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Enhancing Early Number Concept Comprehension Through the Traditional Game of Congklak: A Classroom Action Research

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Abstract

Early mathematical competence, specifically understanding number concepts, provides a crucial cognitive foundation for future academic success. However, young children frequently experience challenges in linking concrete quantities with abstract numerical symbols. This study investigated the implementation of the traditional Indonesian game Congklak as a concrete, game-based learning intervention to enhance number concept comprehension among early childhood learners. Utilizing a Classroom Action Research (CAR) design following the Kemmis and McTaggart model, the study was conducted over two iterative cycles involving 10 children aged 5–6 years (Group B) at RA Al-Huda. Data were gathered through structured observational rubrics assessing five numeracy indicators, teacher facilitation checklists, field notes, and instructional documentation. Quantitative analysis demonstrated a significant improvement in children's average number concept mastery, increasing from 73% (Starting to Develop) in Cycle I to 83% (Developing as Expected) in Cycle II. The most pronounced gains occurred in counting seeds (quantities 10–20) and comparing relative quantities (more vs. less). The findings confirm that integrating traditional concrete games into early childhood curricula offers an effective, culturally relevant pedagogical strategy for developing foundational numeracy.

Keywords: *number concepts, traditional games, Congklak, early mathematics, classroom action research*

INTRODUCTION

Early childhood represents a critical development window wherein foundational cognitive, socio-emotional, and physical capacities are established. Cognitive development enables young learners to construct knowledge, observe environmental patterns, analyze cause-and-effect relationships, and solve everyday problems. Within early childhood education (ECE), early mathematical competence—specifically early numeracy—serves as a primary predictor of later academic achievement in science, technology, engineering, and mathematics (STEM) fields.

Understanding number concepts encompasses far more than mechanical rote counting. It requires integrating several interrelated cognitive capacities: 1-to-1 correspondence, numeral identification, matching concrete set quantities to visual number symbols, comparing relative magnitudes (more vs. less), and placing numbers in ordinal sequence. According to national developmental standards, children aged 5–6 years are expected to count concrete objects up to 20, recognize numerical symbols, and comprehend basic quantitative relationships.

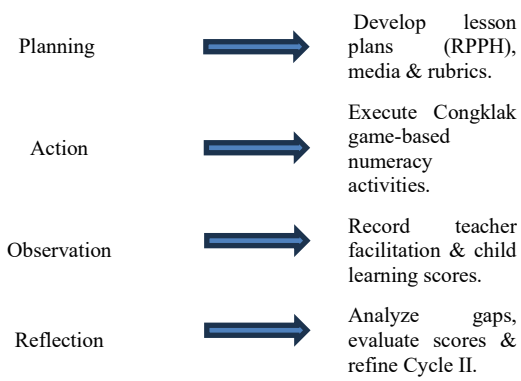
Despite its recognized importance, early numeracy instruction often relies on abstract worksheets or passive drill methods, which fail to align with the cognitive needs of children in Piaget's preoperational stage.

Preoperational learners require concrete manipulatives and playful experiential activities to bridge physical actions with abstract mathematical thinking. Game-based learning, particularly using traditional cultural games like *Congklak*, offers an optimal solution. *Congklak* is a traditional mancala board game involving the systematic distribution of seeds into carved wooden pits. Playing *Congklak* naturally embeds counting, spatial distribution, quantity comparison, and strategic turn-taking within an engaging social activity.

This study evaluates how the structured implementation of *Congklak* enhances specific early number concept indicators among children aged 5–6 years at RA Al-Huda.

RESEARCH METHODS

This study employed a Classroom Action Research (CAR) methodology following the two-cycle iterative framework developed by Kemmis and McTaggart. Each cycle comprised four interconnected phases: Planning, Action, Observation, and Reflection.



CLASSROOM ACTION RESEARCH CYCLE (CAR)

Context and Participants

The research was conducted at RA Al-Huda. The study participants comprised 10 children (4 boys and 6 girls) aged 5–6 years enrolled in Group B. The primary classroom teacher acted as the instructional facilitator, while the researcher served as an objective classroom observer.

Instructional Procedure

The *Congklak* intervention was executed across four distinct task stages during each learning cycle:

1. Introduction and Rules: The teacher demonstrated game rules and seed distribution mechanics.
2. Counting and Symbol Recognition: Children distributed seeds while counting aloud (10–20 seeds per hole) and recorded matching numerical symbols on paper.
3. Quantity Comparison: Upon completing a game round, children counted their accumulated seeds and compared their total against their opponent's total (determining more vs. less).
4. Ordinal Ordering: Children arranged seed groups in ascending order from the smallest to the largest quantity.

