be easily implemented in the home environment.

Keywords: *Traditional Games, Marbles Challenge, Cognitive, Fine Motor, Early Childhood*

1) INTRODUCTION

Early childhood cognitive and fine motor development forms a critical foundation for learning readiness and adaptive behavior in later educational contexts. Yet, a considerable number of young children continue to experience delays in these areas due to insufficient stimulation at home and school. In Indonesia, an estimated 13-18% of children show delays in fine motor, intellectual, and socio-emotional development, largely due to limited parental involvement in providing purposeful, play-based activities (Rukmini, 2022). These delays are exacerbated by the increasing dominance of digital device use and the declining prevalence of traditional games, which reduce opportunities for

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children to engage in hands-on, exploratory tasks essential to both motor and cognitive growth (Ariasih et al., 2024).

Traditional play, such as *congklak*, has long offered natural stimulation for children's fine motor coordination and cognitive problem-solving. Abdul Rahman (2023) highlights that such culturally embedded activities promote dexterity and logical reasoning simultaneously. Similar outcomes have been observed in formal learning contexts through the use of educational play media such as marbles, which enhance conceptual understanding and motor coordination (Kreinsen, 2024). Despite these findings, limited studies have explored how traditional games can be systematically adapted to meet contemporary developmental challenges faced by early learners.

Fine motor skills involve the coordinated use of small muscle groups primarily the hands and fingers supported by visual control. These skills are essential for academic tasks such as writing, cutting, drawing, and sequencing objects (Budiaman, 2025; Hayati, 2019). Cognitive development, meanwhile, encompasses processes of reasoning, understanding, evaluating, and problem-solving, which progress in tandem with children's physical and psychological maturation (Izzuddin, 2021). Because these two domains are interdependent, learning experiences that integrate motor activity with cognitive engagement hold strong potential for strengthening early developmental readiness.

Recent research has emphasized the developmental value of marble-based activities. Handayani et al. (2022) report that structured play involving grasping, directing, and releasing marbles significantly enhances fine motor control. Sudariyah and Widyaningsih (2024) found notable improvements in attention, finger dexterity, and hand-eye coordination following children's participation in marble games. Wulansari et al. (2021) further demonstrate that visual play media such as marbles not only increase children's motivation and learning engagement but also support the development of proper pencil grasp as an indicator of fine motor maturity. Marble games also strengthen children's social and emotional competencies by fostering cooperation, turn-taking, and emotional regulation during peer interaction.

Traditional marble games additionally reflect local cultural heritage and function as natural tools for socialization. Ngaisah et al. (2023) underscore their role in promoting empathy, rule-following, and positive peer relationships. Kusumastuti et al. (2025) add that traditional games help develop children's bilateral coordination and finger flexibility, contributing to both motor and behavioral regulation. Yet, despite widespread cultural familiarity, research on modified, developmentally purposeful versions of

marble games remains scarce. Interactive adaptations such as challenge-based marble activities requiring children to aim at targets or group marbles by color, offer promising opportunities to enhance engagement while strengthening cognitive and fine motor processes.

To address this gap, the present study examines the impact and effectiveness of the modified “Challenge Marble Game” on cognitive and fine motor development among children aged 6–7 years. This game integrates coordinated physical tasks such as grasping, aiming, and rolling marbles with problem-solving and decision-making processes. Through these activities, children practice visual-motor integration, finger precision, strategic thinking, and rule comprehension. The intervention also embeds character-building values, including honesty, responsibility, and sportsmanship.

This study contributes to the growing body of literature on culturally grounded play-based learning and demonstrates how simple, low-cost traditional games can be adapted into meaningful learning tools aligned with children’s developmental needs. The findings also support the mandate of Indonesia’s National Education System Law No. 20 of 2003, which emphasizes the importance of educational stimulation to promote children’s physical and psychological growth in preparation for subsequent schooling (Primanisa, 2024). By focusing on both cognitive and fine motor outcomes, this research offers valuable insights for educators, curriculum designers, and policymakers seeking effective strategies to enhance early childhood development through interactive and culturally relevant play.

2) METHODS

According to Junaidah and Qadrianti (2023), service learning is an experiential learning approach in which students apply classroom knowledge through direct service activities within the community. This method aims to strengthen academic understanding while fostering social awareness and civic responsibility. In this community engagement activity, the target beneficiaries were children aged 6–7 years, with a total population of four participants. The four children identified by the initials TL, NH, ZA, and S were selected using a random or purposive sampling technique based on the following criteria: (a) being 6-7 years old; (b) having sufficient cognitive ability to understand the instructions given; (c) providing verbal assent to participate; and (d) attending the full two-day service-learning program.

