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Application of the Traditional Game *Congklak* to Improve Counting Concept Ability

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ABSTRACT

This research is motivated by group A children at Dharma Wanita Persatuan Putukrejo Kindergarten, Malang Regency, who experience difficulties in the concept of counting, thus requiring concrete activities that can improve their counting abilities. Based on these problems, this study introduces the traditional game of *congklak* to improve the ability to count number sequences 1-10, count objects by applying one-to-one correspondence, calculate quantities, and distinguish between the concepts of many and few. The research method used is Classroom Action Research (CAR), conducted over two cycles, with each cycle consisting of two meetings. The results of this study show that the pre-cycle results obtained an average of 45.8% (MB - Starting to Develop). In Cycle I, Meeting 1 obtained an average of 48.5% (MB), Cycle I, Meeting 2 obtained an average of 53.8% (BSH - Developing as Expected). Cycle II, Meeting 1 obtained an average of 74.4% (BSH), and Cycle II, Meeting 2 obtained an average of 81.7% (BSB - Very Well Developed). The results of this study can be concluded that the traditional game of *congklak* can improve the counting abilities of group A children at Dharma Wanita Persatuan Putukrejo Kindergarten, Malang Regency.

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1. Introduction

The developmental period of early childhood, encompassing physical, cognitive, and linguistic aspects, requires stimulation that supports their growth and development. A child's potential needs support from both the family environment and the educational environment. Early childhood individuals are born with diverse potentials, each possessing unique characteristics also influenced by their surrounding environment (Suryana, 2021). This period is known as the sensitive period, a phase that determines the quality of child development, thus requiring appropriate stimulation that aligns with the child's age characteristics (Izomi et al., 2024).

One aspect of development that must be achieved is cognitive development. Cognitive development is a crucial aspect of early childhood growth as it forms the basis for thinking, reasoning, problem-solving, and understanding the world around them. According to Jean Piaget's theory of cognitive development (Fauzia, 2024), early childhood is in the preoperational stage, occurring between the ages of 2-7 years. In this stage, children begin to use symbols such as words, pictures, or objects to represent objects or events, but their thinking remains largely egocentric (Khadijah & Amelia, 2020).

A child's ability to understand a concept is heavily influenced by tangible learning experiences that can be directly manipulated. Children need interaction with concrete objects to help build more mature thinking structures, particularly concerning logical abilities that develop gradually. According to Piaget (Haryanti & Tejaningrum, 2020), concrete activities play an essential role in helping children develop logical thinking abilities, which form the foundation for subsequent cognitive development, including understanding the concept of numbers.

The concept of numbers is a form of cognitive development related to a child's ability to recognize, understand, and use numbers meaningfully (Suyanto, 2018). Counting is not merely an activity of reciting numbers in sequence but also involves understanding that each number has a specific order and value related to the quantity of objects. According to Coopley (Waty et al., 2024), the abilities children need to master in numbers and number operations include counting, one-to-one correspondence, quantity, and recognizing and writing numbers.

Learning number concepts helps children connect number symbols with concrete quantities of objects, which forms the basis for mastering mathematical concepts at higher levels (Puspita, 2025). Implementing number concepts in early childhood can be achieved using learning media or through traditional games. Sufa (2022) states that traditional games can provide concrete, enjoyable, and meaningful learning experiences, allowing children to learn actively through social interaction with peers, thus creating a fun learning process.

Observations of 12 group A children at Dharma Wanita Persatuan Putukrejo Kindergarten, as an initial identification during block play activities, found that based on preliminary results, out of 12 children, 3 children (25%) were able to sequence numbers 1-10 correctly but not fluently, while 3 children (25%) were only able to sequence numbers 1-5 with assistance, and the other 6 children (50%) could only sequence numbers 1-3. Only 2 children (17.7%) could recite numbers with one-to-one correspondence, while 4 children (41.7%) could recite numbers without pointing to each block one by one. Meanwhile, the other 6 children (50%), when sequencing objects, repeatedly said the same numbers (one, two, one, two) or often skipped blocks being counted. In activities counting the number of blocks, 3 children (25%) could count more than 5 blocks, 4 children (33.3%) could count 1-3 blocks with assistance, and the other 5 children (41.7%) could only count one or two blocks. In activities comparing blocks, 6 children (50%) could compare large and small quantities of blocks, while the other 6 children (50%) still required assistance.

