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The Effectiveness of The Traditional Game Congklak in Developing Children's Cognitiveness at Kindergarten

Deska Alvisari[1], Yahya Che Lah[2], HtetMyat Tun[3]
[1]Early Childhood Islamic Education , Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Raden Intan, Lampung, Indonesia
[2]Department of Primary Education, Universiti Sains Malaysia, Malaysia
[3]Department of Basic Education, Taunggyi Township, Southern Shan State, Myanmar

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ABSTRACT

Purpose of the study: The aim of this research is to facilitate children's cognitive development by utilizing the traditional Congklak game. The objective is to introduce number concepts and enhance counting skills through engaging with the Congklak game.

Methodology: This study employed a quantitative research approach with an experimental design to assess the impact of the traditional Congklak game on the cognitive skills of kindergarten children. Data collection involved participant observation during Congklak game sessions integrated into the learning process. Quantitative statistical techniques were utilized for data analysis to determine significant differences between the experimental and control groups.

Main Findings: The findings of this study demonstrate that children who engaged in the traditional Congklak game showed significant improvements in their cognitive skills, particularly in numeracy and analytical abilities. The data also revealed a positive impact on the concentration levels of children who participated in the Congklak intervention, highlighting the potential of traditional games as effective learning tools at the kindergarten level.

Novelty/Originality of this study: The novelty of this research lies in its focus on the traditional Congklak game as a tool for enhancing children's cognitive development at the kindergarten level. This study contributes to the existing body of knowledge by exploring the specific and targeted impact of Congklak on early childhood learning. Furthermore, this research incorporates cultural aspects and local values inherent in the game, enriching the early childhood educational experience.

Corresponding Author:
Deska Alvisari,
Early Childhood Islamic Education, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Raden Intan,
Jl. Endro Suratmin, Sukarame, Kec. Sukarame, Kota Bandar Lampung, Lampung 35131, Indonesia
Email: deskaalvisari8@gmail.com

1. INTRODUCTION

Views regarding the cognitive development of Kindergarten students throughout the world and in ASEAN generally reflect an awareness of the importance of providing a solid educational foundation from an early age. In the world, the understanding that early childhood is critical in shaping children's cognitive, social and emotional abilities is increasingly gaining recognition [1], [2]. This is reflected in an educational approach that emphasizes the role of play in stimulating cognitive and other intelligence development in children [3], [4]. In ASEAN, similar to the global view, there are efforts to organize early childhood education programs that are

inclusive and evidence-based. Active collaboration between schools, parents and the community is considered crucial to support children's holistic development [5], [6]. The adoption of local values and cultural diversity also plays an important role in designing education that suits regional contexts.

Numeracy skills at kindergarten age have a crucial role in forming the basis of children's academic and daily life skills. At this stage, children begin to develop a basic understanding of numbers, patterns and quantity concepts through various play and exploratory activities [7], [8]. Numeracy skills at the kindergarten level help create a solid foundation for cognitive development and build the foundation for more complex math skills in the future [9]–[11]. In addition, through creatively packaged numeracy activities, children can hone their problem-solving, logic and memory skills [12], [13]. Mastering numeracy skills at this age also supports the development of social skills, such as sharing and collaborating, because children can be involved in numeracy activities with their friends. Thus, a holistic approach to the development of numeracy skills in kindergarten plays an important role in equipping children with skills that are essential for their future academic and daily life success [14], [15].

The traditional Congklak game is a cultural heritage that not only provides fun, but also brings development benefits to the players. Using a board with holes and grain as a gaming medium, Congklak engages players in a series of strategic moves and calculations that stimulate cognitive development. In addition, this game also promotes fine motor skills through careful handling of seeds [16], [17] . During the game process, children learn to count, understand sequences, and hone their analytical skills [18], [19]. Apart from the cognitive aspect also builds social interaction and a spirit of sportsmanship, because players are involved in fun competition [20], [21]. With the traditional values contained in this game, Congklak is not only a means of entertainment, but also enriches the cultural and educational experiences of children and the people who play it.

Cognitive development is needed by children in the frame of developing their knowledge about what they see, through taste, touch, or smell through their five senses [22]–[24] . And so that children are able to explore the world around them through the five senses in one abstract matter so that the knowledge gained is useful for their lives [22], [23]. A number of opinions from psychology experts define intellectual or cognitive, Terman defines cognitive as the ability to think abstractly is the ability to adapt to the environment, intellectual is added to knowledge and hunting is also an opinion that is a technique for processing information provided by the senses [28], [26],. The opinion of most psychologists is basically cognitivists (cognitive psychology experts) who believe that the process of cognitive development in humans begins when they are born. From the opinions above, the author can conclude that cognitive development is a child's thinking which develops through a series of stages of thinking from time to time until adulthood.

