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IMPACT OF TRADITIONAL GAMES ON CRITICAL AND CREATIVE THINKING IN PRIMARY SCHOOL STUDENTS: A QUASI-EXPERIMENTAL MIXED-METHODS STUDY

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Abstract

This study explores the influence of traditional Turkish games on the development of creative and critical thinking in primary school students. These traditional games, now at risk of disappearing, may hold untapped educational potential. Using an exploratory sequential mixed-methods design, interviews with 12 primary school teachers identified themes indicating that such games foster critical thinking, analytical ability, mathematical reasoning, creativity, confidence, teamwork, and strategic planning. These qualitative insights guided a quasi-experimental study with 79 fourth-grade students: an experimental group (39 students engaged in traditional games) and a control group (40 students with regular activities). The intervention involved 40-minute sessions, four days a week for eight weeks. Pretest scores showed no significant differences between groups, but posttests revealed marked improvements in the experimental group. These results suggest that integrating traditional games into classroom settings can be an effective alternative to conventional teaching for promoting critical thinking.

Keywords: Traditional games, critical thinking, creative thinking, play-based learning.

INTRODUCTION

The pedagogical strategies used within the Turkish primary education system reveal a dominant focus on silent observation, memorisation, frequent testing, and restrictions on social interaction and recreational activities, with particular emphasis on multiple-choice assessments. In some schools, students spend more than 8 hours a day indoors to enhance their academic skills. This approach relies on the belief that rigorous pedagogical methods—such as silent individual study and regular assessments—will improve academic achievement and help secure a more promising future for children.

However, reports by OECD (2019) and UNESCO (2021) emphasise the importance of children acquiring cognitive, problem-solving, social-emotional, and transformative skills by 2030. These skills cannot be effectively developed through rote memorisation, individual study or multiple-choice assessments alone. Instead, play-based learning emerges as a crucial pedagogical approach, fostering

cooperation, analytical reasoning, and inference, thus supporting the development of cognitive and social abilities vital for success in the 2030s. Studies (Yılmaz & Griffiths, 2023; Lee et al., 2020) show that games offer benefits beyond mere entertainment, functioning as tools for enhancing physical, emotional, social, and cognitive growth. Given the decline of traditional games, there is potential to reintroduce them as valuable alternatives to the dominant, outdated educational methods prevalent in Turkey.

Children gain many benefits from participating in games beyond simple entertainment. The idea of 'tradition' relates to customs passed down through generations, highlighting the importance of preserving cultural heritage and maintaining traditional practices (Adorno, 1992). In this context, traditional games can help sustain cultural identity and improve cognitive skills, especially in an era where learners are immersed in digital educational environments (Nussbaum, 2010).

Although traditional games may confer cognitive benefits, empirical research on their impact on cognitive skills remains limited (Vygotsky, 1978). Yılmaz and Griffiths (2023) conducted a study on children's problem-solving abilities through games, finding that nearly all studies published between 2000 and 2019 reported positive effects of both video and traditional games on students' problem-solving skills. However, research specifically focused on traditional games remains limited, with only three studies examining their effects. Despite growing recognition of the value of game-based learning (Fung & Chung, 2025; Aiono, 2020), most research has concentrated on digital or structured games (Passos et al., 2024; Rosli & Saleh, 2022). Empirical evidence on the cognitive demands and interactional dynamics of traditional games is limited (Yılmaz & Griffiths, 2023; Lestariningrum, 2017; Petrovska et al., 2013). Therefore, this study aims to address this gap by developing a framework that links traditional games to critical and creative thinking.

Purpose and Research Questions

This study investigates the effect of traditional Turkish games on the critical and creative thinking skills of children aged 9-11. The study unfolds in two phases: The study design is illustrated in Figure 1 below.

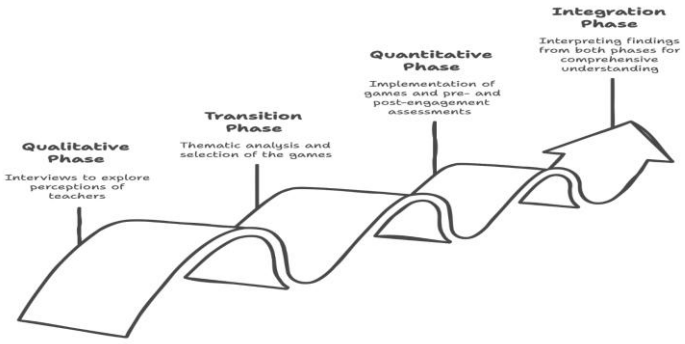

Figure 1. The study design.

To guide this research, the following questions were formulated :

1. Could traditional games (Mule Stake, Dwarf Hall, Zırdır Zımba, Arab Hair, Hadgirchief Grap) contribute to the development of critical thinking skills? If so, in what ways?
2. Does an eight-week traditional game intervention enhance children's critical thinking compared to a non-intervention control group (as measured by the Creative Thinking Task for Children scale)?

Literature Review

Critical Thinking & Play

Critical thinking (CT) is fundamental to effectively addressing the challenges inherent in contemporary society and achieving academic success. Rather than simply accumulating knowledge,

CT emphasises understanding the processes behind knowledge creation.—how information is generated, supported, and evaluated. This approach underscores the importance of gathering evidence to either substantiate or challenge the validity of presented information or knowledge (Hudgins & Delman, 1986).

Critical thinking involves analysing, evaluating, and synthesising information systematically. It's essential for problem-solving and decision-making, vital for academic and life success. Developing this skill helps navigate complex situations by encouraging questioning, responsibility, and cognitive growth. See Table 1 for critical thinking and sub-skills.

Table 1. Core critical thinking skills and their sub-skills.

Core Skill	Definition	Key Sub-skills	Example
1. Interpretation	Understanding and communicating the significance of experiences or information.	Categorizing, decoding significance, clarifying meaning	Clarifying what a chart or statement means.
2. Analysis	Recognising connections between statements, questions, and concepts	Examining ideas, detecting and analyzing arguments	Distinguishing main ideas from supporting evidence.
3. Evaluation	Assessing the credibility of sources and the strength of arguments strength.	Assessing credibility, judging reasoning strength	Determining if conclusions follow logically from data.
4. Inference	Making conclusions and developing hypotheses based on relevant information.	Querying evidence, conjecturing alternatives, drawing conclusions	Predicting likely outcomes from available evidence.
5. Explanation	Expressing and explaining one's reasoning clearly and convincingly logically.	Stating results, justifying procedures, presenting arguments	Explaining the rationale behind a decision.
6. Self-Regulation	Monitoring and adjusting one's cognitive processes and beliefs.	Self-examination, self-correction	Revising one's opinion when presented with new evidence.