This condition indicates that children's early numeracy skills, particularly in understanding number concepts, one-to-one correspondence, counting, and comparing quantities, still need improvement through appropriate learning activities supported by adequate learning resources. This aligns with Permendikbudristek No. 22 of 2023 concerning Standards for Facilities and Infrastructure in ECE, which emphasizes the importance of providing educational play tools that suit children's developmental stages to stimulate cognitive and numeracy development.

Information from the homeroom teacher of group A at Dharma Wanita Persatuan Putukrejo Kindergarten indicates that teachers have attempted to use various worksheets, but these have not fully captured children's attention. Based on this, more interactive and enjoyable learning media innovations are needed. This situation opens opportunities to present learning experiences more suited to the characteristics of early childhood through engaging play activities. Using more interactive media involving direct activities can add variety to learning and support children in understanding number concepts more easily.

Previous research has shown that traditional games can improve early childhood number concepts, including research conducted by Sari (2020) entitled "Application of the

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Traditional *Congklak* Game to Improve Counting Abilities in Children Aged 5-6 Years at TK Pertiwi Sukoharjo". This classroom action research was conducted over two cycles, focusing on improving counting abilities through the activity of moving *congklak* seeds into each hole. The results showed a significant improvement in children's counting skills because they repeatedly practiced one-to-one correspondence. The children appeared more enthusiastic and actively involved in the learning process. The conclusion of this study was that *congklak* is an effective medium for improving early childhood counting abilities.

Research by Rahmawati & Lestari (2021) entitled "The Effect of the *Congklak* Game on the Ability to Recognize Number Concepts in Children Aged 4-5 Years" examined the differences in learning outcomes between a group using *congklak* and a group that did not. The results showed that children who played *congklak* had significant improvements in their ability to recite numbers in sequence and count objects accurately. The children also showed greater focus and learning motivation. The study concluded that using *congklak* could be an alternative medium for strengthening the mastery of number concepts in early childhood.

Research by Putri (2019) entitled "Implementation of the *Congklak* Game to Develop Early Childhood Numeracy Skills at PAUD Melati" used *congklak* as a numeracy medium in daily learning activities. The results showed that the *congklak* game encouraged children to count carefully because they counted each seed one by one at each step. Children experienced improved counting abilities and the ability to distinguish between more and fewer quantities. The conclusion was that *congklak* is effective as an educational medium for improving basic numeracy skills in early childhood. Based on the problems above, this study uses the traditional game of *congklak*. In this research, the traditional *congklak* game has been modified to suit the characteristics and needs of group A children at Dharma Wanita Persatuan Putukrejo Kindergarten, Malang Regency. The traditional *congklak* game involves counting and strategic thinking activities using concrete objects like seeds and holes on a board.

The Learning Outcomes used are the basic elements of literacy and STEAM, with assessment criteria including: (a) counting number sequences 1-10; (b) counting *congklak* seeds by applying one-to-one correspondence; (c) counting the number of seeds in each *congklak* hole; and (d) distinguishing between the concepts of many and few based on the number of seeds in the *congklak* barn (BSKAP, 2025).

2. Method

This study employed a Classroom Action Research (CAR) design. CAR is defined as a form of self-reflective inquiry undertaken by participants in social situations to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which these practices are carried out (Kemmis & McTaggart, 1988). CAR was selected because of its participatory, collaborative, cyclical, and context-specific nature, which aligns with the needs of both students and the school environment. This approach is particularly suitable for early childhood settings, where direct observation and classroom-based intervention are necessary to authentically capture developmental progress. According to Carr & Kemmis (2009), CAR provides a systematic means for educators to improve the quality of learning through reflective and continuous action.

The research adopted the spiral model developed by Kemmis & McTaggart (1988). This model was chosen for its clear and systematic framework for implementing improvement-oriented actions. In the Kemmis and McTaggart spiral model, each cycle consists of four interrelated stages: planning, acting, observing, and reflecting (Arikunto, 2021). These stages recur in a spiral of cycles, where each iteration begins anew with evaluation to ensure continuous improvement. The four components are integrated within a single cycle,

enabling researchers to collaboratively and sustainably refine classroom practices. This cyclical process allows for ongoing adjustment based on observed outcomes, which is essential for interventions targeting cognitive skills in young children (Mills, 2018).

