EFFECTIVENESS OF GAMIFIED TEACHING FOR DEVELOPING OF EARLY CHILDHOOD MATHEMATICS AT XINHUA KINDERGARTEN IN HECHUAN, CHONGQING

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ABSTRACT
The objectives of this study were 1) to study the level of effectiveness of gamified teaching for developing of early childhood mathematics at Xinhua Kindergarten in Hechuan, Chongqing, and 2) to study mathematics games among effectiveness of gamified teaching for developing of early childhood at Xinhua Kindergarten in Hechuan, Chongqing. This research was quantitative research. The conceptual framework was applied from gamified teaching of Piaget's theory. The population consisted of 120 students from 12 classes at Xinhua Kindergarten in Hechuan, Chongqing. The samples of 97 students were determined by Krejcie and Morgan table. The instrument used in the study was a 5-rating scale questionnaire. The statistics used for data analysis were mean, standard deviation, and t test. The study results revealed that 1) effectiveness level of gamified teaching for developing of early childhood mathematics at Xinhua Kindergarten in Hechuan, Chongqing was at a much level. When considering each aspect from highest to lowest, it found that praising its mental health and physical development aspect was at the highest level, followed by could develop early childhood 's ability to perceive, ability to develop and enhance early childhood 's senses, motor abilities, body control and coordination respectively. 2) The level of mathematics games among effectiveness of gamified teaching for developing of early childhood at Xinhua Kindergarten in Hechuan, Chongqing was at a much level.
Keywords: Effectiveness of Gamified Teaching, Mathematics Games, Early Childhood at Xinhua Kindergarten in Hechuan, Chongqing

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INTRODUCTION

Mathematics is a fundamental course and essential discipline, representing a core cultural competency everyone should possess. Mathematics education is crucial for children's cognitive and analytical development at this significant phase of human growth. Mathematics pertains to the relationship between spatial form and quantity, with mathematical methods for describing and representing quantities, shapes, space, and patterns facilitating the systematic organization of human insights and ideas about the world, thereby offering a robust means for understanding and analyzing it. Children must necessarily engage with their surrounding environment from infancy. All elements in the surrounding environment possess distinct shapes, quantities, and sizes. Early mathematics education fosters the development of children's cognitive and analytical abilities. Most youngsters aged 3 to 6 are in the phase of visual cognition. During this stage, attaining children's mathematical literacy by direct instruction by educators will be challenging. When mathematics instruction is conducted via games, children may acquire mathematical information by direct perception, personal experience, and practical engagement. Teaching gamification is integrating the goals, material, and requirements of early childhood education into a gaming format. The main goal is to enable youngsters to serve as the principal agents of learning and growth inside the game. Games and teaching are inherently different activities. Teaching is the deliberate and planned arrangement of children's learning aligned with educational goals, whereas games are children's spontaneous, autonomous, and unrestricted actions. In educational gamification, the focus is on integrating games, referred to as "game-centered learning." This method enables youngsters to acquire information and experience via gameplay. Research indicates that one cause for the suboptimal implementation of teaching gamification is the improper management of the interaction between games and pedagogy throughout the gamification process, coupled with instructors' deficient comprehension of gamification. Therefore, the amalgamation of pedagogy and gaming is essential in the instruction of gamification.

The relevance of mathematics as a fundamental discipline and the critical role of early mathematics education in fostering children's cognitive and analytical development. It underscores the need for a gamified methodology in mathematics instruction for children aged 3-6, whose cognitive processes mostly rely on visual thinking. Below is a concise description of the main points:

1) Significance of Mathematics in Early Childhood Development, Mathematics is essential for aiding youngsters in comprehending the universe. It includes spatial shapes, numbers, sizes, and patterns, all elements of the physical world that infants engage with from birth. Early mathematics education is essential due to its significance. It methodically organizes children's perceptions of the world. It improves their cognitive functions and analytical capabilities, promoting logical reasoning and problem-solving skills. It equips students for future academic achievement in mathematics and other disciplines.

