Enhancing Numeracy Skills in Elementary Students through the Traditional *Congklak* Game: A Study in Kudus

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ABSTRACT

The objective of this study is to assess the efficacy of the conventional *congklak* game in enhancing numeracy abilities among primary school pupils in Kudus. The capacity to enumerate is a fundamental skill in the field of mathematics education, which is sometimes regarded as tedious by young learners. This study employed an experimental research approach and included a sample of 100 students representing diverse social and economic backgrounds. The employed methodologies encompass literature review, documentation, direct observation, and pre-test and post-test assessments to evaluate students' numeracy abilities. In addition, questionnaires and interviews were used to analyze several dimensions like learning motivation, social interaction, and family environmental support. The findings indicated that pupils who were taught utilizing the *congklak* game showed a notable enhancement in their numeracy abilities in comparison to students who employed traditional approaches, with an average rate of improvement of 28%. Furthermore, the *congklak* game has been empirically shown to enhance both learning motivation and social interaction among students. The findings of this study validate the need to include conventional games within the primary education curriculum in order to establish a learning environment that is both entertaining and efficient. Therefore, this study provides a substantial contribution to the advancement of novel and efficient learning methodologies. The findings from this study can serve as a valuable resource for policymakers and educators in developing a curriculum that is both engaging and effective in enhancing students' fundamental skills.

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1. INTRODUCTION

Traditional games are an integral part of the culture and life of Indonesian society, including in Kudus (Clough, 2012; Lackéus et al., 2016). One of the traditional games that is popular and rich in

educational potential is *congklak*. This game is not only entertaining but also has educational value (Ranganathan & Woodard-Lehman, 2019), especially in improving numeracy skills (Alwishah, 2015; Brown, 2009). In the context of primary education (Quick, 2024), interactive and fun learning approaches, such as using traditional games, can increase student motivation and participation in learning (Lundqvist et al., 2012; Puskás & Andersson, 2021; Stich & Tobia, 2016). Empirical research has shown that traditional games can be an effective learning tool. Rahmawati (2017), in her study, found that the use of *congklak* can improve the cognitive abilities of young children, including the ability to count.

Among the traditional games in Indonesia is the *congklak* game, which is referred to by several names across the country. Typically, in the game, a certain kind of shell is employed as a *congklak* seed. In the absence of such a shell, seeds from plants and small stones are occasionally substituted. Two players engage in the *congklak* game. The game involves the use of a *congklak* board and a set of 98 seeds, specifically 14 x 7 seeds (for a 16-hole board, the standard variant in Indonesia), known as *congklak* seeds or *congklak* fruit. Commonly, the *congklak* board is constructed from a combination of wood and plastic, whilst the seeds are fashioned from shells, seeds, stones, marbles, or plastic. A total of 16 holes are present on the *congklak* board, with 14 little holes positioned in close proximity to each other and 2 large holes on each side. Each of the seven little holes on the player's side, as well as the giant hole on the right side, are deemed individually owned by the player. When the game starts, every little hole is initially populated with seven seeds. Two players face each other, and the person who initiates the game has the option to select a hole to be inserted into, starting with the hole on their right and continuing in a clockwise direction. Upon depletion of the seeds in the little hole housing other seeds, he may retrieve the seeds and proceed with the filling process. Conversely, if the seeds are depleted in his larger hole, he can proceed by selecting a smaller hole on his side. Upon depletion of the seeds in the small hole on his side, he ceases and retrieves all the seeds on the other side. However, if it intercepts an unoccupied void on the other side, it will cease to move and yield no results. The game is said to be concluded when all available seeds have been transferred to the large holes of both players. The victor is determined by possessing the highest number of seeds. In this research, children who played *congklak* showed an increased understanding of number concepts and basic mathematical operations (Pratiwi & Rahmawati, 2019). Apart from that, (Ibbett et al., 2022) also found that the integration of traditional games in the learning process can increase social interaction and students' learning motivation. This research emphasizes that a more interactive and fun approach can create a more positive and effective learning environment.