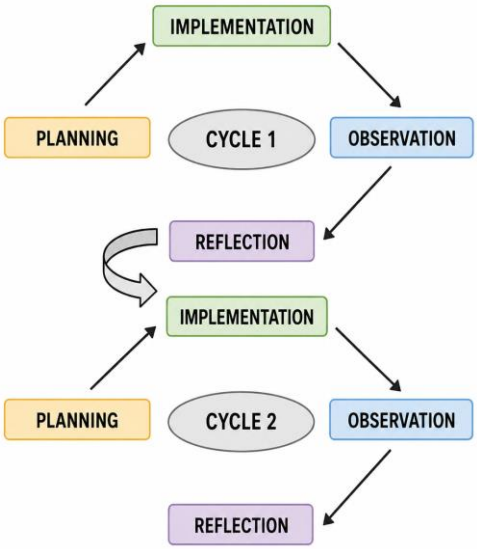

Figure 1. The Kemmis and McTaggart Classroom Action Research (CAR) Cycle (adapted from Anugrah, 2019).

The subjects of this study were 12 group A children at Dharma Wanita Persatuan Putukrejo Kindergarten, Malang Regency. In the context of CAR, research subjects are the learners who are the targets of the action aimed at improving their abilities, particularly in cognitive domains and counting skills (Kunandar, 2015). The subjects were selected based on initial observational data indicating low proficiency in number concept skills, thereby necessitating an intervention using the traditional game of *congklak*. CAR is categorized as a form of naturalistic or qualitative inquiry, where subjects may include events, individuals, and observed situations (Creswell & Poth, 2018). With a limited and specific subject pool, this study aimed to identify changes and improvements in ability resulting from the intervention. The sample size of 12 children is considered appropriate for CAR in early childhood settings, as it allows for in-depth observation and individualized scaffolding (Stringer, 2014).

The research was conducted in November 2025, with specific dates from November 11 to 15, 2025. CAR is typically implemented over a minimum of two cycles or until predetermined success indicators are achieved (Burns, 2010). In this study, the intervention was carried out over two cycles, each cycle consisting of two meetings. The duration of each meeting was adjusted to the attention span of young children and the allocated time for core learning activities. Time management is a critical aspect of CAR, as it relates to pre-cycle data collection, intervention implementation in each cycle, and final evaluation to determine the success of the action (Mertler, 2019). The selection of the early November period ensured that children had already adapted to the learning environment following the initial period of the academic year, allowing the main focus to be directed toward the intervention process and accurate data collection. This timing also minimized external disruptions commonly found at the beginning or end of a school term (McNiff, 2017).

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3. Result and Discussion

Pre-Cycle

The pre-cycle activity was conducted on August 11, 2025, prior to the implementation of any intervention. During this phase, children engaged in block play, which served as a conventional learning activity commonly used in the classroom to introduce basic numeracy concepts. The purpose of the pre-cycle observation was to establish a baseline measure of children's counting abilities across four specified indicators, namely: (1) reciting number sequences from 1 to 10; (2) counting objects using one-to-one correspondence; (3) calculating the total quantity of objects; and (4) distinguishing between the concepts of "many" and "few."

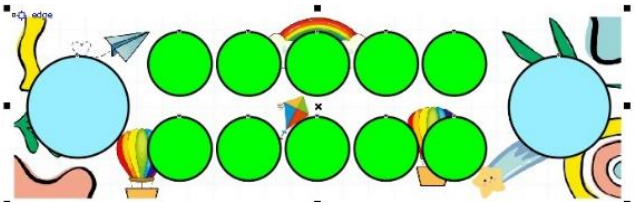

Figure 2. Traditional *Congklak* Game Media

Figure 3. *Congklak* Game Seeds

The results revealed that the highest score among the four indicators was achieved in the ability to differentiate many versus few, which reached 52%, while the lowest score was in one-to-one correspondence at only 41.6%. The indicator of reciting number sequences 1–10 stood at 43.7%, and calculating quantity reached 45.8%. The overall average across all indicators was 45.8%, which falls into the "MB" (*Mulai Berkembang* or "Starting to Develop") category according to the standard early childhood assessment rubric. These baseline data confirm that the majority of children had not yet mastered basic counting skills and required more concrete, engaging, and developmentally appropriate learning experiences.