2) Obstacles in Conventional Mathematics Education, Direct instructional approaches often prove inadequate for children aged 3-6 owing to their developmental period, which is characterized by a reliance on visual cognition and sensory experiences. Conventional teaching approaches may need to effectively engage this demographic, hindering the development of mathematical literacy.

3) Advantages of Gamification in Education, The gamification of education integrates educational goals into games, enhancing the learning experience for youngsters. The methodology is defined by: Active engagement: Children assume active roles in their educational journey. Experiential learning: Games facilitate children's acquisition of information and experience via direct perception, personal engagement, and practical actions. Gamification corresponds with children's inherent propensity for play, facilitating a more relaxed, fun, and successful learning experience. Principal advantages comprise:

Heightened motivation and involvement. Enhancement of problem-solving abilities.
Improved cognitive and social skills via peer contact while gaming.
4) Differentiation between Instruction and Games, Teaching and games are inherently distinct—teaching is systematic and intentional, while games are impulsive and autonomous—yet gamification integrates both elements. This method transforms learning into a joyful but purpose-driven endeavor. In "game-centered learning," the game is the primary medium for delivering instructional material.
5) Obstacles in the Implementation of Teaching Gamification, Research reveals that balancing play and disciplined learning is a primary challenge in effectively gamifying education. Confident educators may need a comprehensive knowledge of properly integrating educational goals into games. For gamification to be effective, educators must:
Acquire a comprehensive grasp of the role of games as an educational instrument.
Guarantee the smooth integration of instructional information into the game design.
Achieve equilibrium between the impromptu essence of games and the deliberate objectives of education.

LITERATURE REVIEWS

The integration of games and kindergarten teaching has long been a subject of debate and investigation among researchers. Across different time periods and regions, the role of games in early childhood education has been perceived in varied ways. This literature review explores the evolving views of games in kindergarten teaching, their integration, and the potential value they bring to children's development.
1) Historical Context: Separation of Games and Teaching, Historically, games and teaching have often been viewed as separate entities, particularly in Western societies during the Middle Ages, when ascetic values dominated. Games were suppressed in educational settings due to the belief that they encouraged physical pleasure and indulgence, which was contrary to the values upheld by the church (Wyver, 2008). This separation of games from formal education was further reinforced by the deformed view of human nature that denied the value of games. In China, the separation of games from teaching is tied to traditional educational systems, such as the imperial examination system. The view that learning should be a formal and disciplined pursuit emerged from ideologies like "learning makes one an official" and "all is inferior, but studying is high", which emphasized serious academic learning over the freedom associated with games (Huang, 2015). Thus, games were seen as contrary to the academic rigor expected of students, and their value was diminished in educational contexts.
2) The Emergence of Games in Educational Systems, As preschool education developed, the value of games began to be recognized, particularly in early childhood education. Researchers such as Chen Heqin in China advocated for game-based education or "gameplay education" (Chen, 1930). Similarly, Dewey's "learning by doing" and Samuelsson and Johansson's belief in the inseparability of games and teaching (Samuelsson & Johansson, 2008) marked the beginning of incorporating games as a tool for education. The separation of games and teaching gradually gave way to a parallel existence, where both were acknowledged as essential components of early childhood education but were structured independently in time and space. Games were no longer excluded from the educational system, but they were treated as activities distinct from teaching. Teaching was scheduled in certain periods, while games were allocated separate time slots, with little overlap in theme or content. This parallel approach, while recognizing the importance of games, maintained the traditional boundaries between structured learning and play.
3) Games as a Means to Promote Teaching, The literature reveals varying degrees of integration between games and teaching. At one end of the spectrum, games are viewed as a means to promote teaching, an idea that dates back to Plato and Aristotle in ancient Greece. Plato