(Adapted from Facione, 2011, p. 9)

CT skills can be developed through interactive learning environments and techniques like Socratic questioning, visualisation tools, simulations, and game-based activities (Daniel & Auriac, 2011; Gelder, 2001). However, the role of games and play in developing these competencies, especially among children, remains underexplored in the literature. Play, by broadening children's perspectives and stimulating creativity, is known to support cognitive development and problem-solving (Devecioğlu & Karadağ, 2016). According to Bruner (1996), adapting play to educational settings can bridge cultural traditions and contemporary learning goals. Traditional games, in particular, encourage flexible problem-solving, perspective-taking, and critical thinking.

Critical thinking skills enable individuals to analyse, evaluate, and make decisions based on evidence and reasoning. These skills are essential for fostering independence and creativity in learners, helping them understand and address the complex issues of today's world (Alsaleh, 2020). Facione's (1990) taxonomy identifies six essential skills that constitute critical thinking: 1) interpretation (clarifying meaning and categorisation), 2) analysis (examining ideas, identifying arguments, and scrutinising reasoning), 3) evaluation (assessing claims and arguments critically), 4) inference (querying evidence, considering alternatives, and drawing informed conclusions), 5) explanation (articulating results, justifying procedures, and presenting coherent arguments), and 6) self-regulation (conducting self-examinations and implementing self-corrections). Moreover, problem-solving is an integral aspect of critical and creative thinking.

The relevant literature highlights that critical thinking can be improved through interactive learning platforms, Socratic questioning, visualisation tools, simulations, and games (Gelder, 2001). The

research also suggests that play may improve children's critical and creative thinking (Fung & Chung, 2025; Aiono, 2020). Incorporating playful strategies in classroom settings, such as games and dialogic interactions, may offer valuable resources for addressing emotional distress and increasing creativity (Sebastián et al., 2025). Samuelsson (2025) emphasises that blending imagination, play, cultural knowledge, and factual information can enhance teaching methods and support children's learning. A pedagogy that promotes learning through play and beyond makes a significant contribution to children's education (Magnusson, 2024). In this context, play-based learning strategies can help children develop skills and attitudes that empower them to become problem solvers and to imagine and create new ideas.

Traditional Games

Several studies highlight the beneficial effects of culturally embedded games across a range of developmental domains, including physical, social, and cognitive skills (Lestariningrum, 2017; Petrovska et al., 2013). Traditional games, transmitted across generations, serve not only as sources of entertainment but also as mechanisms that facilitate socialisation, promote physical activity, and enhance cognitive development (Huizinga, 1955; Rogoff, 2003). In contrast to modern digital games that often emphasise rapid response times and reflexive actions, traditional games prioritise strategic thinking, anticipation, decision-making, and the iterative refinement of strategies (Gee, 2003).

Regarding traditional Turkish games, such as "Mule Pile" and "Dwarf Hall," these activities necessitate strategy and planning, thereby promoting decision-making skills and the exploration of alternative solutions (Özdemir, 2006). Furthermore, games like "Zırdır Zımba" and "Arab Hair" help develop decision-making and strategic thinking skills. These games incorporate elements that support both physical and cognitive development. For this study, five traditional Turkish games at risk of fading away were chosen, each briefly discussed below.

Mule Stake (Katır kazığı)

The mule stake is a traditional Turkish game where one player, the mule, tries to tag others who are attempting to retrieve objects from a circle. A rope tied to a wood piece at the circle's centre limits the mule's movement. As the other players aim to collect their belongings without being caught, they must strategise and evaluate their moves. Figure 2 illustrates the game's structure and interactions.

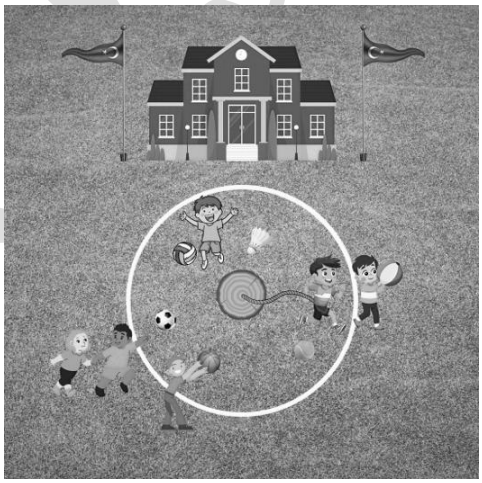

Figure 2. Mule stake game.

The Mule Stake Game encourages children to analyse situations and make logical decisions, enhancing their problem-solving and decision-making skills. It promotes communication and cooperation among players, which may foster critical thinking through strategy discussions. Since it can be played both indoors and outdoors, players can adapt their strategies to different environments.

Dwarf Holl Game (Cüce Höl)

The game involves a straight line and a circular line opposite each other. The goal is for a chosen player to place a target tile before other players reach the line, while the others try to hit it to escape. Players must plan strategies, communicate effectively, cooperate, think critically, and adapt to their surroundings in this open-field game.

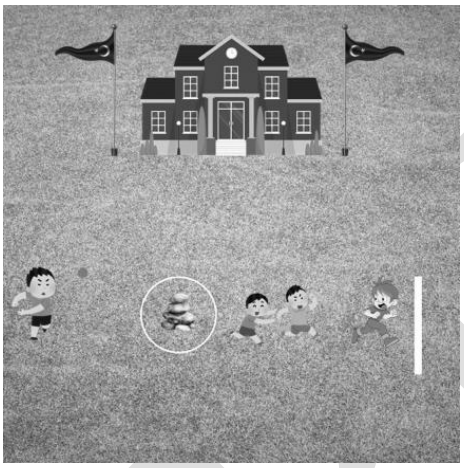

Figure 3. Dwarf holl game.

In this game, children must develop strategies to hit the target by throwing stones. The game may develop children's hand-eye coordination and support their ability to think and move towards the target. This process emphasises focusing, planning and evaluation skills. In addition, evaluating each shot's results and developing strategies for the next shot may improve children's ability to learn from feedback.

Zırdır Zımba

The game involves eliminating players by touching them outside a circle. The chosen player can only exit the circle by hopping on one foot and attempting to tip the others. Another way to tip off the others is to ask riddles to the players. Other players use strategies like hiding or running away to avoid being caught. Figure 4 shows the game.

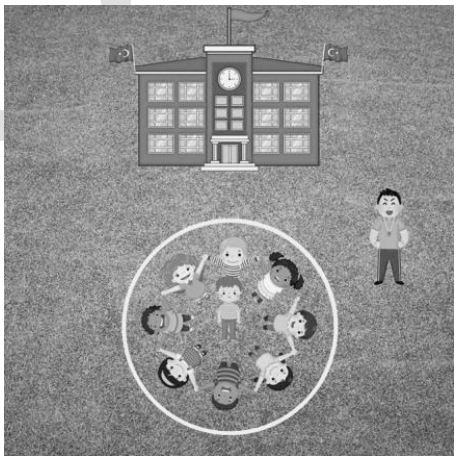

Figure 4. Zırdır zımba game.