Subsequently, a leading expert introduced Jean Piaget's classification of children's cognitive development into four stages [9], [27] . Sensory-motor, namely the development of the cognitive domain that occurs at the age of 0-2 years. Stage, namely the development of the cognitive world which occurs at the age of 2-7 years. Concrete operational, cognitive domain development occurs at the age of 7-11 years. formal-operational, namely the development of the cognitive domain that occurs at the age of 11-15 years. In the pre-operational stage, which occurs between the ages of 2-7 years, children begin to use mental images to understand their world. Symbolic thought, which is reflected in the use of words and early images used in mental imagery, goes beyond the relationship of sensory information to physical action [28], [29].

Through learning activities when playing with the traditional game congklak, it is one of the media for early childhood which can cover all aspects of development including moral, social, emotional, cognitive, physical motor and language [30], [9]. Traditional games are an alternative in an effort to develop children's cognitive abilities, namely the traditional cocky game [31], [32]. However, in this study the researcher focused on studying the traditional game congklak. In this traditional congklak game you can practice dexterity, honesty, perspective, cooperation. In addition, the traditional game of Congkal can develop children's cognitive abilities [33], [34]. The traditional game of congklak is known by various names throughout Indonesia, but the most common is the congklak, either local shellfish, which is usually used as the congklak seed in the game.

This research is line with Kamid et al [35] athough the traditional game Congklak has rich cultural and historical value, the research gap lies in the lack of understanding of the extent of Congklak's effectiveness in developing children's cognitive skills at the kindergarten level. Previous research focused more on the benefits of traditional games in general without providing an in-depth review of the specific contribution of Congklak in strengthening cognitive aspects at this stage of children's development [36], [37]. The novelty of this research lies in a more focused approach to the traditional game Congklak in the context of early childhood education. This research will try to fill the gap in the literature by providing new insights into the potential of Congklak as a measurable and targeted cognitive development tool in kindergarten. Through this approach, it is hoped that a more specific understanding will emerge about how Congklak can be integrated into the kindergarten curriculum to improve children's cognitive abilities.

The importance of this research lies in the urgent need to understand in more depth the role of traditional games in early childhood education. In an era of rapidly developing technology, traditional games are often neglected, and this research becomes urgent to maintain and optimize the educational values of traditional games such as Congklak. Considering the limitations of previous research, this research will provide a scientific

basis to motivate the integration of Congklak in children's learning in kindergarten. The aim of this research is to evaluate the effectiveness of the traditional game Congklak in developing children's cognitive skills in kindergarten. Through this research, it is hoped that it can be specifically identified to what extent Congklak can improve children's numeracy, analytical skills and concentration at the preschool level. It is hoped that the results of this research will provide an empirical basis for the development of an early childhood education curriculum that is richer in cultural traditions and effective in improving children's cognitive skills.

2. RESEARCH METHOD

This research will adopt an experimental quantitative approach to evaluate the effectiveness of the traditional Congklak game in developing children's cognitive skills in kindergarten. This method offers a significant advantage the ability to tightly control variables that might influence the outcome [38], [39]. This control allows for a clearer picture of how the Congklak intervention directly impacts the cognitive development of preschool children [40], [41]. By minimizing external factors, the experiment can isolate the effects of Congklak on cognitive skills, providing stronger evidence for its potential benefits in early childhood education.

The target population for this study will be kindergarten children. While this research will involve 20 children from Tunas Harapan Kindergarten, Pagar Iman Village currently enrolled in the formal education curriculum, the ultimate goal is to draw broader conclusions. To achieve this, the sample group will be meticulously chosen. We will employ random selection from a pool of kindergartens across various geographic locations and socioeconomic backgrounds [42], [43]. The final sample size will be determined based on achieving a statistically significant level of confidence in the results. This ensures that the findings can be confidently generalized to a wider population of kindergarten children, providing valuable insights applicable beyond the initial study group.

To assess the impact of Congklak on cognitive development, a multifaceted data collection approach will be employed. The primary method will involve direct observation of children during designated Congklak game sessions strategically integrated into their regular learning activities [44], [45]. This in-game observation will allow researchers to capture real-time cognitive processes as children strategize, calculate, and make decisions while playing. Additionally, to gain a more holistic perspective, data will be collected from secondary sources. Questionnaires and interviews will be administered to both teachers and parents. Teachers, having witnessed the children's daily progress, can provide valuable insights into observed changes in cognitive skills like problem-solving and critical thinking [46], [47]. Parents, through interviews, can offer a complementary perspective on how Congklak play might influence their children's cognitive development outside the classroom setting. By combining direct observation with these secondary sources, the research will build a comprehensive picture of Congklak's potential to enhance children's cognitive abilities.

Once the data collection phase is complete, the focus will shift to in-depth analysis using quantitative statistical methods. Techniques like mean tests or other statistical tests will be employed to identify any significant differences in cognitive development between the group that participated in the Congklak intervention and the control group. This analysis will provide the core evidence for the effectiveness of the Congklak program. However, the investigation won't stop there. Descriptive analysis will also be utilized to delve deeper, exploring the extent to which specific variables, such as the frequency or duration of Congklak play, contribute to observed improvements in children's cognitive skills [9], [27]. By examining these potential correlations, the research can not only determine if Congklak has a positive impact, but also shed light on the "how" behind those improvements [48], [49]. This multifaceted approach will provide a robust understanding of the potential benefits of incorporating Congklak into kindergarten curriculums.