advocated for combining education with games, suggesting that games contain educational elements that can facilitate learning (Plato, 380 BCE). Similarly, Aristotle viewed games as a method of educating children before they reached the age of seven, emphasizing their role in early childhood development (Aristotle, 350 BCE). In the modern era, this view has been expanded by educators such as Chen Heqin and scholars like Pramling Samuelsson and Johansson, who argue that "learning by playing" is essential for young children (Samuelsson & Johansson, 2006). This perspective aligns with Dewey's idea of "learning by doing", which emphasizes the active engagement of students in their learning process through practical activities (Dewey, 1938). The idea of game-based learning is also reflected in the game teaching method, initially proposed by Linquist (1975). This approach emphasizes the use of games as a pedagogical tool to engage children in social drama, imaginative play, and continuous learning (Loizou, 2006; Pyle & Danniels, 2017). The game teaching method helps children develop cognitive skills, social abilities, and emotional understanding while fostering creativity and problem-solving skills.

4) Teaching as Games: Blurring the Boundaries, Another perspective found in the literature suggests that teaching can be like games, where the boundaries between teaching and playing are blurred. This view, pioneered in China by Deng Youchao, posits that "teaching is like a game" and that the best teaching resembles the characteristics of play (Deng, 1995). This view is reinforced by researchers such as Wyver (2008), who argue that games promote children's cognitive, social, and emotional growth, suggesting that learning and playing should be seamlessly integrated in educational settings. The concept of teaching as a game indicates a more profound integration, where the structured aspects of teaching are merged with the playful, exploratory nature of games. This integration fosters a dynamic learning environment where children are encouraged to discover and learn through interaction, creativity, and engagement.

5) The Integration of Games and Kindergarten Teaching, Research on the possibility of integrating games and kindergarten teaching reveals that games and teaching share similar educational goals—the development of children. Wang Chunyan and Chen Qianqiao argue that games have evolved beyond mere spontaneous activities to become an integral part of children's work and life, making the integration of games and teaching possible (Wang & Chen, 2012). The integration of games into kindergarten teaching can be approached in several ways: Games and Teaching Share Educational Goals: Both aim to develop children cognitively, emotionally, socially, and physically. Once games are incorporated into education, they are no longer viewed as purely recreational activities but as educational tools that promote learning (Edwards, 2005). Learning as a Link between Games and Teaching: Games offer opportunities for learning, and by combining them with teaching, children can control their learning experiences, engage in creative meaning-making, and explore new concepts (Samuelsson & Johansson, 2006). Games as Learning Resources: Games provide rich learning resources that educators can incorporate into early childhood education environments. They offer a context where children can apply knowledge, practice skills, and interact with peers in meaningful ways (Edwards, 2017).

6) Games in Mathematics Teaching, In both China and abroad, the integration of games into mathematics teaching has been widely studied. Mathematics is seen as a subject where games can enhance children's understanding of concepts such as numbers, geometry, and logical relationships. The Ministry of Education of China has included games in mathematics teaching guidelines, stating that games can help children grasp basic mathematical ideas while experiencing the fun of mathematics (Ministry of Education, 2001).

Research on mathematics games for preschoolers emphasizes that games provide opportunities for children to explore mathematical ideas in a hands-on, engaging manner. Through games, children learn to count, compare objects, and solve problems in ways that are developmentally

appropriate and enjoyable. The use of puzzles, building blocks, and interactive games in mathematics education encourages children to experiment, reason, and collaborate with their peers, thus making mathematics more accessible and enjoyable (Huang, 2015; Shi, 2017).

The literature shows a clear evolution in how games are viewed within the realm of kindergarten teaching. While historically separated from formal education, games are now seen as essential to children's development. The integration of games and teaching provides a holistic approach to early childhood education, one that acknowledges the educational value of play and its role in fostering cognitive, social, and emotional growth.

As research continues to explore the integration of games into early childhood curricula, educators must focus on balancing structured teaching with the exploratory, creative nature of games. The successful integration of games into teaching practices has the potential to enhance learning across various domains, including mathematics, language, and social development, ultimately contributing to a more engaging and effective early childhood education system.