Acting in a limited space enhances children's flexibility and adaptability. Zırdır Zımba is a game that integrates physical and cognitive skills. The selected player, moving on one leg, must make strategic decisions and analyse opponents to succeed. This game may develop logical thinking and analytical

skills, while predicting others' moves strengthens foresight. Players evaluate their options and must think critically to anticipate and adjust strategies effectively.

Arab Hair (Arap Saçı)

The Arab hair game involves 5 or 6 players who create a spider web with string and work together to unravel it. Usually played indoors, it can also be enjoyed outdoors in gardens during spring and summer. See Figure 5.

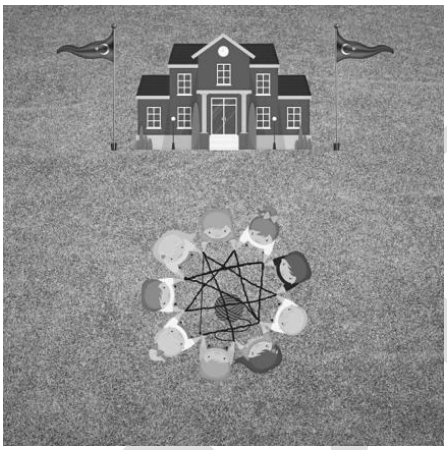

Figure 5. Arab hair game.

This game may enhance children's memory, attention, and strategic thinking skills. Players must recall and plan the sequence to untie the rope knots, fostering observation and logical analysis. It may also encourage focus and analytical thinking by reviewing past moves while promoting teamwork and collaborative problem-solving.

Handkerchief Grab (Mendil Kapmaca)

The game involves two groups. Players opposite each other try to grab a handkerchief from the referee and return to their seats without being caught.

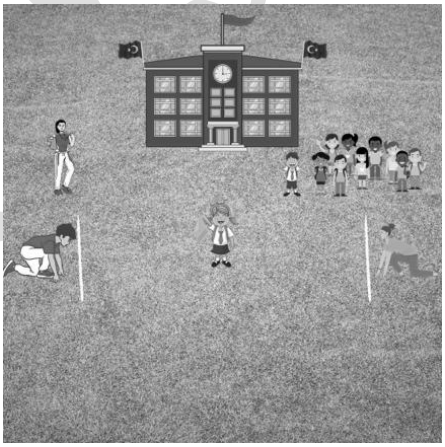

Figure 6. Handkerchief Grab Game.

It can be played indoors or outdoors, with an equal players in each group, as shown in Figure 6.

METHOD

Research Model

This study employed an exploratory sequential mixed-methods design, which is particularly appropriate when the research aims first to explore a phenomenon in-depth through qualitative

inquiry and then to test a hypothesis based on the quantitative findings (Creswell & Plano Clark, 2017).

1. Qualitative Phase: Semi-structured interviews with 12 experienced primary school teachers in two settings identified core themes regarding games' potential impact on critical and creative thinking subskills. Content analysis was conducted, and both member checking and peer debriefing supported the credibility and reliability of the study.

2. Quantitative Phase: Informed by focus group results, a quasi-experimental, pretest-posttest, control group design was implemented, with 79 fourth-grade students. The experimental group of 39 participants played traditional games during class hours, while the 40 in the control group continued with regular activities.

The integration of qualitative and quantitative phases occurred at the interpretation stage. Qualitative findings were used to select the games to be implemented, and the quantitative results helped validate and extend the initial qualitative insights (Creswell & Plano Clark, 2017). This sequential approach enabled a deeper and more comprehensive understanding of the role of traditional games in enhancing critical thinking skills in the elementary school context. This approach improves the reliability of results by utilising data from multiple sources, minimising biases, and providing a clearer understanding of the findings (Johnson et al., 2007; Tashakkori & Teddlie, 2010).

Part I: Qualitative Research Design

Data Collection Tool

Özden Gürbüz's (2016) study examines 25 traditional children's games in Turkey, highlighting their potential to enhance cognitive skills, including problem-solving and critical thinking. For this research, five games—Mule Stake, Zırdır Zımba, Cüce Hol, Handkerchief Grab, and Arab Hair—were selected through consultations with sports experts and academics to investigate their potential effectiveness in promoting creative and critical thinking.

For data collection, we developed an initial version of the qualitative interview form after reviewing the literature on traditional games and cognitive thinking skills. We sought feedback on its content and readability from two field professors, which ultimately led to the development of the final semi-structured data collection interview form.

In the semi-structured interview form, the questions focused on two main concerns: (1) whether the presented games could enhance children's critical thinking skills, and if so, which specific sub-skills are influenced; and (2) the feasibility of implementing these games in a classroom setting.

Data Collection Process

Researchers conducted focus group interviews in two settings. First, they outlined core thinking skills and introduced five games—Mule Stake, Zırdır Zımba, Cüce Hol, Handkerchief Grab, and Arab Hair—with illustrations and rules, without hinting at expected outcomes. The participants were then interviewed using the form. Each session was recorded, transcribed, and analysed to identify themes related to the games' effectiveness.

Participants

Twelve elementary school teachers with experience in teaching critical thinking and incorporating games were purposively selected for focus group interviews. Selection criteria included seniority, willingness, and permanent status. All participants consented voluntarily.

Data Analysis

Qualitative data were analysed using NVivo 16. Content analysis was conducted using themes, subthemes, and codes. The themes for the content analysis were developed based on the interview questions that were asked. The dataset was primarily used to determine the codes, which were mostly decided at the paragraph level.

Validity and Reliability Studies

For the credibility of the findings, we employed member checking. After the interviews, we summarised key themes and returned them to participants for verification and potential additions (Mayring, 2014). Additionally, we utilised peer debriefing throughout the research process. Two researchers coded the transcribed data and discussed emerging themes to reduce bias and increase reliability. This ongoing dialogue helped mitigate researcher bias and strengthen the reliability of our findings (Patton, 2002). Additionally, the data triangulation method was utilised, incorporating various methods and data sources (both qualitative and quantitative) to examine the phenomenon. This approach helped to validate the findings and enhance their generalizability (Kenny, 2019).

Trustworthiness

To gather comprehensive data, each interview lasted approximately 90 minutes, enabling in-depth interactions. This extended engagement enhanced the credibility of the research, aligning with the recommendations of Lincoln and Guba (1985). Peer debriefing was also utilised, following the guidance of Hail et al. (2011), by sharing the research findings with an external researcher to identify any potential biases.