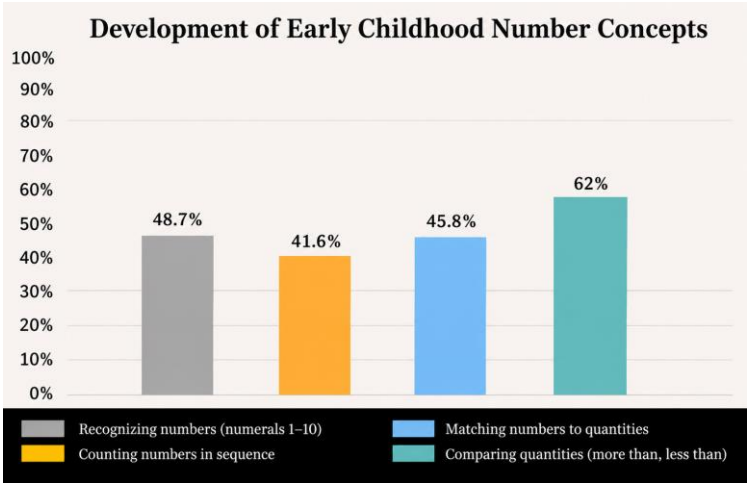

Figure 4. Pre-Cycle Results

The relatively low performance on one-to-one correspondence is particularly noteworthy, as this skill is foundational for understanding that each number corresponds to a single, distinct object. Without this understanding, later mathematical concepts such as addition and subtraction become difficult to internalize. Therefore, the pre-cycle findings strongly justified the need for a targeted intervention using a modified traditional *congklak* game, which inherently requires children to move seeds one by one into holes, thereby practicing one-to-one correspondence repeatedly in a playful context.

Cycle I

Cycle I was implemented over two consecutive meetings held on November 11 and 12, 2025. The theme of the learning activities was traditional games, with a specific sub-theme of *congklak*. During each meeting, children played the modified *congklak* game in pairs, as the game inherently requires two players to alternate turns. The decision to use paired play was deliberate, as it encourages social interaction, turn-taking, and peer learning—all of which are important for cognitive and socio-emotional development in early childhood (Vygotsky, 1978).

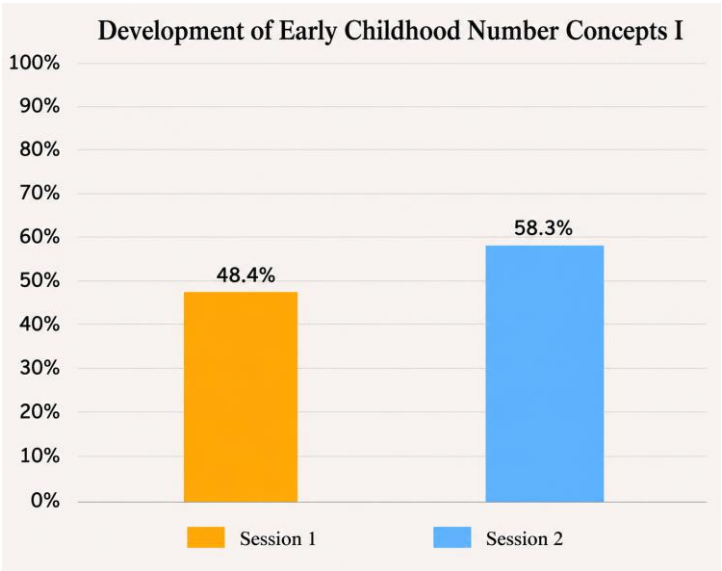

Figure 5. Cycle 1 Results

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The first meeting of Cycle I yielded an average score of 48.4%, still within the MB category. Several obstacles were identified during this initial intervention session. First, children continued to require substantial teacher assistance in understanding the correct order of numbers, often skipping numbers or repeating the same number consecutively. Second, the concept of one-to-one correspondence remained challenging; many children moved multiple seeds simultaneously rather than transferring them one by one, indicating that they had not yet internalized the link between a single counting word and a single physical object. Third, children struggled to distinguish between "more" and "fewer" when comparing the contents of different holes. Based on these findings, the first reflection led to a planned modification for the subsequent meeting: the integration of a counting song (1–10) at the beginning of each session. Music and rhythm have been shown to support memory retention in young children, and the use of songs to reinforce numerical sequences is a well-established strategy in early mathematics education (Geist, 2015). The second meeting of Cycle I showed improvement, with an average score of 58.3%, representing an increase of 9.9 percentage points from the first meeting. This score falls into the "BSH" (*Berkembang Sesuai Harapan* or "Developing as Expected") category. Nevertheless, persistent challenges included difficulty in maintaining focus throughout the game and confusion when asked to compare quantities using the terms "more" and "less." Some children also exhibited a tendency to count the same seed twice due to a lack of precise hand-eye coordination. In response, the reflection from the second meeting recommended replacing the original *congklak* seeds—which were small, smooth stones—with larger, easier-to-grasp bottle caps. This modification was intended to improve children's manual dexterity and reduce counting errors, as a more comfortable grip would allow them to focus cognitive resources on the counting process itself rather than on fine motor manipulation (Montessori, 2012).