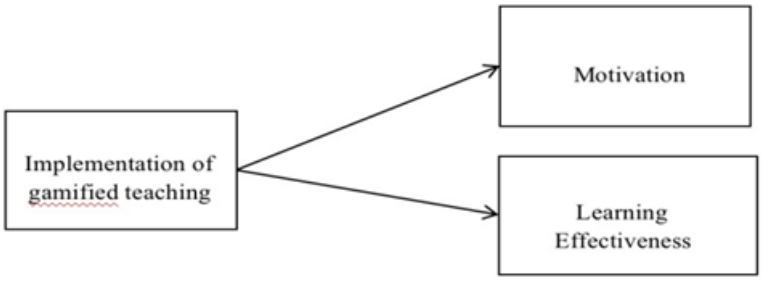

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

The population and Sample Group

This population consisted of study in Chongqing Xinhua Kindergarten 12 class 120 children as the research Kindergarten were enrolled as 120 children in mathematics subject and using teaching game. The sample used in the research consisted of 92 Kindergarten students at in Chongqing Xinhua Kindergarten school, China in the first semester of the academic year, 2023 determined by simple random sampling.

Research Instruments

This research instruments was a rating scale with 5 levels: highest, high, moderate, low, and very low. Literary methodology, the literature method is a technique for gathering, organizing, and evaluating data aimed at providing theoretical underpinning for the study. This research utilizes the Chinese network (CNKI) and relevant literature, including "Xinhua Kindergarten Mathematics Teaching Activities," "Kindergarten Teaching Game," and "Xinhua Kindergarten Mathematics Teaching Activities Game." Through the systematic review and analysis of this literature, the study aims to comprehend existing research findings to delineate the research problem at hand. The literature study further elucidates the notion of gamification in the mathematics teaching activities of Xinhua Kindergarten, establishing a framework for the research.

Method of Interviewing, The interview method is a technique for acquiring primary information via verbal inquiries and discussions with respondents. This research included semi-structured interviews categorized into pre-implementation and during-implementation phases. The primary objective of the pre-implementation interview is to gain a comprehensive understanding of teachers' authentic and profound perspectives on the gamification of mathematics instruction, focusing on the goals, content, execution, and assessment of such activities. This will serve as foundational preparation for the action research plan, enabling thorough dialogue with teachers regarding the outcomes, existing challenges, and potential

enhancements, thereby facilitating the refinement of each initiative. This research included eight educators from the extensive cohort of Xinhua Kindergarten.

Data Collection

The collection of data in this study was completed in two ways, namely, interview records and observation records. The interview records mainly included the researchers' views on the gamification of Xinhua Kindergarten mathematics teaching activities at the beginning of the study, and the researchers about the problems and improvements of the activities after the implementation of the activity in the middle of the study.

Data Analysis

The analysis focused on kindergarten instructors and observing mathematics teaching activities to identify the challenges and influencing elements inside Xinhua Kindergarten, establishing a robust basis for the subsequent design and execution of action research. Secondly, action research involves analyzing data collected from the cooperative teacher's mathematics instruction, which encompasses the teaching effectiveness during the action phase, early childhood responses, and post-activity reflections. Through interviews with cooperative teachers, issues related to mathematics teaching activities and potential improvements were identified, aimed at offering recommendations for future activities.

Subsequently, following the action study, all original data were examined to determine the research outcomes. This link involves the analysis of data before action and during the action process to comprehend action research concerning child development, teacher progress, and researcher influence. It entails the examination of each cycle of action research, continuous reflection, and summarization to enhance the research framework and its content, ultimately refining and producing research outcomes.

RESEARCH RESULTS

Present State of Gamified Mathematics Instruction for Young Children

The study's objective was to examine the effectiveness of gamified teaching in developing early childhood mathematics skills at Xinhua Kindergarten in Hechuan, Chongqing. The results focus on the gamified activities integrated into the curriculum, particularly in promoting conceptual understanding of numbers and mathematical operations among children.