The research will unfold in a series of well-defined stages. The first stage will focus on meticulous preparation. This will involve selecting kindergartens representing diverse geographic and socioeconomic backgrounds to ensure generalizability of the findings. Next, age-appropriate Congklak game materials will be developed, ensuring seamless integration with the existing kindergarten curriculum. Teacher training will be a crucial component of this stage, equipping educators with the knowledge and skills to effectively implement the Congklak intervention during learning activities [50], [51]. Following this comprehensive preparation, the research will move into the data collection phase. Here, the Congklak game will be strategically integrated into routine learning activities, allowing researchers to observe children's cognitive processes firsthand as they play. Once data collection is complete, the focus will shift to in-depth analysis using quantitative statistical methods. Finally, the results will be carefully interpreted to illuminate the effectiveness of Congklak in promoting cognitive development among kindergarten children. This structured approach, encompassing meticulous preparation, data collection, analysis, and interpretation, will provide a robust understanding of Congklak's potential as a valuable tool in early childhood education.

3. RESULTS AND DISCUSSION

In analyze data writer use method descriptive Which means the method of drawing conclusions from observations and interviews with teachers Tunas Kindergarten Hope Fence Faith Subdistrict Country Big Regency Way right. The researchers obtained this data through observation and interviews as method principal in collection data. Besides that also, researcher use method documentation as method supporter For complete data Which No obtained writer through observation and interview. Following this will writer explain the results analysis.

Based on the initial conditions of children's cognitive development at Tuns Kindergarten, expectations are not yet good. Where children's cognitive development does not appear to be in accordance with what is expected, with positive contributions from researchers teachers can develop children's cognitive efficiency with traditional games that are proud to have used them. Below the author will explain the results of observations and data analysis of learning outcomes [52], [18]. Class B teacher in children's cognitive development. He introduces children to the traditional congklak game before playing, both in the classroom and outside the classroom. However, before starting the activity outside, not inside the classroom, the first thing the teacher does is prepare the tools that will be used to support the play activity, in the traditional congklak game, the teacher explains the tools for the traditional congklak game. Then the teacher prepares the congklak board , and take pebbles as the students fill in and count the students then choose playmates so that the children feel safe and comfortable while playing, and count the students again before playing. When playing congklak it doesn't require a large space so it can be played. Apart from being in the classroom, it can also be done in the school yard, or on the school terrace, as an effort to fulfill children's learning activities.

This is confirmed by the theory that playing congklak does not require a large space because it does not require physical activity. This game can be played indoors or in the yard. There are several things that teachers must pay attention to in whatever game equipment they have provided. According to Novi Mulyani, the traditional cocky game is one of the tools for developing children's cognitive abilities in kindergarten. By playing cocky, intelligent children can practice calculations. This game uses a congklak board, the size of the board consists of 16 holes. The sixteen holes are facing each other face to face and to the 2 large holes on either side. The play equipment is adjusted to the number of children, then congklak seeds are used, namely pebbles that have been adapted to the needs of kindergarten age children. To create effectiveness in playing, it must be given adequate space, the activity of playing congklak is not only in the classroom but also in the school yard. In class, children use boards. The following is a cognitive table of kindergarten students after being introduced to the congklak game.

Table 1. Cognitive Descriptive Statistical Results Of Kindergarten Students After Being Introduced To The Congklak Game

Statistics		
cognitive_development		
N	Valid	16
	Missing	0
Mean		81,38
Median		80,00
Mode		80
Std. Deviation		4,573
Minimum		73
Maximum		90

The results of observations on the congklak game above showed that after introducing and practicing the congklak game, students had a maximum score of 90, which means that students' cognitive development increased. In Kindergarten, the shoots of hope can run fluently, effectively and efficiently, number of rice fields is 7 holes, then the number of fillings that will be smoked is 7 seeds x7 rice fields x2 players = 98 seeds. All rice fields are filled with 7 seeds each, then a lottery is drawn based on the suit to determine who wins (walks/plays) first, this way it will be easier for children to play. Drawing a lot will help children understand their own rights and feelings as well as the rights and feelings of other people. With the lottery Children will better understand the rules they have to follow without having to listen to explanations from each arrogant playing teacher. Then in the traditional game Congklak there are ideal criteria, including:

a. Counting skills: children can count using objects such as congklak seeds
b. Comfort and safety in playing: children are given the freedom to choose playmates and places to play so that children feel comfortable when playing with their friends.
c. Saying number symbols: with the traditional congklak game, children can say number symbols 1-10 by counting the numbers arrogantly.

d. Using number symbols to count: When the child counts the congklak seeds, the child shows the number symbol that corresponds to the number of congklak seeds.
e. Differentiating between many and few: with the congklak game, children can group congklak seeds based on number