Additionally, a member-checking procedure was implemented, allowing participants to verify the accuracy and relevance of the results in relation to their views (Birt et al., 2016). Participants were selected through purposeful sampling to enhance the transferability of the findings (Kemper et al., 2003). In this dependability study (Akkerman et al., 2006), the methodology and results were reviewed by a field expert who audited the data collection and analysis processes. An audit trail was maintained to ensure that the findings were consistent with the collected data, thereby supporting confirmability (Akkerman et al., 2006).

Part II: Quasi-experimental Study

Participants

The study involved 79 fourth-grade children, aged 9 to 11 years. Eight fourth-grade classes at a state school in Gaziantep were selected to complete the Creative Thinking Task for Children (CTTC) scale. Among these, four classes that exhibited no statistically significant differences in the pre-test were randomly assigned to either the experimental or control group, with two classes in each condition. Given the similarity in class size and demographic background, this class-level randomization was employed to enhance comparability between groups and to mitigate selection bias.The experimental group of 39 students played traditional games, while the control group of 40 students continued regular activities.

To maintain environmental consistency, both groups were selected from the same school and experienced similar classroom conditions. The control group received the standard instructional program, while the experimental group participated in traditional games as part of the intervention. Each group's sessions were led by different instructors to prevent the mixing of instructional techniques.

Data Collection Tool

The Creative Thinking Task for Children (CTTC) scale, developed by Tatlı and Artar (2022), was used as both a pre-test and a post-test. The scale consists of 11 items, each scored from 0 to 3, for children. It has a four-factor structure: originality, elaboration, fluency, and divergent thinking.

The scale includes a set of tasks that directly assess children's creative thinking processes. Children demonstrate their creative thinking skills in line with the tasks set. The tasks aim to evaluate children's problem-solving processes, their ability to generate different and new ideas, and their originality. In these tasks, children develop their solutions in line with the given clues or problems, and these solutions are evaluated using criteria such as originality, flexibility, fluency, and elaboration. The total Cronbach Alpha reliability is .67, with sub-dimensions scoring originality .73, elaboration .60, fluency .61, and divergent thinking .69.

CTTC offers a structured method for assessing children's creative thinking, focusing on specific aspects such as fluency, originality, and flexibility. However, it overlooks broader elements like questioning and metacognition. Although the tool demonstrates acceptable reliability and validity, these have primarily been tested within specific cultural and educational contexts, which may limit its generalizability. As a task-based assessment, the CTTC may not fully capture all cognitive processes involved in traditional games. Despite these limitations, it was appropriate for this study due to its alignment with the developmental stage of primary school children's creative thinking, its established scoring system, and its provision of measurable indicators related to targeted creative skills interventions.

Facione (2011) defines critical thinking as purposeful, self-regulatory judgment involving interpretation, analysis, evaluation, inference, and explanation of the considerations behind that judgment. It involves both cognitive skills and dispositions, guiding belief and action toward justifiable conclusions. Facione emphasises that critical thinking is distinct from, but may include, elements of creative thinking. Creativity generates ideas; critical thinking evaluates, clarifies, and justifies them. Paul and Elder (2014) say critical thinking is a disciplined reasoning process that includes creativity, such as imagination, curiosity, and problem formulation. They argue that creativity is essential for critical thinking, helping develop and evaluate new insights. While often treated separately, prior research suggests critical thinking encompasses creative components, such as generating perspectives or solutions before evaluation. Our use of a creative thinking measure was aimed at assessing these subprocesses within critical reasoning.

In the data analysis phase, the scoring process was conducted by two independent researchers who evaluated students' papers using a standardised rubric to ensure consistency across assessments. Each rater independently reviewed all papers, and their scores were subsequently compared. Inter-rater reliability was assessed using Cohen's Kappa to quantify the agreement between the raters. The analysis revealed a Kappa value of .91, indicating a high level of agreement and excellent reliability between the raters (Koo & Li, 2016).

The Intervention: Implementing Games in the Classroom

Selection of Games

Employing a mixed-methods design, the study integrated qualitative (focus group interviews) and quantitative (Quasi-experimental study) components to ensure coherence. The initial qualitative analysis guided the selection of traditional games for the experimental phase. Following the intervention, the quantitative results were complemented by qualitative findings on student engagement in critical and creative thinking. The integration of these data during interpretation provided a comprehensive and unified understanding of how traditional games support cognitive development and grounded the quantitative findings in a broader contextual framework.

Four traditional games—Mule Stake, Zırdır Zımba, Dwarf Hall, and Arab Hair—were identified through focus group interviews with elementary school teachers, who posited that these games could enhance various analytical and cognitive sub-skills. The Handkerchief Grab game was excluded due to its anticipated lack of contribution to the development of critical thinking.

Implementation of the Games

The study used a pretest-posttest control group design. Seventy-nine participants completed the critical thinking assessment before the intervention. The experimental group participated in games for eight weeks, with sessions lasting approximately 40 minutes, four times a week. Rules were explained at the start of each session, prioritising children's safety.

The implementation fidelity was assessed using a checklist for observations and weekly session records. In the experimental group, 95% of the intended intervention elements were successfully executed, with an average session duration of 40 minutes. Observers rated the quality of delivery highly, with a mean rating of 4.6 out of 5 (O'Donnell, 08). In the control group, educators adhered to

the standard curriculum and had no exposure to the intervention content, as confirmed through biweekly interviews and reviews of lesson plans. No instances of contamination were identified between the two groups.

Data Analysis

All students were reassessed after the intervention using the same creative thinking assessment scale administered during the pretest phase. Normality, outliers, and missing values were assessed to determine whether the dataset was suitable for further analysis. Univariate normality was evaluated by calculating skewness and kurtosis for each variable. All values ranged between -2.0 and +2.0, indicating that the data generally followed a normal distribution (George & Mallery). The changes in scores from the pretest to the posttest for both groups were analysed using t-tests to determine if there was a significant improvement in scores after implementing traditional games. Additionally, Pearson correlation coefficients were calculated for each group individually to examine the relationship between pre-test and post-test scores. Finally, a repeated measures ANOVA was conducted to investigate the effects of time, group, and their interaction.

RESULTS

Focus Group Interviews: Can traditional games help develop critical thinking skills?

The study revealed that incorporating traditional games into education may boost children's critical and creative thinking. Games like Mule Stake and Dwarf Hall foster analysis, attention, evaluation, cooperation, problem-solving, and strategic planning. Zırdır Zımba may enhance linguistic abilities, self-regulation, and strategic thinking. Arab Hair improves problem-solving, analytical skills, and collaboration. Handkerchief Grab supports concentration, discipline, and motor skills but may be less effective in promoting cognitive abilities.

Table 2. Enhancement of children's critical and creative thinking skills through traditional games.