1) Execution of the First Phase of Instructional Design, The instructional design was implemented through gamified activities based on the Xinhua Kindergarten mathematics curriculum, which emphasized number concepts and number operations. The specific content chosen for this study focused on enabling children to understand the decomposition and composition of numbers, particularly around the number six.

Educational Curriculum, In alignment with the kindergarten's curriculum and The Outline provided by the Ministry of Education, the mathematics instruction was designed to help children experience the quantitative relationships of objects through life and games. The instruction was designed to be enjoyable and significant for children, reinforcing mathematical learning through interactive and engaging activities. The instructional activity "Cups and Marbles" was designed based on previous class experiences, as children had already developed a foundational understanding of the decomposition of numbers (e.g., the decomposition of 5).

Gamified Activity: "Cups and Marbles" The game "Cups and Marbles" was developed in collaboration with Teacher T to reinforce the concept of decomposition of numbers through playful interaction. The activity focused on breaking down the number six into smaller combinations using cups and marbles as teaching aids. The implementation of the activity can be categorized into several key elements:

Game Design: The activity was designed to capture the children's interest from the beginning, using a familiar scenario involving characters (An An and his brother) who needed help

dividing six marbles into two plates. The teacher used this story to engage students in problem-solving tasks, allowing them to help the characters by practicing decomposition.
Mathematical Learning: The game provided an interactive and hands-on approach for children to explore number operations. The teacher guided the students through the decomposition process, asking them to divide six marbles into two groups and record their results on a record sheet. This encouraged children to visualize mathematical concepts and reinforced learning through repetition and manipulation.
Student Participation: Throughout the activity, children were given the opportunity to demonstrate their decomposition strategies. This was done by asking individual students to perform the decomposition in front of the class. For example:
C16 demonstrated a 3+3 decomposition method, explaining that each tray received an equal number of three marbles.
C10 demonstrated a 5+1 decomposition method, explaining that five marbles were placed on one plate, and one marble on the other, representing the addition and subtraction principles.
Evaluation and Adaptation
The game included an evaluation phase where children were encouraged to self-assess and communicate their reasoning. This assessment was designed to help both the teacher and the children understand the effectiveness of their strategies and provide immediate feedback to support learning. Additionally, the teacher used this information to adapt future lessons by collaborating with the co-teacher to ensure consistency in the instructional design and execution.
The results from this phase demonstrated that children were able to actively participate in the learning process, engage with the content, and develop a deeper understanding of number decomposition through the gamified activity.
2) Implementation of Gamified Instruction
Capturing Students' Interest, The teacher used storytelling to capture the children's interest. By introducing characters (An An and his brother) who were engaged in a relatable and fun activity (playing with marbles), the teacher was able to frame mathematics learning within a narrative context. This approach proved to be effective in drawing the students into the lesson and maintaining their engagement.
Guided Exploration and Demonstration, The children were then invited to participate in the exploration of the decomposition of six through direct interaction. The following key points summarize the implementation:
Exploration and Problem Solving: Children were asked to split the six marbles into two groups in various ways, demonstrating their understanding of how numbers can be divided. This process involved hands-on manipulation and encouraged children to think critically about number combinations.
Collaboration and Interaction: The activity fostered a collaborative learning environment where students could take turns demonstrating their methods, discussing different solutions with their peers, and learning from each other. This peer interaction was critical for reinforcing concepts and providing opportunities for social learning.
Teacher Guidance: The teacher played a crucial role in guiding the children through the learning process, offering support and feedback as they experimented with different decomposition strategies. This ensured that the children remained on task and deepened their understanding of mathematical operations.
Reflection and Recording: After each decomposition, the children and teacher collaboratively recorded the results, reinforcing the idea of documenting and reflecting on the mathematical process. This reflection was instrumental in helping children consolidate their learning.
The implementation of gamified teaching activities, such as "Cups and Marbles," led to the following key findings:

Enhanced Understanding of Number Decomposition: The children showed a marked improvement in their ability to decompose numbers, particularly the number six. The use of hands-on materials and an engaging narrative helped children internalize mathematical concepts.