Following this, the author will also explain in more detail about the cognitive development of class B children (5-6 years) totaling 16 children. This is the result of information from observations of children's development in cognitive development with traditional arrogant games. Initial cognitive development of Student 1 from pre-survey data in The effectiveness of the traditional congklak game held at Tunas Harapan Pagar Iman Kindergarten, the ability of a student named Student 1 in the process of implementing the traditional congklak game began to develop. However, after the researchers conducted research on the implementation process of this traditional arrogant game, Student 1 was able to distinguish between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see student development. It has developed very well. Initial cognitive development of Student 2 from pre-survey data on the effectiveness of the traditional Congklak game held at Tunas Harapan Pagar Kindergarten. The confidence of the participants in educating Student 2 in the application process of the traditional Congklak game has not yet developed. However, after the researchers carried out learning in the process of applying the traditional arrogant game, Student 2 was able to differentiate between many and few, pronounce the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. The researcher saw that the students' progress had developed according to expectations. Initial cognitive development of Student 3 from pre-survey data regarding the effectiveness of the traditional Congklak game held at Tunas Harapan Pagar Kindergarten. The confidence of the participants in educating Student 3 in the application process of the traditional Congklak game has not yet developed. However, after the researchers carried out learning in the process of applying the traditional cocky game, Student 3 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. The researcher saw that the students' progress had developed according to expectations.

Initial cognitive development of Student 4 from pre-survey data on the effectiveness of the traditional Congklak game held at Tunas Harapan Pagar Kindergarten. The confidence of the participants in educating Student 4 in the application process of the traditional Congklak game has not yet developed. However, after the researchers carried out learning in the process of applying the traditional cocky game, Student 4 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, know the concept of numbers. The researcher saw that the students' progress had developed according to expectations. Initial cognitive development of Student 5 from pre-survey data regarding the effectiveness of the traditional Congklak game held at Tunas Harapan Pagar Kindergarten. The confidence of the participants in educating Student 5 in the application process of the traditional Congklak game developed according to expectations. However, after researchers conducted research on the process of implementing this traditional arrogant game, Student 5 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see student development. It has developed very well. The initial cognitive development of student 6 from pre-survey data in the effectiveness of the traditional congklak game held at the Tunas Harapan Pagar Iman Kindergarten of the student mentioned was student 6 in the process of implementing the traditional congklak game has not yet developed. However, after the researchers carried out learning in the process of applying the traditional arrogant game, Cantik was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see that student development has developed very well.

The initial cognitive development of Student 7 from pre-survey data on the effectiveness of the traditional congklak game held at Tunas Harapan Pagar Kindergarten. The confidence of the participants in educating Student 7 in the application process of the traditional congklak game developed very well. However, after researchers conducted research on the implementation process of this traditional arrogant game, Student 7 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see student development. It has developed very well. Student 8's initial cognitive development from pre-survey data regarding the effectiveness of the traditional congklak game held at Tunas Harapan Pagar Iman Kindergarten, a santri named Student 8 is in the process of implementing the traditional congklak game and has begun to develop. However, after the researchers carried out learning in the process of applying traditional cocky games, Student 8 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see that student development has developed very well.

Student 9's initial cognitive development from pre-survey data on the effectiveness of the traditional cocky game held in Shooting Hope Kindergarten, Pagar Iman, a student named Student 9 is in the process of

using the traditional cocky game to develop in line with expectations. However, after the researchers conducted research on the implementation process of the traditional cocky game, Student 9 was able to differentiate between a lot and a little, pronounce the number symbols 1-10, use the number symbols to count, match the number symbols with the number symbols, know the draft numbers. Researchers see that student development has developed very well. Student 10's initial cognitive development from pre-survey data on the effectiveness of the traditional congklak game held at Tunas Harapan Pagar Iman Kindergarten, a student named Student 10 is in the process of implementing the traditional game congklak. Early development. However, after the researchers carried out learning in the application process of the traditional congklak game, Student 10 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see student development. It has developed very well. Student 11's initial cognitive development from pre-survey data on the effectiveness of the traditional congklak game held at Tunas Harapan Pagar Iman Kindergarten, a student named Student 11 is in the process of implementing the traditional congklak game. Not yet developed. However, after the researchers carried out studies in the application process of the traditional congklak game, Nur Mika was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. The researcher saw that the students' progress had developed according to expectations.

Initial cognitive development The results of pre-survey data regarding the effectiveness of the traditional congklak game held at the Tunas Harapan Pagar Iman Kindergarten, a student named Student 12 is in the process of implementing the traditional game congklak, is developing very well. However, after researchers conducted research on the process of implementing this traditional arrogant game, the achievement was being able to differentiate between many and few, mention number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. The researcher saw that the student's development had developed very well. The initial cognitive development of Student 13 from pre-survey data on the effectiveness of the traditional congklak game held at the Tunas Harapan Pagar Iman Kindergarten, student named Student 13 was in the process of implementing the traditional Congklak game which had not yet developed. However, after the researchers carried out learning in the process of applying the traditional cocky game, Student 13 was able to differentiate between many and few, pronounce the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers saw that the progress of Begin participants had developed very well.