Traditional Game	Sub-skill	How the Mechanism Supports Development
Mule Stake	Analysis	Players must analyze the environment and choose optimal actions.
	Attention	Focus is required to observe subtle cues and anticipate changes.
	Cooperation	Cooperation enhances coordinated execution of game tasks.
	Evaluation	Players monitor others' actions, improving perceptual awareness.
	Self-confidence	Successful decision-making builds confidence in one's abilities.
Dwarf Hall	Evaluation	Involves evaluating options and solving problems under constraints.
	Analysis / Math skills	Numerical reasoning emerges as players calculate moves and outcomes.
	Attention	Requires sustained focus to track patterns and opponent actions.
	Strategic planning	Players plan sequences of moves to achieve game objectives.
	Cooperation	Collaborative elements promote shared planning and role distribution.
Zırdır Zımba	Linguistic skills	Using riddles may improve verbal skills.
	Self-regulation	Players assess their decisions and adjust approaches, promoting reflective thinking.
	Analysis	Encourages gathering information and testing hypotheses within game scenarios.
	Strategic thinking & Evaluation	The game's competitive structure requires anticipating moves and planning responses.
	Cooperation	Players must coordinate and collaborate to progress, enhancing teamwork.

Table 2 (Continued). Enhancement of children's critical and creative thinking skills through traditional games.

Traditional Game	Sub-skill	How the Mechanism Supports Development
Arab Hair	Problem-solving	Learners identify challenges and test possible solutions.
	Analysis	Requires anticipating opponent decisions and planning accordingly.
	Inferincing / Decision-making	Fast-paced choices strengthen judgment and evaluative thinking.
	Planning	Players organize steps to achieve successful outcomes.
	Analytical skills	Requires breaking down situations into components to guide actions.
	Cooperation	To be able to untie the rope nots, they have to work together.
	Concentration	Players have to focus on the complex web they have created to untie the nots.
Handkerchief Grab	Concentration	Players sustain focus to react at the correct moment.
	Rule-following	Adhering to structured rules fosters discipline and self-regulation.
	Strategy	Players position themselves and plan timing to succeed.
	Self-confidence	Performing under pressure enhances belief in one's abilities.
	Motor skills	Quick physical responses strengthen coordination and agility.

Table 2 shows how each game can develop specific subskills in children's thinking.

The findings of the focus group study indicated that traditional games may enhance children's critical thinking skills and related subskills, including analytical thinking, mathematical aptitude, creativity, self-confidence, teamwork, and strategic planning.

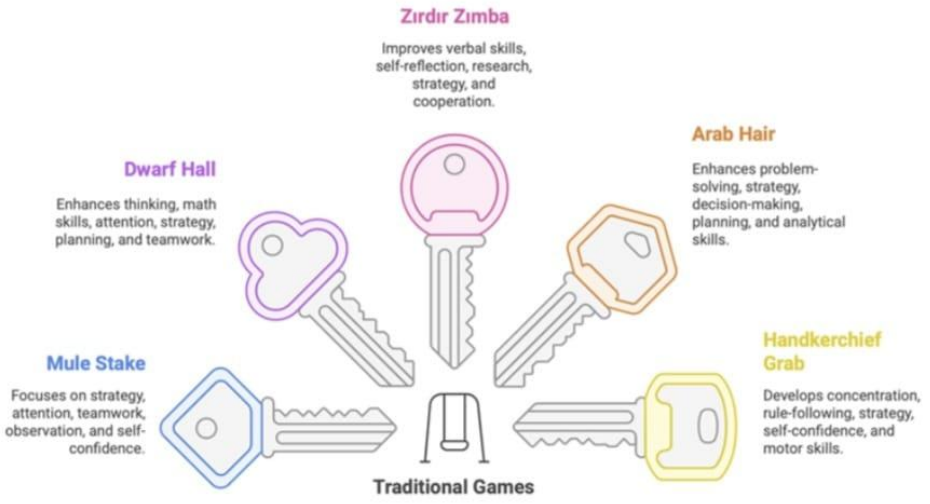

Figure 7. The games and their potential for enhancing critical thinking.

Figure 7 illustrates how each traditional game may enhance children's critical thinking abilities and promote the development of specific subskills.

Mule Stake (Katır Kazığı) & Critical Thinking Skills

The findings of the study indicate that engagement in the Mule Stake game has the potential to facilitate the development of essential competencies among participants. Specifically, involvement in Mule Stake appears to enhance analytical abilities, sustained attention, and teamwork skills. Furthermore, the game may support ongoing assessment of team dynamics and serve to bolster self-confidence through reflective practice.

For example, Kurt stated:

> "This game requires creating chaos and acting together simultaneously, where you must distract the player's attention in the circle. If he does it individually, he will get caught (…). They have to learn to work cooperatively."

In line with Kurt, Mira expressed her ideas and added the game might also improve analysis and strategy:

> "There is more need for cooperation in this game than in other games. While some players distract the tipped player, others try to get their stuff. It is a game that requires a little more strategy (…). They strategise as a group, and it is an entirely cooperative game. Everyone cooperates to distract the mule; if you distract the mule, I will take it, and so on."

Mira agreed:

> "She (the child) needs to determine a strategy, focus her attention, follow the chosen player well, and look at her friends. She may learn from friends about the strategies they use. If they fail, she must abandon the strategy and devise an alternative approach."

Tan also believes the game will enhance the power of analysis and evaluation:

> "The child will try not to get caught by the rival player [the mule] and will follow his partners; for example, the child has to observe the rivals at that moment and analyse their motions, that is, observe them. At this point, it will develop the same sub-skills."

Ezel shares Tan's viewpoint on the issue, adding that the game might also improve problem-solving skills:

> "Making observations will improve analytical thinking and enhance students' decision-making, problem-solving, and other skills."

Ela also believes that the game will foster critical thinking ability and qualities such as being analytical, cooperative, and self-confident.

> "It will develop problem-solving and analytical thinking skills in students. Increases cooperation and self-confidence." In line with Ela, Kurt thinks that: "This might improve students' self-confidence; they also have to think quickly and make decisions more rapidly."

Dwarf Hall (Cüce Höl) & critical thinking skills

The analysis of Dwarf Hall highlights the cognitive and social skills it fosters. Players engage in complex evaluation and problem-solving, often under various constraints, which may encourage the development of reasoning through frequent mathematical calculations and outcome assessments. The game demands sustained attention to follow evolving patterns and anticipate opponent actions, while also requiring strategic planning to achieve objectives. Furthermore, Dwarf Hall's collaborative components support cooperation, as players engage in shared planning and effectively distribute roles to achieve collective success.

For example, Aren thinks that the Dwarf Hall game might improve strategic thinking skills in children:

> "The game promotes cooperation and strategic thinking while helping children develop psychomotor skills. (…) It is not a one-dimensional activity, but it enhances cognitive abilities and quick thinking. As players must focus on two or three elements simultaneously, decision-making skills are crucial in this game."