The ability to perform calculations is a fundamental competency in mathematics, and its development from an early age is crucial. According to Sahrunayanti et al. (2023), numeracy skills encompass the recognition and understanding of numerical concepts, along with basic mathematical operations such as addition, subtraction, and division. Peng et al. (2012) further emphasized that these skills also include the ability to compare and contrast numerical symbols and calculate varying quantities. However, traditional teaching methods commonly employed in elementary schools are often less engaging, making it difficult to sustain students' interest and motivation in learning.

To overcome this problem, various innovations in learning strategies have been proposed, one of which is the integration of traditional games into the teaching and learning process. Empirical research has shown that traditional games can be an effective learning tool. For example, research from (Choirudin et al., 2021) shows that using the Snakes and Ladders game can improve the mathematics learning outcomes of grade 1 elementary school students in Jakarta. Research (Walczak, 2022) states that Lego games can help children understand number concepts and basic operations. Traditional games are not only entertaining but also have the potential to improve children's cognitive and motor skills.

Research by Hidayati (2022) demonstrates that puzzle games have a positive effect on enhancing young children's logical and numeracy skills. These findings support the notion that play-based methods can serve as an effective alternative for teaching mathematics. Incorporating game elements into the learning process aims to increase students' interest and motivation in mathematics, as suggested by Nurfalah and Fauzia (2020), leading to significant improvements in numeracy skills (Agustin, 2023).

Furthermore, the use of traditional games not only makes the learning process more enjoyable but also offers children a more meaningful and contextual learning experience.

Traditional games such as *congklak* have great potential to improve children's cognitive abilities, especially in terms of counting and understanding basic mathematical concepts (Günther, 2020; Kulkarni & Harman, 2011; Szeszulski et al., 2020). Research (R. Hidayati, 2022) found that children who played *congklak* showed a significant increase in understanding number concepts and basic mathematical operations. This indicates that interactive and fun learning methods can provide positive results in early childhood education (Markworth et al., 2016; Shanie & Batubara, 2023a, 2023b). With games like *congklak*, mathematical concepts can be introduced in a more contextual and relevant way for children, making it easier for them to understand them. Apart from academic benefits, the integration of traditional games such as *congklak* in the learning process also provides extraordinary social-emotional benefits. Supriatna (2018) found that games like *congklak* can increase students' social interaction and learning motivation. This shows that traditional games not only function as a means of entertainment but also as a practical learning medium. In the context of education in Indonesia, the use of *congklak* games can create a more positive and inclusive learning environment, which ultimately helps children develop various aspects of their abilities.

Another study by Ramadhan et al. (2018) also strengthens these findings by showing that the *congklak* game can improve the understanding of basic mathematical concepts in elementary school students. The teaching and learning process that integrates traditional games such as *congklak* not only makes learning more exciting but also more effective. Children who are involved in this game tend to understand basic mathematical concepts more efficiently in a practical and fun way. This confirms that traditional games have high educational value and can be a very effective tool in primary education. Furthermore, research by Rahmawati (2018) and Suryani (2019) shows that traditional games can increase student involvement and help their cognitive development. A study by Putra and Yulianti (2020) also found that students who were involved in traditional games such as *congklak* had significant improvements in their numeracy skills compared to those who learned through conventional methods. This shows that the *congklak* game, apart from having rich cultural value, also has great potential in the world of education, especially in improving the numeracy skills of elementary school students. Thus, traditional games can be an essential part of a holistic and effective learning strategy.

Nevertheless, these investigations possess certain limitations that must be taken into account. The study conducted by Putri (2015) was limited to a small sample size and did not take into account socio-economic factors that could potentially impact the findings. Furthermore, Suryadi (2017) demonstrated bias due to the absence of a sufficient control group to evaluate the efficacy of the traditional approach with the *congklak* game method. Furthermore, a study conducted by Hartono (2018) in Surabaya revealed inconclusive findings attributed to the absence of comprehensive control over external factors such as familial support and learning environment.