Cycle II

Cycle II was carried out on November 13 and 14, 2025, following the reflections and improvements identified at the end of Cycle I. The theme and sub-theme remained consistent, namely traditional games and *congklak*, to ensure continuity of learning and to allow children to build upon previously acquired skills.

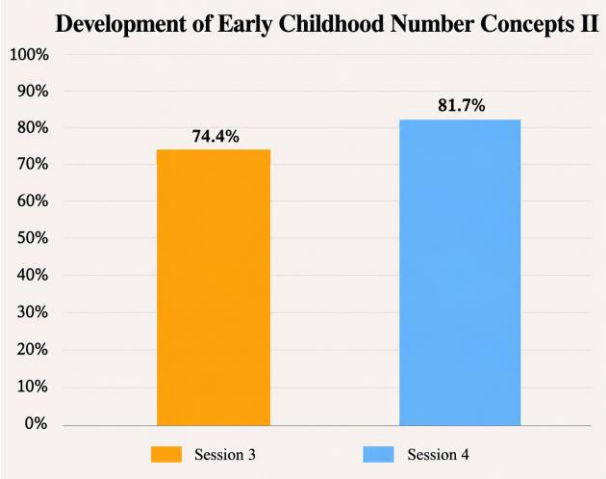

Figure 6. Cycle II Results

As presented in Figure 6, the first meeting of Cycle II achieved an average score of 74.4%, which falls into the "BSH" (Developing as Expected) category but approaches the upper threshold of this classification. This marked a substantial increase of 16.1 percentage points from the last meeting of Cycle I, indicating that the modifications implemented—particularly the use of bottle cap seeds and the counting song—had a positive effect on children's counting abilities. However, several residual obstacles were still observed. Some children occasionally lost focus during the game, especially when waiting for their turn in the paired play format. Others demonstrated a tendency to count the same seed twice or to miss a seed entirely, due to insufficient attentional control. These behaviors are not uncommon in early childhood, as sustained attention is still developing and is heavily influenced by the novelty and appeal of the activity (Diamond, 2013). Based on the reflection from the first meeting of Cycle II, a further refinement was introduced for the second meeting: before beginning the core *congklak* activity, children were invited to collectively count various objects present in the classroom environment—such as chairs, books, or crayons—at a deliberately slow tempo. This pre-activity was designed to activate children's prior knowledge, reinforce the rhythm of accurate counting, and build a shared attentional focus before the game began. The second meeting of Cycle II yielded an average score of 81.7%, which falls into the "BSB" (*Berkembang Sangat Baik* or "Very Well Developed") category. This represents a further increase of 7.3 percentage points from the previous meeting. At this stage, the majority of children were able to recite numbers 1–10 fluently, apply one-to-one correspondence consistently, count the total number of seeds in a given hole accurately, and verbally distinguish between holes containing "more" seeds and those containing "fewer" seeds. Because the predetermined success criteria (a class average of at least 80% in the BSB category) had been met, no further cycles were deemed necessary.

Discussion

The progressive improvement in children's number concept abilities across all phases of the study is clearly depicted in **Figure 7**. The graph shows a steady upward trajectory: from a pre-cycle average of 45.8% (MB), to Cycle I, Meeting 1 at 48.4% (MB), Cycle I, Meeting 2 at 58.3% (BSH), Cycle II, Meeting 1 at 74.4% (BSH), and finally Cycle II, Meeting 2 at 81.7% (BSB). The consistency of this increase—with no decline between any two consecutive measurement points—provides strong evidence that the intervention, including its iterative refinements, was effective in enhancing children's counting competencies.