Kurt agrees with Aren on the issue, adding that the game might also improve self-confidence:

> "As students try to hit the stones without being caught, they need to follow a planned and systematic approach, which will help them gain self-confidence."

Deren also agrees that the game will help children develop analytical thinking skills and understand their limits:

> "The child will also learn about their limits, which we already find challenging. They understand their boundaries, and I have been considering this in the context of the dwarf's role. Within which limits should the child play, and how much can they achieve when restricting their movement within those boundaries? They will be moving in a circular area. I believe this will also enhance their analytical thinking skills. Other players must implement strategies to avoid being caught within those limits."

Ada concurs with Deren, and she believes the game might foster strategy and enhance children's attention spans:

> "He (the child) develops a strategy; for instance, when he first throws it, if he cannot hit, he will move to the right, move to the left, throw fast, and throw slow, etc (…) This might contribute to focusing attention and, thus, critical thinking. The primary issue this generation faces is its short attention span."

Aysu agrees with others and adds that the game might have a positive impact on children. "It will improve students' attention and focus skills."

Ela supports this and says that the game will additionally promote analytical and mathematical thinking:

> "It also requires some mathematical thinking. You have to calculate how far you can throw the stone, in which direction it should be thrown, and so on. Thus, it can develop both analytical and three-dimensional thinking skills."

Mira agrees with Ela that the game can enhance analytical thinking skills and build self-confidence: "It may help students improve their analytical thinking, problem-solving skills, and self-confidence."

Sami adds that, in addition to analytical thinking skills, the game may also foster problem-solving and self-confidence: "This game may develop analytical thinking and problem-solving skills, and may also boost students' self-confidence."

Deniz agrees and adds that the game might improve evaluation and self-confidence: "It is a style game. It may improve various aspects of critical thinking, including interpretation, self-confidence, and openness to different ideas. It is a versatile and playable game."

Mira also thinks that children might learn to be more cooperative when they play this game:

> "For example, cooperation: the child who fails first will watch their other friends and learn from them. By observing them, he will learn new methods that will improve cooperation."

In line with Mira, Deniz thinks*:*

> "Cooperation, problem-solving, and acting in a group. They learn to take turns by throwing stones. He will throw when it is his turn, or he should not throw before his friend."

Zırdır Zımba & critical thinking skills

The study's results show that engaging with the game Zırdır Zımba can provide players with various benefits, especially in developing linguistic skills, self-control, analytical thinking, strategic planning, and teamwork. The game mechanics, including riddles and competitive play, not only improve verbal skills but also promote reflective thinking and collaboration, providing a well-rounded context for assessing participants' cognitive and social development.

For example, Ceren stated that using riddles in the game might improve students' cognitive skills as well as physical coordination while trying to catch each other on one foot:

> "Asking riddles can improve cognitive skills. At the same time, trying to catch on one foot can improve children's physical coordination."

Kurt added: I liked the idea of using riddles: "I believe that will improve language skills in children". Ezel also thinks the game might foster cognitive skills: "I think this kind of self-confidence and analytical skills are things that this game could help kids develop. It will enhance the child's ability to think strategically."

In line with Kurt, Ela believes that using riddles will lead children to research and learn:

> "Assume we played it for the first time, and there are riddles to ask the others. When I tell my ambitious children we will play this game, I am sure they will memorise many riddles and come to class prepared. (…) They will memorise and learn. I think it will be useful for them to learn riddles in this regard. I believe it will push children to do research."

Kurt also believes that this game will improve the strategic thinking of children:

> "Here, students can work with you by developing strategies for themselves. (…) They ask questions first and refine a strategy based on your instructions."

Deniz adds that it is an engaging game fostering concentration: "Planned behaviour, concentration, attention to detail, and an engaging game."

Tan believes that the game will also contribute to focus and can be used to check what is learned in class: "There is attention, and there is focus again. Going out of the circle on one foot requires concentration and balance. Since there is a specific limit, I think he needs to follow the rules and obey the order. It is a game that can be adapted to track achievements across various lessons."

Aren also believes this game is entertaining and might improve psychomotor skills, allowing children to practice what they have learned in class:

> "If we focused on teaching addition in mathematics rather than presenting rhymes to children, we could give them tasks such as addition or subtraction questions. This approach would help develop their psychomotor skills through physical activity and enhance their cognitive abilities in various ways, all while having fun. The child would feel like they are playing a game while learning and practising essential skills."

Tan also agrees with Aren and adds that the game might also improve self-confidence:

> "During the lesson, children will research and participate in a game. Often, when questions are posed, many children hesitate to share their knowledge even though they know the answers. Here, self-confidence plays a crucial role. By incorporating a game, we can help children build their self-confidence in a fun and engaging way. The excitement of the game captures their interest, motivating them to participate and fostering a healthy ambition to succeed. This approach will improve their learning experience and encourage a desire to contribute and engage actively in discussions."

Arab Hair Game & Critical Thinking Skills

The results suggest that participation in the Arab Hair game can develop a range of cognitive and social skills among learners. Notably, the task encouraged problem-solving by prompting individuals to identify challenges and systematically test potential solutions. Players need to track and analyse each move, fostering analytical thinking and advanced decision-making in a fast-paced environment, which may enhance judgment and evaluative skills. The game may also require strategic planning, as participants must organise their actions effectively to achieve successful outcomes. Notably, cooperation proved vital, as untangling the rope knots required collective effort. Lastly, the complex nature of the knots demanded high levels of concentration, pushing players to stay focused and attentive throughout the task.

To illustrate, Ada stated: "First, they create a problem and then solve it. Children set up a problem and then solve it. This is an excellent idea that can be implemented. Ceren concurred that the game may foster problem-solving skills. The game may enhance problem-solving skills, making it a suitable choice for our classes."

Tan agreed and stated that playing the game will increase children's cognitive abilities, such as problem-solving.

> "First, problem-solving came to my mind. After creating that Arab hair, solving it is a process too. Those who throw it (string ball) first need to remember the order, how to solve it more quickly, and how to solve it. They need to think about it. (…) It would be effective because children would be able to set and solve problems."

> Ela added: "This game is feasible and fun; it will encourage students to solve problems (…). It allows them to follow a planned and systematic approach. Ezel agreed: I believe this game will improve critical thinking skills. Students will develop problem-solving skills and learn to think systematically and strategically."

Mira also thinks that the game will teach children to act together:

> "They will strive to win, become more ambitious to win, and want to play. When they play in groups with their friends, they will respond positively and act together. Let's do this; let's do that. They will also develop a sense of achievement in cooperation."

Deren agrees, stating that children might interact in groups instead of only playing with one specific child:

> "In such games, he (the child) directly passes the rope ball to his closest friend. Once he understands the game's logic, he will share the ball with his friends. This often represents one of the biggest challenges. When we engage in class activities, we tend to fall into repetitive patterns, such as playing with just a single child. (…) However, once he grasps the game's logic, he will realise that it should not proceed so monotonously, encouraging more group sharing."