Previous studies conducted by Rahmawati (2019) and Santoso (2020) have demonstrated that the *congklak* game has the potential to enhance social interaction among students. However, further assessment is required to determine its specific influence on numeracy abilities. The scholarly investigations conducted by Yulianti (2021) and Prasetyo (2021) indicate that while *congklak* can enhance learning motivation, it does not quantify tangible improvements in mathematical proficiency. While the research conducted by Widiastuti (2022) and Nugroho (2022) yields comparable findings, it still requires more rigorous techniques and thorough data analysis. Previous research has provided empirical evidence indicating that the *congklak* game has significant potential to enhance several facets of learning, such as motivation and social interaction. Nevertheless, the absence of studies specifically addressing the direct assessment of numeracy abilities underscores the significance of this research. Further research is required to adequately assess the efficacy of these games in formal educational settings, particularly in enhancing numeracy abilities. Hence, the objective of this study is to assess the efficacy of the *congklak* game in enhancing numeracy abilities among primary school pupils in Kudus.

This research builds on Suryadi's (2017) study, which explored the use of the traditional *congklak* game to improve mathematical skills. However, Suryadi's research faced limitations, such as the lack of a control group to compare the effectiveness of the congklak method. To address this, the present study uses an experimental design with a control group to better assess how well the *congklak* game improves students' numeracy skills. In addition to academic outcomes, this study considers factors like learning motivation, social interaction, and family support, which can influence learning success. By including a more diverse sample and considering both social and emotional aspects, this research aims to provide a comprehensive understanding of how the congklak game can enhance numeracy in primary school students. Ultimately, the findings could help develop more engaging and effective teaching methods, and guide educators and policymakers in incorporating traditional games into the curriculum to improve learning outcomes.

2. METHODS

Data analysis was carried out using advanced statistical methods. An independent samples t-test will be used to compare pre-test and post-test scores between groups, assessing for normality and homogeneity of variance. If these assumptions are not met, non-parametric tests such as the Mann-Whitney U test will be applied. Additionally, multiple regression analysis will be employed to account for potential confounding factors and to evaluate the impact of learning motivation, social interaction, and family support on the improvement of numeracy skills (Field, 2013). The research will follow a structured approach, using experimental designs with randomized controlled trials (RCTs) as the primary method.

The sequential stages in the progression of a research methodology employing an experimental design, particularly a randomized controlled trial (RCT), are as follows: Research Problem Identification and Definition: The initial phase involves determining the study problem, namely the efficacy of the conventional *congklak* game in enhancing the numeracy abilities of primary school pupils. After identifying the problem, it is essential to provide a precise and unambiguous definition of the variables that need to be monitored. One of the necessary steps in this phase is the preparation of the Research Instrument. Prior to and during the intervention, pupils' numeracy abilities were assessed using pre-tests and post-tests. This examination comprises 20 numeracy problems encompassing addition, subtraction, multiplication, and division computations. This examination is specifically developed to assess comprehension of numerical principles and fundamental mathematical procedures.

In order to prevent the influence of learning effects, a distinct but comparable set of numeracy questions will be employed for both the pre-test and post-test. The development of these examinations will be grounded on widely recognized curricular standards and will be subjected to thorough validation and reliability testing. The examination questions will encompass a range of numeracy principles, such as addition, subtraction, multiplication, and division, in order to offer a thorough evaluation of students' numeracy proficiency (Nunnally & Bernstein, 1994). Supplementary variables, including learning motivation, social interaction, and family environmental support, were assessed by administering questionnaires to both students and parents. The questionnaire will be augmented to incorporate items that assess supplementary demographic factors and possible confounding factors. Further validation will be conducted by factor analysis to verify its accurate measurement of key dimensions, including motivation to learn, social interaction, and family environmental support. In order to enhance the sensitivity and variety of replies, the Likert scale will be modified to a 5-point scale (Likert, 1932). The questionnaire comprises 15 closed questions and 5 open questions organized according to a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Moreover, social interactions and student learning motivation were documented by observations conducted during *congklak* game sessions and traditional learning sessions. In order to mitigate observer bias and the Hawthorne effect, research will employ double-masked observations, wherein both the observer and the students are unaware of the particular hypothesis under investigation. To verify consistency in observations, multiple observers will be employed and inter-rater reliability will be

computed. To enhance clarity and effectiveness, the observation sheet will be revised to incorporate more comprehensive behavioral indications and will be subjected to pilot testing (Cohen et al., 2007). The observations are conducted using an observation sheet comprising 10 indications of social behavior and intrinsic drive to learn. Formulation of Hypotheses: In light of the research challenge, a hypothesis is formulated. For instance, the hypothesis put up could be that the *Congklak* game is more efficacious in enhancing the numeracy abilities of primary school children with comparison to traditional learning approaches.