Increased Engagement and Participation: The narrative and interactive elements of the game captured the children's attention and motivated them to participate actively. The children were eager to demonstrate their understanding and explore different ways to decompose numbers, showcasing high levels of engagement throughout the lesson.

Collaboration and Social Learning: The activity fostered collaborative learning by encouraging children to work together and share their strategies. This not only supported the development of mathematical understanding but also promoted the development of social skills such as communication and turn-taking.

Positive Teacher-Student Interaction: The teacher's role in guiding the children and providing immediate feedback was critical to the success of the lesson. The teacher-student interaction helped maintain a focus on learning while making the experience enjoyable and engaging.

The research results demonstrate that gamified teaching for early childhood mathematics development at Xinhua Kindergarten in Hechuan, Chongqing was highly effective. The use of games and storytelling allowed children to engage deeply with mathematical concepts, particularly in understanding number decomposition. The interactive nature of the lessons, combined with hands-on activities, promoted active learning and cognitive development.

Additionally, the results highlight the importance of teacher guidance, peer interaction, and reflection in supporting young children's mathematical learning. The success of this gamified approach suggests that integrating games and playful learning into mathematics instruction can significantly enhance children's engagement, understanding, and overall learning outcomes in early childhood education.

DISCUSSION & CONCLUSION

A Present State of Gamified Mathematics Instruction for Young Children

This research aimed to evaluate the effectiveness of gamified teaching in the development of early childhood mathematics at Xinhua Kindergarten in Hechuan, Chongqing. The focus was on determining how gamification influences young learners' understanding of mathematics, particularly in the area of number concepts and number operations. The study examined the impact of gamified activities in terms of children's cognitive development, engagement, and social interaction, all of which are essential elements in early childhood learning.

1) Execution of Instructional Design and Curriculum

In the first phase of instructional design, the Xinhua Kindergarten mathematics curriculum guided the integration of gamified teaching activities. The curriculum emphasized the importance of children experiencing quantitative relationships through daily life and games, a principle aligned with China's early childhood education standards.

The chosen mathematical topic was the decomposition and composition of numbers, a foundational concept in early mathematics. The instructional design of this study emphasized hands-on learning through games, using the activity "Cups and Marbles" as the primary teaching tool. The game allowed children to practice decomposing the number six into various smaller groups using physical manipulatives (marbles) and worksheets to document their findings.

Key Elements of Gamified Instruction

The game was designed to support several pedagogical goals:

Engagement and Motivation: By introducing a scenario involving familiar characters (An An and his brother) and a playful challenge (dividing marbles), the game captivated children's attention and encouraged them to participate.