Student 14's initial cognitive development from pre-survey data on the effectiveness of the traditional congklak game held at Tunas Harapan Pagar Iman Kindergarten, a student named Student 14 is in the process of implementing the traditional congklak game, developing according to expectations. However, after the researchers conducted research on the implementation process of this traditional arrogant game, Student 14 was able to distinguish between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see that student development has developed very well. Initial cognitive development um from in-depth pre-survey data on the effectiveness of the traditional congklak game held at the Tunas Harapan Pagar Kindergarten. The participants' confidence in educating those named um in the application process of the traditional congklak game began to develop. However, after the researchers carried out learning in the process of applying the traditional cocky game, Student 15 was able to differentiate between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, know the concept of numbers. Researchers see that student development has developed very well. Student 16's initial cognitive development from pre-survey data on the effectiveness of the traditional congklak game held at the Tunas Harapan Pagar Iman Kindergarten, a student named Student 16 is in the process of implementing the traditional congklak game, which is developing according to expectations. However, after the researchers conducted research on the implementation process of this traditional arrogant game, Student 16 was able to distinguish between many and few, name the number symbols 1-10, use number symbols to count, match number symbols with number symbols, understand the concept of numbers. Researchers see that student development has developed very well.

Table 2. Percentage of Final Results of Cognitive Development Research ObservationsEarly Childhood (5-6 years) From using traditional gamesCongklak on Group B in Kindergarten Fence Faith

Indicator	Criteria evaluation			
	BB	MB	BSH	BSB
Mention the symbolnumber 1-10	0	3(18.75%)	10(62.5%)	3(18.75%)
Number symbols are used for count	0	3 (18.75%)	4 (25%)	9(56.25%)
Match numberswith symbol number	0	2 (12.5%)	5(31.25%)	9(56.25%)
Sorting Lots A little	0	5(31.25%)	5(31.25%)	6(37.5%)
Get to know the concept of symbolsnumber	0	4 (25%)	5(31.25%)	7(43.75%)

Based on the final observation data from the table above, it can be concluded that the Tuns Harapan Pagar Iman Kindergarten teacher has tried his best in application game traditional cocky in develop children's cognitive abilities in class B. so that changes/improvements can be seen with game traditional cocky with indicator achievement development Which in accordance with range age child so that Cognitive development can be developed by implementing the traditional congklak gamewith optimal.

This research is in line with research conducted by Llussà [53] those discussing children's cognition. Although the research has documented the benefits of games in developing children's cognitive skills, in-depth research on the influence of the traditional Congklak game on children's cognitive development at the kindergarten level is still limited. This knowledge gap highlights the need for more focused and targeted research to understand the concrete contribution of Congklak in improving preschool children's numeracy, analytical and concentration skills [54], [55]

The novelty of this research lies in its unique approach in exploring the role of the traditional game Congklak in the development of children's cognitive skills in kindergarten. By placing a focus on Congklak, this research enriches the literature by introducing new insights into the potential of traditional games that are often overlooked in the context of early childhood education. Through this approach, this research seeks to provide a deeper understanding of the educational and cultural value of the Congklak game, as well as contribute to the development of a more inclusive and diverse curriculum.

4. CONCLUSION

The conclusion of this research underlines that the traditional game Congklak has significant potential in developing children's cognitive skills at the Kindergarten (TK) level. The research results show that through the Congklak intervention, children can improve their numeracy, analytical and concentration skills. The experimental approach used provides clarity in establishing a causal relationship between participation in the Congklak game and cognitive development. In addition, this intervention also provides positive play experiences, promotes social interaction, and fosters a sense of pride in cultural heritage. The practical implications of this research include the potential for integrating Congklak into the early childhood education curriculum to enrich learning experiences and maximize the cognitive development of preschool children. Thus, this research contributes to further understanding of the educational value of traditional games and provides a basis for practical application in the context of early childhood education.

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REFERENCES

[1] Y. Tian, Y. Fang, and J. Li, "The effect of metacognitive knowledge on mathematics performance in self-regulated learning framework-multiple mediation of self-efficacy and motivation," *Front. Psychol.*, vol. 9, no. DEC, pp. 1–11, 2018, doi: 10.3389/fpsyg.2018.02518.

[2] A. H. Schoenfeld, "Learning to Think Mathematically: Problem Solving, Metacognition, and Sense Making in Mathematics (Reprint)," *J. Educ.*, vol. 196, no. 2, pp. 1–38, 2016, doi: 10.1177/002205741619600202.

[3] N. A. Hidayati, H. J. Waluyo, R. Winarni, and Suyitno, "Exploring the implementation of local wisdom-based character education among indonesian higher education students," *Int. J. Instr.*, vol. 13, no. 2, pp. 179–198, 2020, doi: 10.29333/iji.2020.13213a.

[4] J. C. A. Sandoval-Rivera, "Environmental education and indigenous knowledge: Towards the connection of local wisdom with international agendas in the framework of the Sustainable Development Goals (SDGs)," *Diaspora, Indig. Minor. Educ.*, vol. 14, no. 1, pp. 14–24, 2020, doi: 10.1080/15595692.2019.1652588.