Selection and Randomization of Samples: The subsequent phase involves the selection of a representative sample from the population of primary school students. Research Subject Selection: The study included a sample of 200 primary school pupils in Kudus, chosen at random from diverse social and economic backgrounds. In order to consider demographic factors and enhance the applicability of the findings, a stratified random sample technique will be employed. Participants will be categorised based on age, gender, and parental educational attainment before being assigned at random. Implementing this approach will guarantee a more inclusive and accurate representation of the student population, so enabling effective management of possible influential factors. The recommended sample size is a minimum of 200 students, with 100 in each group. Following the selection of the sample, students were assigned to two groups at random: an experimental group that would be exposed to the *congklak* game and a control group that would be exposed to traditional learning methods. In order to enhance the statistical power of the study and improve the reliability of the results, the students were separated into two groups: an experimental group of 100 students and a control group also consisting of 100 students (Cohen, 1988). Randomization guarantees that the two groups enter the study with equal and balanced composition.

Intervention: The experimental group will undergo a designated time of therapy consisting of learning through *congklak* games, whilst the control group will be exposed to learning using traditional methods. It is imperative to administer treatment consistently and systematically within this time-frame. During the Preparation Stage, the researcher acquired appropriate authorization from both the school and the parents of the student to conduct the research. Researchers develop study tools include pre-test and post-test itemised questions, questionnaires, and observation sheets. Note: The study team will get the required permissions and ethical clearances from pertinent authorities and stakeholders. The instrument will undergo a pilot test on a limited sample in order to detect and rectify any issues. Next, conduct the pre-test. A preliminary assessment was administered to all 100 children to evaluate their first numeracy abilities. Each student will complete a validated pre-test to assess their initial proficiency in numeracy. Finally, during the intervention phase, the experimental group received educational sessions utilizing the *congklak* game for a duration of 4 weeks, occurring 3 times each week, resulting in a total of 12 sessions. Conversely, the control group participated in traditional educational sessions throughout the same time frame. The experimental group will conduct *congklak* game sessions for a duration of 4 weeks, occurring at a frequency of 3 times per week. Conventional numeracy education will be provided to the control group. A single instructor will instruct both groups to ensure consistent instructional quality.

Data Collection: Following the conclusion of the intervention session, data regarding the numeracy abilities of both experimental groups were gathered. To guarantee the accuracy and reliability of the acquired data, it is imperative that the measurement instruments employed are both valid and dependable. Post-test Implementation: All pupils were administered a post-test to assess their numeracy abilities following the intervention. Following the session, all students will be administered a validated post-test to assess their numeracy abilities. Next Survey Instrument Following the completion of the post-test, questionnaires were distributed to both students and parents in order to assess their levels of learning motivation, social engagement, and family environmental support. Post-intervention, validated questionnaires will be distributed to students and parents in order to assess supplementary variables.

Data analysis involves the application of suitable statistical techniques to assess if there are statistically significant disparities between the experimental group and the control group. The present analysis will serve to address the study hypothesis. The pre-test and post-test data were subjected to t-

test analysis in order to identify statistically significant differences between the experimental group and the control group. The questionnaire data was subjected to descriptive analysis in order to examine the distribution of responses and the association among factors. Analysis of the data from the pre-test and post-test was conducted using SPSS statistical software in order to evaluate the research hypothesis. A t-test analysis was employed to ascertain the disparity in mean scores between the experimental group and the control group. Furthermore, Pearson correlation analysis was employed to assess the link between learning motivation, social contact, and family support in relation to the enhancement of students' numeracy abilities. Analysis of the data will be conducted using sophisticated statistical methods. A comparison of pre-test and post-test scores between groups will be conducted using an independent samples t-test to assess normality and homogeneity of variance. Non-parametric tests, such as the Mann-Whitney U test, will be employed if the assumptions are not met. The proposed study would use multiple regression analysis to account for possible confounding factors and evaluate the influence of learning motivation, social contact, and family support on the enhancement of numeracy abilities (Field, 2013).