Active Exploration: Children were given the opportunity to manipulate objects (cups and marbles) to explore different ways to decompose numbers. This hands-on approach was critical in helping children visualize abstract mathematical concepts.
Teacher Guidance and Interaction: The teacher played a central role in facilitating the activity, asking children to explain their thinking, provide demonstrations, and reflect on their actions. This active involvement of the teacher helped to ensure that the children remained engaged and on task.
2) Implementation of Gamified Teaching Activities
Engaging Children in Learning through Play
The gamified teaching method placed an emphasis on engaging children through interactive and collaborative learning experiences. The teacher initiated the lesson by introducing a scenario where the characters An An and his brother needed help in dividing six marbles into two plates. This story-driven approach helped establish a context for the activity, making the learning process more relatable and enjoyable for the children.
Exploration and Problem Solving: The core of the activity involved children manipulating the marbles to find different ways of decomposing the number six. The teacher facilitated the activity by encouraging students to try various decomposition strategies and then share their findings with the class. For instance:
C16 demonstrated the decomposition of 6 as 3+3, explaining that three marbles were placed on each plate.
C10 used a different strategy, splitting the marbles into 5 and 1, and explained that 5 plus 1 equals 6.
The interactive nature of the activity helped the children understand mathematical operations through concrete experiences, rather than through abstract concepts.
Evaluation of Learning Outcomes
The evaluation phase was a key component of the gamified teaching strategy. After each decomposition, the children were asked to record their results on a worksheet. This step encouraged them to reflect on their learning and take ownership of their understanding. Additionally, the teacher's role in facilitating the evaluation process was instrumental in reinforcing the children's learning. The teacher guided the students in comparing their solutions and discussing the different strategies they used.
3) Effectiveness of Gamified Teaching in Cognitive and Motor Development
The research revealed that gamified teaching had a profound effect on both the cognitive and motor development of the children at Xinhua Kindergarten. The following key findings emerged from the study:
Cognitive Development
Enhanced Understanding of Number Concepts: The children demonstrated a marked improvement in their ability to decompose numbers. The hands-on manipulation of marbles helped solidify their understanding of the decomposition and composition of numbers, particularly the number six. By physically moving the marbles and visualizing the different combinations, the children were able to internalize mathematical concepts that might have been more difficult to grasp through traditional teaching methods.
Improved Problem-Solving Skills: The gamified activities encouraged the children to think critically and explore multiple solutions to the same problem. This process helped develop their problem-solving abilities, as they were challenged to find different ways to break down numbers and justify their reasoning.
Conceptual Transfer: The children not only understood the decomposition of six but were also able to transfer this understanding to other numbers, as evidenced by their ability to generalize the principles of addition and subtraction during the activity. This shows that the gamified teaching method enabled the children to apply their learning in broader contexts.

Motor Development

Fine Motor Skills: The activity also supported the development of fine motor skills, as children had to physically manipulate small objects (marbles) and record their findings on paper. This dual-task activity—combining cognitive problem-solving with physical manipulation—helped enhance the children's coordination and motor control.

4) Social and Emotional Impact of Gamified Teaching

In addition to cognitive and motor development, the study revealed several important social and emotional outcomes:

Increased Engagement and Motivation

The use of games in teaching significantly increased children's engagement in the learning process. The narrative-based approach, coupled with the competitive and collaborative elements of the activity, kept the children motivated throughout the lesson. Children were eager to participate, raise their hands, and demonstrate their understanding, indicating that the gamified approach was successful in fostering a positive learning environment.

Collaborative Learning

The activity encouraged peer interaction and collaborative learning. Children were given opportunities to work together, share their solutions, and learn from one another. This social learning environment not only helped reinforce mathematical concepts but also supported the development of important social skills such as communication, teamwork, and turn-taking.

Teacher-Student Interaction

The role of the teacher in the gamified approach was critical. The teacher's guidance and feedback helped maintain focus on learning while making the experience enjoyable and interactive. The teacher-student interaction was characterized by positive reinforcement, with the teacher acknowledging and celebrating the children's efforts and successes. This helped build the children's confidence in their mathematical abilities and fostered a supportive learning environment.

Conclusion

The study concludes that gamified teaching is highly effective in promoting the development of early childhood mathematics at Xinhua Kindergarten in Hechuan, Chongqing. The integration of games into the mathematics curriculum not only enhanced children's understanding of number concepts but also promoted their cognitive, motor, social, and emotional development. The interactive, hands-on learning approach allowed children to actively engage with the material, improving their problem-solving skills and fostering a love for learning.

Key outcomes of the research include:

Improved mathematical comprehension, particularly in the area of number decomposition and operations.

Increased engagement and motivation, with children demonstrating enthusiasm for participating in the activities.

Enhanced collaboration and social interaction, with children learning from one another and working together to solve problems.

Positive teacher-student dynamics, where the teacher's role in guiding and reinforcing learning was critical to the success of the gamified approach.

Overall, the study demonstrates that gamified teaching is an effective instructional method for young children and suggests that this approach should be further explored and expanded in early childhood education to maximize learning outcomes across various subjects, particularly in mathematics.

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