The community engagement activity employed the “Challenge Marble Game,” which was implemented through the following procedure:

- a. Preparing a table, attaching four colored cups (red, yellow, green, and blue), providing an adequate number of marbles, preparing small rewards according to the cup colors, and marking a throwing line using tape;
- b. Inviting the children to line up, explaining the rules of the game, introducing the cup colors and corresponding rewards, and encouraging the children to remain enthusiastic even if they were not initially successful;
- c. Allowing each child to throw marbles from the marked line toward the colored cups. When a marble successfully entered a cup, the child received the reward and returned to their seat; if not, the child returned to the line to wait for the next turn;
- d. After all children had participated, gathering them in a circle to share impressions and experiences, including identifying who successfully placed marbles into the corresponding colored cups; and
- e. Providing positive reinforcement to all participants for their effort and enthusiasm, and closing the activity with a group cheer and congratulatory remarks.

The materials used in this activity were marbles and plastic cups. These materials were modified from the traditional version of the marble game, which is typically played on the ground. In this modified version, the game was adapted to be played on a table to provide a more structured and developmentally appropriate setting for the children. The following figure presents the media used in this activity.



Figure 1. *Game Media*

The instruments used for data collection consisted of a student checklist sheet and an intervention implementation evaluation sheet. The student checklist sheet was developed by the researchers based on eight indicators. The corresponding blueprint is presented in the following table:

Table 1. *Instrument Blueprint*

No.	INDICATORS	STATEMENTS/ITEMS
1.	Recognizing colors	The child can name the colors of the cups before the game begins.
2.	Understanding rules	The child is able to restate the game rules in their own words.
3.	Focus and concentration	The child appears focused while watching the marble as it is thrown toward the cups.
4.	Estimating distance and direction	The child is able to estimate the distance and direct the throw accurately toward the cup.
5.	Hand and eye coordination	The hand movement when throwing the marble aligns with the eye's focus on the target cup.
6.	Fine motor control (finger movements)	The child demonstrates the ability to control finger strength when throwing the marble.
7.	Sportsmanship and patience	The child waits for their turn patiently and does not show excessive disappointment when unsuccessful.
8.	Associative memory for color-reward pairs	The child can identify the correct reward associated with each cup color during the reflection session.

The community service activities were carried out over two days, from 7 to 8 June 2025

3) RESULTS AND DISCUSSION

The implementation of the community service activity using the “Challenge Marble Game” to enhance the cognitive and fine motor skills of children aged 6-7 years was carried out through a systematic and structured sequence of steps. The activity took place in a home environment and began with an initial observation to identify the children's baseline cognitive and fine motor abilities, including concentration, hand-eye coordination, and color recognition skills.

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The children then participated directly in the game, taking turns according to the previously established rules. Upon completion of the activity, an evaluation was conducted through continuous observation to capture changes in the children's behaviors and abilities.

The results indicate noticeable improvements in both cognitive and fine motor domains. These improvements were reflected in the children's increased focus during gameplay, their enhanced ability to throw marbles accurately toward the target, and their capacity to recall the colors and associated rewards.

These findings demonstrate that the traditional "Challenge Marble Game" serves as an enjoyable and effective learning medium that supports early childhood developmental growth. The activity not only engaged the children actively but also provided meaningful opportunities for experiential learning that contributed to their cognitive and fine motor development.

Table 2. *Observation Results of the Children Before Stimulation*

Name	Items								Total	Average
	A	B	C	D	E	F	G	H		
TL	4	4	3	2	2	2	3	4	24	3,00
NH	4	4	3	2	2	2	3	4	24	3,00
ZA	4	3	3	3	3	2	3	3	24	3,00
S	4	3	3	2	2	2	3	3	23	3,00

Table 3. *Observation Results of the Children After Stimulation*

Name	Items								Total	Average
	A	B	C	D	E	F	G	H		
TL	4	4	4	3	3	3	4	4	30	3,75
NH	4	4	4	3	3	4	3	4	29	3,63
ZA	4	4	4	4	3	4	3	4	31	3,88
S	4	4	4	3	3	4	4	4	30	3,75

Notes:

Score 4: Very Well Developed (VWD)

Score 3: Developing as Expected (DE)

Score 2: Beginning to Develop (BD)

Score 1: Not Yet Developing (ND)

Based on the observations summarized in Tables 2 and 3, children aged 6-7 years who participated in the "Challenge Marble Game" showed measurable improvements in both cognitive and fine motor

development following the stimulation activities. The game was assessed using eight observation items (A-H) with score ranges from 2 to 4, where a score of 4 indicates *Very Well Developed (VWD)*, 3 indicates *Developing as Expected (DE)*, and 2 indicates *Beginning to Develop (BD)*.