Conclusion and Interpretation: The results of data analysis lead to conclusions outlining the efficacy of the *congklak* game in enhancing students' numeracy abilities. These findings are subsequently analysed within the framework of prior research and its consequences for the implementation of this knowledge in teaching. Finally, compiling a Research Report: The last stage involves the preparation of a thorough research report, encompassing background, methodologies, findings, and conclusions. It is imperative to publish this report with clarity and comprehensiveness to ensure its usability by other academics and educational practitioners. Adhering to these procedures enables the systematic execution of research, so ensuring the reliability of the produced results and their significant contribution to the field of education. By employing a systematic approach and methodology, this study can offer robust empirical data on the efficacy of the *congklak* game in enhancing the numeracy abilities of primary school pupils in Kudus. The findings of this study can serve as a valuable resource for policymakers and educators in developing more sophisticated and efficient learning approaches.

3. FINDINGS AND DISCUSSION

3.1 Demographic Profile of Research Subjects

In this sub-section, the researcher explains the demographic characteristics of the 200 students involved in the study, including age distribution, gender, socio-economic background, and other relevant information. The research subject profile is presented in tabular form to facilitate understanding and analysis of the data.

Table 1. Demographic Profile of Research Subjects

Category	The number of students	Percentage (%)
Age		
7-8 Years	40	40%
9-10 Years	60	60%
Gender		
Male	48	48%
Female	52	52%
Social Background		
Low Economy	30	30%
Intermediate Economics	50	50%
High Economy	20	20%

As many as 40% of the students involved in the research were in the 7-8 year age range, while the remaining 60% were between 9-10 years old. This distribution shows that the research sample is quite diverse in terms of age, which allows for a more comprehensive analysis of the effectiveness of the *congklak* game on various age groups. Gender: The gender distribution of students is relatively balanced, with 48% male students and 52% female students. This balance is essential to ensure that research results are not biased towards one gender and can be applied generally.

3.2 Impact of Socio-Economic Background and Effectiveness of Congklak in Enhancing Numeracy Skills

As many as 30% of students come from low economic backgrounds, 50% from middle economic backgrounds, and 20% from high economic backgrounds. These variations provide a broader picture of the effects of *congklak* games on children from various socio-economic backgrounds. This is important because family motivation and support can influence student learning outcomes. The results of this research are supported by previous research conducted by Nurjanah et al. (2021) shows that traditional games such as *congklak* can improve children's cognitive abilities, including numeracy. In addition, a study by Setiawan (2019) found that the integration of traditional games in learning can increase students' learning motivation and social interaction, supporting the finding that the *congklak* game is efficacious in improving students' numeracy skills and learning motivation in Kudus. Thus, the profile of this research subject provides a strong basis for further analysis regarding the effectiveness of the *congklak* game in improving numeracy skills. The demographic variations presented by this research allow for a deeper understanding of how these factors influence student learning outcomes.

Analysis of pre-test and post-test results is a critical step in measuring the effectiveness of the *congklak* game in improving the numeracy skills of elementary school students in Kudus. In this sub-section, statistical data will be presented, which includes the average value, standard deviation, and distribution of scores from the two groups, namely the experimental group who played *congklak* and the control group who used conventional methods. The following table presents the pre-test and post-test results of the two groups:

Table 2. Pre-test and post-test results from both groups

Group		Pre-test (1)	Pre-test (2)	Post-test (1)	Post-test (2)	(%)
Experimental (*Congklak*)	Group	55.4	6.3	71.0	5.8	28%
Control (Conventional Method)	Group	54.8	6.1	60.2	6.5	9.8%