In line with Deren, Ceren adds that the game will improve strategic thinking and cooperation:

> "Establishing a clear strategy is essential to solving this problem effectively. Since collaboration is key, working as a group is particularly beneficial for children at this stage. This problem cannot be tackled individually, and I believe cooperation and teamwork are crucial, especially for today's students."

Kurt added and stated that they thought that the Arab hair game might increase students' communication skills:

> "They also improve their communication skills and refrain from fighting. This strengthens positive attachment. For example, children strengthen positive attachment by learning to act together. (…) This game will equip students with a range of critical thinking skills, including problem-solving, analytical thinking, openness to diverse ideas, planning, self-confidence, and a desire to research. It is undoubtedly an excellent game for developing critical thinking skills, and it can be effectively incorporated into our classes."

Additionally, Ceren believes that students with ADHD can benefit from the game: "Many children have attention deficit problems, making it difficult to focus. For example, when creating Arab hair, I believe children will be more engaged. This approach can be beneficial, encouraging them to focus on the point where the rope originates. By using this method, we can help improve their focus."

Ada agreed and added that it might also improve short-term memory: "They need to know to whom they are throwing the rope and have a plan for that person so that they can solve it again. It is essential to keep this plan in mind in the short term."

Tan concurred with the others: Attention is crucial. He must be mindful of what and who is involved when he throws something, as he will eventually hold it and untie it later.

Ela approaches the issue differently, believing that the game might enhance math abilities and memory: "The game is more complex, providing math skills and improving their memory."

Handkerchief Grab & critical thinking skills

After the presentation on the Handkerchief Grab game, participants expressed that the game might foster concentration, confidence, and *psychomotor* skills, but not critical thinking skills. For instance, Mira believes that kids would become speedier and more focused by playing the handkerchief game:

> "He needs to be right there, ready to grab the handkerchief. Concentration is essential; he has to focus intently. While speed is already the most important criterion, maintaining focus is equally crucial. Once he sets his sights on the handkerchief, he must quickly run away again."

Tan agrees that kids can develop their speed through the game, but not their capacity for critical thought:

> "It just requires speed. Since more resilient children will only be fast, it will not support critical thinking very much."

Deniz also believes that this game may not increase critical thinking skills compared to strategy games:

> "When the rules are clear, the child follows them directly, and yes, the ability to follow them is supported. This is also very important. However, the point we want to reach is critical thinking skills. Of course, games with numerous rules can impact essential thinking skills, but this one is less effective than strategy games."

Deren talks about how the game boosts confidence in oneself: "It will improve their[children's] self-confidence. Sevde agrees with Deren: It will foster self-confidence; children who succeed become more self-assured and feel a sense of accomplishment. They must also act in a planned and cooperative manner."

Unlike the others, Tan thinks that the handkerchief game may improve strategy development and also critical thinking:

> "The child will develop a new strategy. Ultimately, they will attempt to distract the selected player's attention while also diverting another person's focus. This means the child must be more attentive and observant, able to watch two people simultaneously. This will naturally enhance their critical thinking skills."

Ezel concurs and says the game might also enable children to make decisions faster:

> "The child must observe others, make quick decisions, and focus on rivals. I believe this can positively improve a child's critical thinking skills."

The study's findings indicated that four traditional games—Dwarf Hall, Zırdır Zımba, Arab Hair, and Cüce Holl—could effectively enhance critical thinking skills and related abilities. However, the "handkerchief grab" game was found to be less beneficial for this purpose.

The Experiment: Does an 8-week intervention with traditional games improve critical thinking?

The findings from the experimental part of the study provide compelling evidence on the impact of four traditional games—Dwarf Hall, Zırdır Zımba, Arab Hair, and Mull Stake—on class activities. Initial assessments indicated no significant difference in pre-test scores between the control and experimental groups. However, following the intervention, the experimental group showed a marked improvement in post-test scores compared to the control group.

Table 3. Independent samples t-test results.

Test	Group	N	Mean	Std.Dev.	P
Pre-test	Cont. Group	40	11.70	5.29250	.489
	Exp. Group	39	12.74	5.71111	
Post-test	Cont. Group	40	10.00	6.52122	.015*
	Exp. Group	39	14.71	7.17433	

* $p < .05$

The t-test results provided essential insights into the differences between the control and experimental groups. In the pretest, both groups had comparable mean scores: the control group ($M = 11.70$) and the experimental group ($M = 12.74$), indicating no statistically significant difference between the two groups at this stage ($p = .489$; $p < .05$).

However, the t-test analysis revealed a statistically significant difference in post-test scores between the control and experimental groups ($p = .015$; $p < .05$). Specifically, the experimental group achieved a higher mean score ($M = 14.71$) than the control group ($M = 10$).

To better understand the magnitude of the differences observed between groups, effect sizes were calculated for both the pre-test and post-test comparisons.

For the pre-test, the control group (n = 40, M = 11.70, SD = 5.29) and the experimental group (n = 39, M = 12.74, SD = 5.71) did not differ significantly (p = .489). The pooled standard deviation was $SD_p = 5.50$**.**

The effect size was calculated as follows:

Cohen's d = $(M_1 - M_2) / SD_p$
Cohen's d = (11.70 − 12.74) / 5.50 = –.19
|d| = .19 indicates a very small effect size, implying the two groups were essentially equal at the start—no significant difference between groups in the pre-test.

For the post-test, the control group (n = 40, M = 10.00, SD = 6.52) scored lower than the experimental group (n = 39, M = 14.71, SD = 7.17), and the difference was statistically significant (p = .015). The pooled standard deviation was $SD_p = 6.85$**.**

The effect size was calculated as follows:

Cohen's d = $(M_1 - M_2) / SD_p$
Cohen's d = (10.00 − 14.71) / 6.85 = –.69
|d| = .69 represents a medium-to-large effect size**,** indicating that the intervention had a meaningful and positive impact on the experimental group.

Additionally, paired samples t-tests were performed for both the experimental and control groups to assess the effects of traditional games on critical thinking. Pearson correlation coefficients were also computed to evaluate the strength of the relationship between pre-test and post-test scores within each group (see Table 2).

Table 4. Paired sample t-test results.

Group	Compared Tests	t	df	P	Pearson correlation
Exp.	Pre-test vs Post-test	-2.624	39	.012	.757**
Cont.	Pre-test vs Post-test	1.587	40	.129	.689**

* p < .05

The results indicate that the experimental group showed a statistically significant difference between their pre-test and post-test scores ($t_{(39)} = -2.624$, p = .012), indicating an improvement in participants' performance following the game intervention. The Pearson correlation between pre- and post-test scores was r = .757, indicating a strong positive correlation (p < .01). This suggests that, while participants maintained their relative rankings, there was a notable increase in overall scores following the intervention.