Instruments and Data Analysis

rubrics evaluating children's numeracy across five core indicators using a 4-point developmental scale: *Not Yet Developing (BB)*, *Starting to Develop (MB)*, *Developing as Expected (BSH)*, and *Developing Very Well (BSB)*. Teacher facilitation was evaluated using a 4-point implementation checklist. Descriptive quantitative analysis was applied to track percentage mean gains across cycles.

Results and Discussion

Cycle I Performance and Reflection

In Cycle I, children participated in initial *Congklak* gaming sessions. Observational data revealed an overall class achievement mean of 73%, placing the class in the *Starting to Develop (MB)* category.

- Child Development Breakdown: 2 children (20%) were in the *BB* category, 3 children (30%) in *MB*, 1 child (10%) in *BSH*, and 4 children (40%) in *BSB*.
- Pedagogical Reflection: While children were enthusiastic, several learners experienced confusion regarding game rules and struggled to

match their physical seed count with corresponding numeral cards. Teacher facilitation scored an average of 3.0 (Good implementation).

Table 1: Child Numeracy Indicator Mastery in Cycle I ($N = 10$)

No	Numeracy Assessment Indicator	BB (%)	MB (%)	BSH (%)	BSB (%)
1	Counting seeds (Quantities 10–20)	0%	50 %	10 %	40%
2	Recognizing numeral symbols (10–20)	0%	30 %	50 %	20%
3	Matching seed counts to numeral symbols	0%	60 %	40 %	0%
4	Comparing quantities (more vs. less)	0%	10 %	30 %	60%
5	Ordering quantities in simple sequence	0%	30 %	70 %	

Note: BB = Not Yet Developing; MB = Starting to Develop; BSH = Developing as Expected; BSB = Developing Very Well.

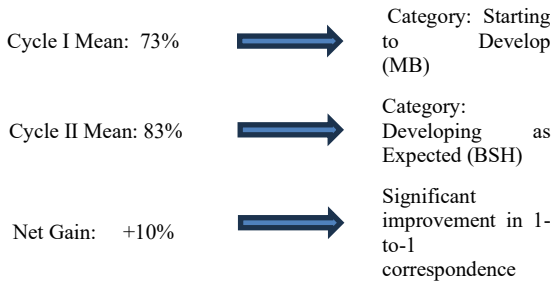
Cycle II Performance and Pedagogical Refinements

Based on Cycle I reflections, Cycle II incorporated targeted pedagogical adjustments: the teacher provided clearer visual rule demonstrations, offered small-group scaffolding, and used explicit numeral-matching prompt cards during gameplay.

- Classroom Gains: In Cycle II, the class overall mean score increased by 10%, reaching 83%, placing the group firmly in the Developing as Expected (BSH) category.
- Child Development Breakdown: 0 children in *BB*, 2 children (20%) in *MB*, 3 children (30%) in *BSH*, and 5 children (50%) in *BSB*. Teacher implementation quality improved to an average score of 4.0 (Very Good implementation).

No	Numeracy Assessment Indicator	BB (%)	MB (%)	BSH (%)	BSB (%)
1	Counting seeds (Quantities 10–20)	0%	0%	40 %	60 %
2	Recognizing numeral symbols (10–20)	0%	10 %	70 %	20 %
3	Matching seed counts to numeral symbols	0%	30 %	60 %	10 %
4	Comparing quantities (more vs. less)	0%	0%	40 %	60 %
5	Ordering quantities in simple sequence	0%	0%	60 %	40 %

Table 2: Child Numeracy Indicator Mastery in Cycle II (N = 10)



NUMERACY PROGRESSION (CAR CYCLES)

Discussion

The empirical results confirm that physical manipulatives embedded within game-based learning significantly enhance early mathematical reasoning. Moving *Congklak* seeds one by one into wooden board

pits provides concrete tactile and visual feedback, directly reinforcing one-to-one correspondence—a foundational requirement for accurate counting.

Furthermore, comparing seed totals at the end of each game round contextualizes abstract mathematical concepts like "greater than" and "less than" through meaningful social play. From a sociocultural perspective, utilizing *Congklak* demonstrates that traditional cultural games serve dual educational functions: providing developmentally appropriate math learning while preserving local cultural heritage.

CONCLUSION

This study demonstrates that the traditional game of *Congklak* is an effective pedagogical tool for developing number concept comprehension among early childhood learners aged 5–6 years. Over two action research cycles, children's average numeracy achievement improved from 73% to 83%, with substantial progress in counting physical seeds, recognizing numerals, and comparing relative quantities. Educators are encouraged to integrate concrete traditional games into early childhood mathematics curricula to promote active, play-based, and culturally meaningful learning.

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