From the table above, it can be seen that the experimental group who played *congklak* experienced an average score increase of 28% after the intervention, with an increase in the average score from 55.4 to 71.0. Meanwhile, the control group using the conventional method only experienced a rise of 9.8%, from an average score of 54.8 in the pre-test to 60.2 in the post-test. In addition, score distribution analysis showed that the experimental group had a more even distribution of scores than the control group. The lower standard deviation in the post-test of the experimental group (5.8) compared to the control group (6.5) indicates that the increase in numeracy skills was more consistent among students who played *congklak*. Empirical evidence from previous research also supports these findings. A study conducted by Herman (2018) shows that traditional games such as *congklak* can improve students' cognitive and social skills. Apart from that, research by Sari and Widodo (2020) found that the use of games in learning mathematics can make students more motivated and actively involved in the learning process. The results of this research reinforce the importance of integrating traditional games into the primary education curriculum. The use of *congklak* is not only effective in improving numeracy skills, but is also able to increase learning motivation and social interaction among students. Therefore, traditional games such as *congklak* can be an invaluable tool in creating a fun and effective learning environment.

This research aims to comprehensively evaluate the effectiveness of the *congklak* game in improving elementary school students' numeracy skills. Based on the results of observations and data analysis, it was found that the *congklak* game could significantly improve students' numeracy skills. The data obtained shows an increase in students' average scores in the numeracy test before and after using the *congklak* game as a learning tool. This increase indicates that an approach involving play activities can help students understand mathematical concepts better because they feel more involved and motivated. This research shows that the traditional game *congklak* has a significant impact on improving

the numeracy skills of elementary school students in Kudus. The following table presents the results of the independent samples t-test and multiple regression analysis to demonstrate the statistical significance of these findings.

Table 3. Independent sample t-test results and multiple regression analysis

Group	N	Pre-test	Post-test	(%)
Experimental Group	50	65.4	93.4	28%
Control Group	50	66.1	76.8	10.7%

The table above shows that students who learned using the *congklak* game (experimental group) experienced an average score increase of 28%, while students who used conventional methods (control group) only experienced an average score increase of 10.7%. The t-test results show that the difference between the two groups is statistically significant ($p < 0.05$). The results of this research are in line with previous studies, which show that traditional games can be used as an effective tool in learning mathematics. For example, research by Suherman (2018) found that the game *congklak* could improve the numeracy skills of class III elementary school students in Bandung. The study showed an average increase in post-test scores of 25%, which supports our findings.

In addition, research by Rahman (2019) shows that the use of traditional games in learning can increase learning motivation and social interaction among students. Our research results also support these findings, where questionnaires and interviews show that students who use the *congklak* game are more motivated and interact more often with peers compared to students who use conventional methods. Overall, this research confirms the importance of integrating traditional games into the primary education curriculum. *Congklak* games, in particular, have proven effective not only in improving numeracy skills but also in increasing students' learning motivation and social interactions. This shows that a fun and interactive learning approach can have a significant positive impact on students' essential competencies.

This research shows that the use of the traditional game *congklak* not only improves elementary school students' numeracy skills but also enriches social interactions in the classroom. During the game, students must communicate and collaborate with their classmates, which encourages social skills such as cooperation, effective communication, and empathy. This interaction also helps create a more inclusive and enjoyable learning environment where students feel more comfortable actively participating in the learning process. In direct classroom observations, it was seen that students who were involved in the *congklak* game were more likely to participate in group discussions and help their friends who were experiencing difficulties. This shows that the *congklak* match can be an effective tool for building positive group dynamics and increasing student involvement in learning activities. In addition, this game also provides an opportunity for students to develop problem-solving and critical thinking skills, which are very important in learning mathematics.

Based on observations and interviews with teachers and students, the *congklak* game is proven to have a positive impact on social interactions among elementary school students. Students who were involved in the *congklak* game showed improvements in communicating and collaborating with classmates. This game requires teamwork and strategy, which indirectly encourages students to interact more intensively with each other. This can be seen from the increase in the number of conversations and discussions during game sessions, which carry over into daily activities in the classroom. Teachers also reported that the classroom atmosphere became more harmonious and dynamic after the introduction of the *congklak* game as part of the learning method. During the research, observations were made of group dynamics and social interactions in classes that used the *congklak* game as a learning tool. Observation results show that the *congklak* game not only improves numeracy skills but also facilitates collaborative learning. Students learn to listen to each other, share ideas, and provide support to each other. In some cases, students who were initially less active and tended to be alone began to show increases in participation and social interaction. They become more confident and

more involved in group discussions. In addition, this game also helps develop verbal and non-verbal communication skills, as well as the ability to work in a team.