In contrast, the control group did not show a statistically significant difference in scores before and after testing ($t_{(40)} = 1.587$, p = .129), implying no substantial change without the intervention. However, the Pearson correlation for this group was also significant (r = .689, p < .01), indicating consistency in their scores over time, but not reflecting any improvement.

Finally, a repeated-measures ANOVA was conducted to examine the effects of time, group, and their interaction (see Table 3).

Table 5. Repeated measures ANOVA results.

Cases	df	F	p	ω^2 (Omega squared)
Time	1	1.221	.284	.003
Group	1	5.383	.032	.094
Time * Gruop	1	16.041	. 001	.124

* p < .05

The analysis revealed no significant main effect of time ($F_{(1,\ N)} = 1.221$, p = .284, $\omega^2 = .003$), suggesting that changes over time were not statistically significant when both groups were combined. However, there was a significant main effect of group (F = 5.383, p = .032, $\omega^2 = .094$), indicating that

overall, the experimental and control groups differed significantly in their scores. More importantly, the interaction between time and group was significant and moderately strong ($F = 16.041$, $p = .001$, $\omega^2 = .124$), implying that the change over time differed between the groups. This interaction suggests that the traditional games intervention led to a significant improvement in the experimental group than in the control group. The significant interaction effect, highlighted by an omega-squared value of .124, indicates a moderate effect size, reinforcing the practical significance of incorporating games into educational strategies.

DISCUSSION, CONCLUSION, and SUGGESTIONS

This study's findings suggest that traditional games hold promise as an effective pedagogical approach for fostering creative and critical thinking skills, as well as related competencies, among primary school students. The eight-week intervention, which included games such as Dwarf Hall, Zırdır Zımba, Arab Hair, and Mull Stake, resulted in significant improvements in creative thinking, with participants in the experimental group demonstrating notable gains compared to controls. This is also supported by primary school teachers' perceptions, which highlight the potential of these games. The effect sizes indicate a meaningful impact, and statistical analyses confirmed the robustness of these results. These outcomes support the potential integration of traditional games into educational practices to enhance cognitive development and critical thinking abilities.

The findings of this study align with existing research, reaffirming primary school teachers' positive perceptions of play-based learning and its potential to enhance student engagement and develop critical and creative thinking skills. Consistent with prior studies (Nhase et al., 2025; O'Sullivan et al., 2025; Wong et al., 2025; Yılmaz and Griffiths, 2023; Lee et al., 2020), our results suggest that movement-based and decision-making games can support analytical thinking, while immersive experiences, as noted by De Vero and Bar (2023), offer additional educational advantages. Furthermore, the enhancement of problem-solving and critical thinking skills through game-based learning, as described by Akpınar et al. (2023), is echoed in our findings. Although some gains are modest and highly context-dependent, our results concur with studies such as Hanifah (2020) and others that demonstrate the potential of teamwork and prototyping in games to foster social and entrepreneurial skills, with variable impacts on critical thinking influenced by implementation factors.

The findings also align with previous research on the relationship between traditional games and cognitive skills such as problem-solving. For instance, Petty and de Souza (2012) found that traditional games like Mastermind and dominoes enhance executive functions, including problem-solving and attention. Similarly, Li et al. (2016) showed that design-based pedagogy using Lego bricks significantly improved problem-solving abilities compared to conventional instructional methods. Additionally, Jurdi et al. (2018) reported that physical versions of Quizbot games promote collaboration and are perceived as more enjoyable, accessible, and effective than digital versions.

The study's findings resonate with prominent global learning frameworks, such as the P21 Framework for 21st Century Learning, developed through collaboration among educators, experts, and business leaders. This framework highlights critical thinking, creativity, collaboration, problem-solving, and communication as vital skills for success, outlining the necessary knowledge, skills, and support systems to achieve student success across professional, personal, and civic domains. It stresses that learning and innovation skills—such as creativity, critical thinking, communication, and collaboration—are key to preparing students for the complexities of modern society and work. Similarly, the OECD Learning Compass 2030 emphasises the importance of cognitive, social-emotional, and transformative skills in navigating a complex world (OECD, 2019). UNESCO's competence taxonomy extends this focus beyond academics to include transversal competences like values, attitudes, and social responsibility (UNESCO, 2021). By aligning our sub-skills with these frameworks, we situate our findings within internationally recognised standards for future education.

In summary, these findings underscore the potential of traditional games to serve as valuable tools in fostering essential cognitive and social skills, advocating for their strategic integration into contemporary educational practices. The findings of this study confirm that play can serve as a valuable tool for fostering critical thinking skills in children. Educators can harness the inherent strategic, cooperative, and problem-solving elements of traditional games to cultivate critical thinking skills by integrating play-based learning into educational settings. The results presented highlight the effectiveness of these activities in enhancing critical thinking and associated skills, such as problem-solving, creativity, and analytical reasoning. Therefore, traditional games may be valuable practices that can be incorporated into curricula, offering a dynamic and engaging approach to classrooms that aligns with contemporary pedagogical practices.

Limitations of the Study

This study offers valuable insights into how traditional games influence elementary students' critical thinking skills, but it has several limitations. It was conducted in a single school with a small sample size, which may limit the generalizability to other cultural or educational contexts. The intervention lasted only eight weeks, capturing short-term improvements without addressing long-term development or retention of critical and creative thinking skills. Although the Creative Thinking Task for Children (CTTC) scale used in the study is valid and reliable, it does not encompass all aspects of critical thinking, such as questioning and metacognition. Additionally, despite employing a quasi-experimental design, the study does not control for all confounding factors, like differences among teachers or classroom environments. Future research should expand the sample size, incorporate longitudinal approaches, and utilise more comprehensive assessment tools better to capture the diverse facets of critical and creative thinking. The results should be interpreted cautiously, given limitations in sample size, contextual influences, and the need for broader validation across different populations and assessment methods.

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Ethics and Conflict of Interest

This study adhered to strict Research Ethics Guidelines and was conducted in accordance with ethical principles. Ethics committee approval was obtained from Gaziantep University (decision dated 09/08/2024, number 529740). Participants' confidentiality and rights were protected, with informed consent secured before participation. Data collection and analysis followed university guidelines, supporting the trustworthiness of the findings. The authors declare that they acted in accordance with ethical rules in all processes of the research. The authors declare no conflicts of interest.

Author Contributions

Suna Utar Özkan: Conceptualisation, methodology, conducting the interviews, Data analysis and interpretation, and writing the original draft.
Sevilay Şahin: Conceptualisation, methodology, data collection, review, and editing,
Zarife Pancar: Conceptualisation, literature review, and data collection.

Data availability

The data that support the findings of this study are available on request from the corresponding author.

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