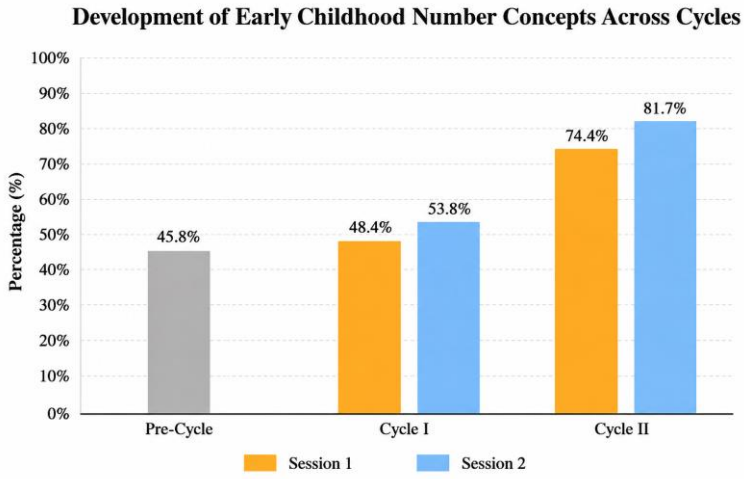

Figure 7. Development of Children's Number Concepts Across Cycles

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The observed improvement can be attributed to several interconnected factors. First, the *congklak* game provided a hands-on, concrete learning experience that aligns with Piaget's theory of cognitive development. According to Piaget (in Haryanti & Tejaningrum, 2020), children in the preoperational stage (ages 2–7) learn best through direct manipulation of physical objects rather than through abstract symbols. Moving *congklak* seeds one by one into holes allowed children to experience the concept of one-to-one correspondence at the enactive level, which Bruner (in Suyanto, 2018) identified as the most foundational mode of representation. Second, the repetitive nature of the game—where each turn involves counting and transferring a fixed number of seeds—provided distributed practice, which is known to strengthen neural connections supporting numerical cognition (Dehaene, 2011). Third, the social aspect of playing in pairs introduced elements of turn-taking, peer observation, and friendly competition, all of which increased children's motivation and engagement. When children observed their peers counting successfully, they were encouraged to imitate and improve their own strategies, a process consistent with Vygotsky's (1978) concept of the zone of proximal development. Fourth, the modifications made during the action research cycles—such as the counting song and the replacement of seeds with bottle caps—addressed specific obstacles as they emerged, demonstrating the value of the reflective spiral model. The counting song helped children internalize the sequence of numbers, while the larger, more graspable bottle caps reduced fine motor frustration and allowed children to focus on the counting task itself, consistent with Montessori's emphasis on child-friendly didactic materials (Lillard, 2017).

These findings are in close agreement with previous studies on the use of traditional games for early numeracy development. Sari (2020) reported that *congklak* play significantly improved counting abilities in children aged 5–6 years because of the repeated practice of one-to-one correspondence. Similarly, Rahmawati & Lestari (2021) found that children who played *congklak* showed greater improvements in sequential counting and object quantification compared to a control group, along with higher levels of sustained attention. Putri (2019) also demonstrated that integrating *congklak* into daily learning activities effectively enhanced basic numeracy skills, including the ability to differentiate between larger and smaller quantities. The present study extends these findings by documenting the step-by-step improvements across two cycles of action research, showing not only that *congklak* works but also how refinements in implementation (e.g., material changes, songs, pre-counting activities) can progressively optimize outcomes.

In conclusion, the results of this study provide robust empirical support for the use of the traditional *congklak* game as an effective, low-cost, and culturally relevant intervention to improve early childhood counting abilities. The game's inherent structure—requiring one-to-one correspondence, sequential counting, and quantity comparison—makes it particularly well-suited for developing foundational number concepts. Furthermore, the action research methodology allowed for responsive adjustments that maximized the intervention's impact. These insights have practical implications for early childhood educators seeking engaging, hands-on strategies to foster numeracy in alignment with the developmental characteristics of young learners.

4. Conclusion

The results of the study can be concluded that the traditional game of *congklak* can improve children's number concept abilities. This is evident from the increase in the average achievement of children at each stage, from pre-cycle at 45.5%, rising in Cycle I to 48.4% and 58.3%, then significantly increasing in Cycle II to 74.4% and 81.7%. These findings indicate that *congklak* not only functions as a traditional game but also as a learning medium that can help children understand number concepts through concrete and enjoyable

counting activities. Thus, *congklak* can be used as an alternative, effective learning method to develop numeracy skills in early childhood. It is suggested that educators can utilize the traditional game of *congklak* as a learning medium to develop children's number concept abilities. This game can be used regularly or as a supplementary medium. For future researchers, it is recommended to develop similar research covering different indicators to obtain more comprehensive results regarding the concept of numbers in early childhood.

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