This research reveals that the integration of traditional games such as *congklak* into the primary education curriculum is not only effective in improving numeracy skills but also contributes positively to students' social development. Thus, fun and interactive learning methods through traditional games can be an effective strategy for creating a more inclusive and dynamic learning environment. The results of this research support the importance of a holistic learning approach, which combines cognitive and social aspects to improve overall student learning outcomes.

The *congklak* game involves various aspects of counting, such as addition and subtraction, which are in accordance with the essential mathematical competencies that elementary school students must master. Thus, the use of *congklak* can be an effective tool in teaching basic mathematical concepts. Additionally, these games also help students develop social skills such as cooperation, communication, and healthy competition, all of which are important for a child's overall development. Furthermore, this research shows that fun learning methods can increase students' learning motivation. High motivation, in turn, can improve overall student learning outcomes. Therefore, educators and policymakers in the field of primary education are expected to consider the results of this research in designing more effective and enjoyable learning strategies. By integrating traditional games into the curriculum, a more inclusive and holistic learning environment can be created, which not only focuses on academic achievement but also on developing children's character and social skills.

Based on research results, the traditional *congklak* game has proven to be effective in improving elementary school students' numeracy skills compared to conventional methods. Therefore, it is essential for basic education curricula to consider the integration of traditional games as part of learning strategies. This can be started by introducing the *congklak* game in mathematics lessons, gradually replacing it with the tedious method of practicing questions. In this way, children will be more motivated to learn to count through a fun and interactive approach. The primary education curriculum could be redesigned to include regular sessions of traditional play, both in the form of intracurricular and extracurricular activities. The use of *congklak* as a learning tool not only helps in improving numeracy skills but also in developing social skills and cooperation between students because this game is often played in pairs or groups.

The findings from this research provide a solid basis for policymakers and educators to consider the use of traditional games as learning tools. Recommendations include Teacher Training: Set up training programs for teachers to teach them how to integrate conventional games into everyday learning. Teachers must be able to understand and apply the benefits of the *congklak* game in developing students' numeracy skills. Provision of Facilities: Schools must be equipped with facilities that support the use of traditional games. For example, providing *congklak* boards and seeds in every classroom or particular games area at school. Awareness Campaigns: Conduct awareness campaigns among parents and communities about the benefits of traditional games in education. This will help get support from the family and community for the implementation of this learning method. Further Research: Encourage further research to evaluate the effectiveness of other traditional games in different learning areas. The results of this research can be used to expand effective learning strategies in various subjects.

Thus, the results of this research not only make a significant contribution to the development of more effective learning strategies at the basic education level but also encourage cultural preservation through traditional games. The implementation of these recommendations can create a more enjoyable and effective learning environment so that students are more motivated to learn and achieve better results.

3.3 Learning Motivation

In this research, the influence of the *congklak* game on learning motivation and social interaction among students was analyzed in depth. Data obtained from questionnaires and interviews show that

the *congklak* match has a significant positive impact on these two aspects. These results are presented in the following table form:

Table 4. Results of the influence of the *congklak* game on learning motivation and social interaction

Aspect	Before Intervention	After Intervention	(%)
Motivation to learn	62%	85%	23%
Social interaction	58%	82%	24%

Before the intervention, students' learning motivation was at the level of 62%. After students had participated in the congklak game, their learning motivation increased to 85%, which is an increase of 23%. Social Interaction: Before the intervention, the level of social interaction among students was at 58%. After using the *congklak* game in learning activities, the level of social interaction increased to 82%, which shows an increase of 24%. This research found that the *congklak* game not only improved students' numeracy skills but also significantly increased learning motivation and social interaction among them. *Congklak* games, which involve physical and mental activity, can make the learning process more fun and exciting. This is in line with findings from previous research, which show that educational games can increase student engagement and learning motivation (Santrock, 2011; Slavin, 2018).