Before the stimulation was administered (Table 2), the average scores of all children ranged from 2.88 to 3.00, indicating that most participants were in the *Developing as Expected* category. The highest-scoring children were TL, NH, and ZA, each with a total score of 24 and an average of 3.00. In contrast, the lowest score was recorded by S, who obtained a total score of 23 and an average of 2.88. After the stimulation (Table 3), all participants demonstrated significant score improvements. ZA recorded the highest total score of 31, with an average of 3.88. Other participants, such as TL and S, obtained total scores of 30, with an average of 3.75, whereas NH also showed notable improvement with a total score of 29 and an average of 3.63. These results illustrate that after participating in the “Challenge Marble Game,” the children’s cognitive and fine motor skills became more optimally developed.

Overall, the increase in scores suggests that traditional games such as the challenge marble activity can serve as an effective medium for stimulating early childhood cognitive and fine motor abilities. Through enjoyable and interactive learning strategies, children become more motivated to learn while playing, which in turn contributes positively to their holistic developmental progress.

These findings are consistent with the study conducted by Harahap et al. (2023), which reported an increase in the average pretest score from 45.00 to 82.86 in the posttest after children were given a marble-based learning intervention. Children who initially fell into the *Not Yet Developed* and *Beginning to Develop* categories successfully progressed into the *Developing as Expected* category. In their study, the activity required children to place marbles into containers matched with numerical symbols, indirectly stimulating their visual-motor coordination.

In addition, marble games were also found to stimulate children’s cognitive abilities. Activities such as matching the number of marbles to numerical symbols and playing within a time limit encouraged children to think quickly and accurately. These tasks engaged children not only in fine motor control but also in cognitive processes related to problem-solving, decision-making, and the recognition of numerical concepts. Hence, marble games can function as enjoyable and effective educational tools for strengthening school readiness.

Similar findings were also reported by Maisaroh and Sari (2022) in a study conducted at PAUD Nurul Huda. Although the primary focus was on improving gross motor development, the study highlighted additional benefits related to children's concentration, communication, and social cooperation skills. Activities such as walking while balancing marbles, adhering to rules, and waiting for turns helped the children develop discipline, patience, and body coordination. These outcomes underscore the multidisciplinary nature of marble games and their broad impact on children's development.

Taken together, these studies confirm that marble games are not merely a form of entertainment but represent effective stimulation tools that support comprehensive early childhood development. Through this traditional activity, children can enhance both fine motor and cognitive skills simultaneously in an engaging, developmentally appropriate manner. Consequently, educators and parents are encouraged to integrate marble-based activities into children's learning routines as an educational and accessible stimulation strategy.



Figure 2. *Group Photo with the Game Media*



Figure 3. *Photo Taken After the Game and Prize Distribution*

4) CONCLUSIONS

This study demonstrates that the modified traditional game, “Challenge Marble Game,” contributes positively to the cognitive and fine motor development of children aged 6-7 years. Children who participated in the activity exhibited improvements in color recognition, comprehension of instructions, and the ability to estimate direction and target distance. The game also encouraged strategic thinking, goal-oriented focus, and appropriate behavioral responses to success and failure. In terms of fine motor development, the children showed enhanced coordination between hand and eye movements when throwing marbles, as well as improved control of finger strength. These activities indirectly strengthened fine motor muscles, supported movement precision, and improved hand stability skills that are essential for readiness in other learning tasks such as writing, drawing, and daily functional activities.

Overall, the “Challenge Marble Game” proved to be an effective and engaging learning method that aligns with the developmental characteristics of early childhood. Beyond strengthening cognitive and fine motor abilities, the game fostered positive values such as sportsmanship, patience, and perseverance. Therefore, traditional games of this kind should be preserved and integrated into active learning strategies both at home and in formal educational settings.

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