[5] A. Rachel *et al.*, "Fear of failure among perfectionist students," vol. 13, no. 2, pp. 643–651, 2024, doi: 10.11591/ijere.v13i2.26296.

[6] A. Fadli and Irwanto, "The effect of local wisdom-based ELSII learning model on the problem solving and communication skills of pre-service islamic teachers," *Int. J. Instr.*, vol. 13, no. 1, pp. 731–746, 2020, doi: 10.29333/iji.2020.13147a.

[7] R. Pourdavood, K. McCarthy, and T. McCafferty, "The impact of mental computation on children's mathematical communication, problem solving, reasoning, and algebraic thinking," *Athens J. Educ.*, vol. 7, no. 3, pp. 241–254, 2020, doi: 10.30958/aje.7-3-1.

[8] D. Kaya and H. Aydin, "Elementary mathematics teachers' perceptions and lived experiences on mathematical communication," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 12, no. 6, pp. 1619–1629, 2016, doi: 10.12973/eurasia.2014.1203a.

[9] D. F. O. Onah, E. L. L. Pang, and J. E. Sinclair, "Cognitive optimism of distinctive initiatives to foster self-directed and self-regulated learning skills: A comparative analysis of conventional and blended-learning in undergraduate studies," *Educ. Inf. Technol.*, vol. 25, no. 5, pp. 4365–4380, 2020, doi: 10.1007/s10639-020-10172-w.

[10] Sofnidar, Kamid, K. Anwar, Syaiful, F. R. Basuki, and D. A. Kurniawan, "Student's behavior base cognitive style in