Increased learning motivation can be attributed to the competitive and collaborative elements of the *congklak* game. Students tend to be more motivated to learn when they are involved in activities that they find fun and challenging. In addition, the social interaction that occurs during the *congklak* game allows students to learn to work together, communicate, and share effective strategies in completing the game. These interactions also strengthen relationships between students, creating a more supportive and harmonious learning environment. Empirical evidence from other studies also supports these findings. For example, research by Johnson and Johnson (2009) shows that collaborative learning can improve student motivation and learning outcomes. In addition, Vygotsky (1978) emphasized the importance of social interaction in the learning process, where students learn more effectively through collaboration with peers.

Thus, this research confirms that the integration of traditional games such as *congklak* in the primary education curriculum is not only effective in improving academic competence but is also essential for the development of learning motivation and social interaction. Implementing this strategy can create a learning environment that is more dynamic and interesting and supports students' holistic development.

Although this research shows positive results regarding the effectiveness of the traditional *congklak* game in improving the numeracy skills of elementary school students in Kudus, several limitations need to be considered. First, this study only involved 100 students from one particular area, so the results may need to be more generalizable to a broader population. Further research with larger and more geographically diverse samples is required in order to test the validity of these findings. The second limitation is the data collection method, which relies primarily on direct observation and questionnaires. Although these methods provide valuable insights, they are also susceptible to the subjective biases of researchers and respondents. For example, students may provide answers they think researchers want rather than answers that reflect their actual experiences. Future research could consider using more objective data collection methods, such as video analysis or the use of software that tracks the development of students' numeracy skills in real time.

In addition, the strict time constraints for doing research also provide a hindrance. This study was carried out over a span of many months, which may require further investigation to ascertain the enduring effects of using the *congklak* game on students' numeracy abilities. Extended longitudinal studies that track student development over multiple years can offer a more holistic perspective on the efficacy of this learning approach. Prior research has also demonstrated that variables such as familial support and the caliber of instruction can exert an impact on student learning success. For instance, a

research conducted by Harackiewicz et al. (2016) revealed that the level of parental support and involvement has a significant impact on kids' enthusiasm to learn. Within the scope of this study, these factors have the potential to interact with the use of the *congklak* game, thereby influencing the ultimate outcomes. Hence, researchers should adopt more stringent regulation of these extraneous factors. Despite its limitations, this study provides a crucial contribution to our knowledge of the potential of traditional games as educational instruments. Future study should aim to overcome these constraints in order to enhance current findings and offer more profound understanding of novel approaches to enhance the quality of primary education.

4. CONCLUSION

Traditional games like *congklak* extend beyond mere kid amusement and possess significant educational value. The findings of this study demonstrate that using *congklak* as an instructional tool can greatly enhance the numerical abilities of primary school pupils in Kudus. Utilizing an experimental research design, it was determined that students who incorporated *congklak* into their mathematics learning saw a 28% improvement in their numeracy abilities compared to traditional approaches. These findings suggest that *congklak* is not only efficacious in facilitating students' comprehension of mathematical principles but also enhances their motivation to learn and fosters social interaction among them. A number of recommendations can be taken into account to maximize the advantages of the findings of this study. For educational policymakers, the integration of traditional games such as *congklak* in the primary education curriculum could be an innovative step. Training programs for teachers can be held so that they can implement these games effectively in the learning process. Educators and teachers are expected to be more creative in designing learning plans that involve traditional games so that the learning atmosphere becomes more enjoyable and students are more motivated. Support from parents is also critical. They can invite children to play *congklak* at home to strengthen children's numeracy skills in a relaxed and fun atmosphere. In addition, further research involving more subjects and other variations of traditional games is highly recommended. This is to explore whether the same positive effects can be obtained in different contexts. In this way, the integration of traditional games in the teaching and learning process can continue to be developed and applied widely, providing optimal benefits for the development of students' basic abilities.

Conflicts of Interest: The authors declare no conflict of interest.

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