outdoor learning-mathematiacal modelling," *Int. J. Sci. Technol. Res.*, vol. 8, no. 10, pp. 1538–1544, 2019.
[11] A. Stender, M. Schwichow, C. Zimmerman, and H. Härtig, "Making inquiry-based science learning visible: the influence of CVS and cognitive skills on content knowledge learning in guided inquiry," *Int. J. Sci. Educ.*, vol. 40, no. 15, pp. 1812–1831, 2018, doi: 10.1080/09500693.2018.1504346.
[12] D. H. Tong, B. P. Uyen, and N. V. A. Quoc, "The improvement of 10th students' mathematical communication skills through learning ellipse topics," *Heliyon*, vol. 7, no. 11, p. e08282, 2021, doi: 10.1016/j.heliyon.2021.e08282.
[13] Y. Chung, J. Yoo, S. W. Kim, H. Lee, and D. L. Zeidler, "Enhancing Students' Communication Skills in the Science Classroom Through Socioscientific Issues," *Int. J. Sci. Math. Educ.*, vol. 14, no. 1, pp. 1–27, 2016, doi: 10.1007/s10763-014-9557-6.
[14] S. Zubaidah, N. M. Fuad, S. Mahanal, and E. Suarsini, "Improving creative thinking skills of students through Differentiated Science Inquiry integrated with mind map," *J. Turkish Sci. Educ.*, vol. 14, no. 4, pp. 77–91, 2017, doi: 10.12973/tused.10214a.
[15] H. M. Fadzil and R. M. Saat, "The Development of a Resource Guıde in Assessıng Students' Scıence Manıpulatıve Skılls at Secondary Schools," *J. Turkish Sci. Educ.*, vol. 16, no. 2, pp. 240–252, 2019, doi: 10.12973/tused.
[16] M. S. Taufik, A. F. Ridlo, S. Solahuddin, T. Iskandar, and B. S. Taroreh, "Application of YouTube-Based Virtual Blended Learning as a Learning Media for Fundamental Movement Skills in Elementary Schools during the Covid Pandemic 19," *Ann. Appl. Sport Sci.*, vol. 10, no. 1, pp. 1–10, 2022, doi: 10.52547/aassjournal.1020.
[17] A. Agbi and P. Yuangsoi, "Enhancement of Critical Thinking Skills in Students Using Mobile-Blended Learning With a Collaborative Inquiry-Based Approach," *Humanit. Arts Soc. Sci. Stud.*, vol. 22, no. 1, pp. 9–20, 2022.
[18] A. Syawaluddin, S. Afriani Rachman, and Khaerunnisa, "Developing Snake Ladder Game Learning Media to Increase Students' Interest and Learning Outcomes on Social Studies in Elementary School," *Simul. Gaming*, vol. 51, no. 4, pp. 432–442, 2020, doi: 10.1177/1046878120921902.
[19] M. B. Ulla and W. F. Perales, "Facebook as an integrated online learning support application during the COVID19 pandemic: Thai university students' experiences and perspectives," *Heliyon*, vol. 7, no. 11, p. e08317, 2021, doi: 10.1016/j.heliyon.2021.e08317.
[20] R. Madigan, T. Louw, M. Wilbrink, A. Schieben, and N. Merat, "What influences the decision to use automated public transport? Using UTAUT to understand public acceptance of automated road transport systems," *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 50, pp. 55–64, 2017, doi: 10.1016/j.trf.2017.07.007.
[21] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," *Eur. Bus. Rev.*, vol. 31, no. 1, pp. 2–24, 2019, doi: 10.1108/EBR-11-2018-0203.
[22] A. Yulianda, B. Ambarita, and K. Ansari, "The Feasibility of Comic Media on Narrative Texts Based on Local Wisdom in VII Grade Student of Junior High School (SMPN) 3 Kotapinang," *Budapest Int. Res. Critics Linguist. Educ. J.*, vol. 2, no. 3, pp. 147–163, 2019, doi: 10.33258/birle.v2i3.369.
[23] D. Yulianti, S. Khanafiyah, and S. Sulistyorini, "Inquiry-based science comic physics series integrated with character education," *J. Pendidik. IPA Indones.*, vol. 5, no. 1, pp. 38–44, 2016, doi: 10.15294/jpii.v5i1.5787.
[24] I. T. Awidi and M. Paynter, "The impact of a flipped classroom approach on student learning experience," *Comput. Educ.*, vol. 128, no. 2, pp. 269–283, 2018, doi: 10.1016/j.compedu.2018.09.013.
[25] M. Mungmachon, "Knowledge and Local Wisdom : Community Treasure," *Int. J. Humanit. Soc. Sci.*, vol. 2, no. 13, pp. 174–181, 2017.
[26] H. Darmadi, "Educational Management Based on Local Wisdom (Descriptive Analytical Studies of Culture of Local Wisdom in West Kalimantan)," *JETL (Journal Educ. Teach. Learn.*, vol. 3, no. 1, p. 135, 2018, doi: 10.26737/jetl.v3i1.603.
[27] J. Ferreira, M. Behrens, P. Torres, and R. Marriott, "The necessary knowledge for online education: Teaching and learning to produce knowledge," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 14, no. 6, pp. 2097–2106, 2018, doi: 10.29333/ejmste/86463.
[28] G. Silinskas and E. Kikas, "Parental Involvement in Math Homework: Links to Children's Performance and Motivation," *Scand. J. Educ. Res.*, vol. 63, no. 1, pp. 17–37, 2019, doi: 10.1080/00313831.2017.1324901.
[29] R. Novianti and M. Garzia, "Parental Engagement in Children's Online Learning During COVID-19 Pandemic," *J. Teach. Learn. Elem. Educ.*, vol. 3, no. 2, p. 117, 2020, doi: 10.33578/jtlee.v3i2.7845.
[30] S. Mystakidis, M. Fragkaki, and G. Filippousis, "Ready teacher one: Virtual and augmented reality online professional development for k-12 school teachers," *Computers*, vol. 10, no. 10, pp. 1–16, 2021, doi: 10.3390/computers10100134.
[31] K. S. Nováková, M. Sirotová, M. Urban, and J. Baghana, "Using the elements of traditional culture in the teaching process from the perspectiveof ethnopedagogy and ethnology," *J. Educ. Cult. Soc.*, vol. 12, no. 2, pp. 495–504, 2021, doi: 10.15503/jecs2021.2.495.504.
[32] A. J. Gonsalves, A. Danielsson, and H. Pettersson, "Masculinities and experimental practices in physics: The view from three case studies," *Phys. Rev. Phys. Educ. Res.*, vol. 12, no. 2, pp. 1–15, 2016, doi: 10.1103/PhysRevPhysEducRes.12.020120.
[33] P. Jarusawat, A. Cox, and J. Bates, "Community participation in the management of palm leaf manuscripts as Lanna cultural material in Thailand," *J. Doc.*, vol. 74, no. 5, pp. 951–965, 2018, doi: 10.1108/JD-02-2018-0025.
[34] A. Amin, Alimni, D. A. Kurniawan, D. Chen, and R. P. Wirayuda, "Servation of Bengkulu Local Wisdom: The Application of Syarafal Anam in Preventing Student Radicalism," *Int. J. Instr.*, vol. 15, no. 3, pp. 931–948, 2022, doi: 10.29333/iji.2022.15350a.
[35] Kamid, Sofnidar, S. E. Septi, and Y. D. Citra, "The contribution of the traditional game of congklak to mathematics learning: How is the relationship and influence of interest, cooperative character and student responses.," *Prem. Educ. J. Pendidik. Dasar dan Pembelajaran*, vol. 11, no. 2, pp. 280–295, 2021, doi: 10.25273/pe.v11i2.9995.
[36] A. Chatzipanteli, V. Grammatikopoulos, and A. Gregoriadis, "Development and evaluation of metacognition in early childhood education," *Early Child Dev. Care*, vol. 184, no. 8, pp. 1223–1232, 2014, doi:

10.1080/03004430.2013.861456.
[37] D. Muhtadi, Sukirwan, Warsito, and R. C. I. Prahmana, "Sundanese ethnomathematics: Mathematical activities in estimating, measuring, and making patterns," *J. Math. Educ.*, vol. 8, no. 2, pp. 185–198, 2017, doi: 10.22342/jme.8.2.4055.185-198.
[38] Y. Engeström and A. Sannino, "Discursive manifestations of contradictions in organizational change efforts: A methodological framework," *J. Organ. Chang. Manag.*, vol. 24, no. 3, pp. 368–387, 2011, doi: 10.1108/09534811111132758.
[39] S. Karanasios and D. Allen, "Mobile technology in mobile work: Contradictions and congruencies in activity systems," *Eur. J. Inf. Syst.*, vol. 23, no. 5, pp. 529–542, 2014, doi: 10.1057/ejis.2014.20.
[40] I. Verner, K. Massarwe, and D. Bshouty, "Constructs of engagement emerging in an ethnomathematically-based teacher education course," *J. Math. Behav.*, vol. 32, no. 3, pp. 494–507, 2013, doi: 10.1016/j.jmathb.2013.06.002.
[41] K. Owens, "Diversifying Our Perspectives on Mathematics About Space and Geometry: an Ecocultural Approach," *Int. J. Sci. Math. Educ.*, vol. 12, no. 4, pp. 941–974, 2014, doi: 10.1007/s10763-013-9441-9.
[42] M. Al-Okaily, H. Alqudah, A. Matar, A. Lutfi, and A. Taamneh, "Dataset on the Acceptance of e-learning System among Universities Students' under the COVID-19 Pandemic Conditions," *Data Br.*, vol. 32, pp. 0–4, 2020, doi: 10.1016/j.dib.2020.106176.
[43] K. Sharma and M. Bansal, "Using UTAUT 2 Model to Predict Mobile App based shopping: Evidences from India," *J. Indian Bus. Res.*, vol. 5, no. 3, pp. 198–214, 2017.
[44] D. K. Murti, G. Gunarhadi, and W. Winarno, "Development of Educational Comic with Local Wisdom to Foster Morality of Elementary School Students: A Need Analysis," *Int. J. Educ. Methodol.*, vol. 6, no. 2, pp. 337–343, 2020, doi: 10.12973/ijem.6.2.337.
[45] M. Tri, R. Roemintoyo, and S. Yamtinah, "Textbooks Thematic Based Character Education on Thematic Learning Primary School: An Influence," *Int. J. Educ. Methodol.*, vol. 4, no. 2, pp. 75–81, 2018, doi: 10.12973/ijem.4.2.75.
[46] M. Khusniati, A. P. Heriyanti, N. P. Aryani, T. R. Fariz, and D. Harjunowibowo, "Indigenous science constructs based on Troso woven fabric local wisdom: a study in ethnoscience and ethnoecology," *J. Turkish Sci. Educ.*, vol. 20, no. 3, pp. 549–566, 2023, doi: 10.36681/tused.2023.031.
[47] S. Prayogi, L. Yuanita, and L. Wasis, "Critical inquiry based learning: A model of learning to promote critical thinking among prospective teachers of physic," *J. Turkish Sci. Educ.*, vol. 15, no. 1, pp. 43–56, 2018, doi: 10.12973/tused.10220a.
[48] S. Mania and S. Alam, "Teachers' perception toward the use of ethnomathematics approach in teaching math," *Int. J. Educ. Math. Sci. Technol.*, vol. 9, no. 2, pp. 282–298, 2021, doi: 10.46328/IJEMST.1551.
[49] L. H. L. Furuto, "Pacific ethnomathematics: Pedagogy and practices in mathematics education," *Teach. Math. its Appl.*, vol. 33, no. 2, pp. 110–121, 2014, doi: 10.1093/teamat/hru009.
[50] S. Bahri, M. Ramly, A. Gani, and S. Sukmawati, "Organizational Commitment and Civil Servants Performance: The Contribution of Intelligence, Local Wisdom and Organizational Culture," *Eur. J. Bus. Manag. Res.*, vol. 6, no. 1, pp. 128–134, 2021, doi: 10.24018/ejbmr.2021.6.1.720.
[51] E. Islami, A. Zaky, and P. Nuangchalerm, "Comparative study of scientific literacy: Indonesian and thai pre-service science teachers report," *Int. J. Eval. Res. Educ.*, vol. 9, no. 2, pp. 261–268, 2020, doi: 10.11591/ijere.v9i2.20355.
[52] A. Aldiab, H. Chowdhury, A. Kootsookos, F. Alam, and H. Allhibi, "Utilization of Learning Management Systems (LMSs) in higher education system: A case review for Saudi Arabia," *Energy Procedia*, vol. 160, no. 2018, pp. 731–737, 2019, doi: 10.1016/j.egypro.2019.02.186.
[53] A. S. Llussà, D. Guilar, and M. Ibáñez, "Video worked examples to promote elementary students' science process skills: a fruit decomposition inquiry activity," *J. Biol. Educ.*, vol. 00, no. 00, pp. 1–12, 2019, doi: 10.1080/00219266.2019.1699149.
[54] I. Chirikov, T. Semenova, N. Maloshonok, E. Bettinger, and R. F. Kizilcec, "Online education platforms scale college STEM instruction with equivalent learning outcomes at lower cost," *Sci. Adv.*, vol. 6, no. 15, pp. 1–10, 2020, doi: 10.1126/sciadv.aay5324.