EFFECTIVENESS OF INDIGENOUS GAMES ON BASIC NUMERICAL SKILLS AMONG PRE - PRIMARY CHILDREN

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MASTER OF EDUCATION

by

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DECLARATION

I, DIXI. T. M (Reg No. 10124MED0602), hereby declare that the dissertation entitled ***"Effectiveness of indigenous games on basic numerical skills among pre – primary children"*** is a record of the original work carried out by me during the academic year 2024 - 2026 under the guidance and supervision of Dr. Raghi. P. Nair, Professor & Dean, N.V.K.S.D. College of Education, Attoor, Kanniyakumari District. I further declare that this dissertation has not been submitted, either in part or in full, for the award of any degree, diploma, associateship, fellowship or any other similar title to any university or institution.

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CERTIFICATE

This is to certify that the dissertation entitled “EFECTIVENESS OF INDIGENOUS GAMES ON BASIC NUMERICAL SKILLS AMONG PRE – PRIMARY CHILDREN” submitted by DIXI.T. M for the award of the Master of Education degree is an original record of research work carried out by her under my guidance and supervision during the academic year 2024 - 26. It is further certified that this dissertation has not been submitted, either in part or in full, to any other university or institution for the award of any other degree or diploma. It is also certified that the work presented in this dissertation is original and free from any form of duplication.

Place: Attoor

Date: **Signature of the Supervisor**

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CHAPTER – I

INTRODUCTION

Education acts as a cornerstone for personal empowerment and the progress of society, driving development across economic, cultural, technological, and innovative domains. Its impact goes beyond classroom learning, cultivating critical thinking, problem-solving abilities, and empathy in individuals. From early childhood education that encourages curiosity and social interaction to higher education that promotes research and discovery, every phase of learning plays a vital role in shaping individuals and advancing communities and the world at large. In a world that is becoming more interconnected, education is a fundamental means for achieving social mobility and addressing systemic inequalities. By providing learners with the digital skills and flexibility necessary for today's job market, it helps ensure that societies can adapt to rapid technological changes. Developing a strong educational system is not just a public service but also a strategic investment in sustainable growth, harmonious living, and the collective intellectual progress of future generations.

Globally, early childhood is recognized as the period from birth to eight years of age and is considered the most critical phase in a child's development. This phase is significant because the brain grows more rapidly during these years than at any other time, creating a unique window of opportunity that establishes the foundation for a person's lifelong health and success. To reach their full potential, children require a stable environment of "nurturing care" that provides for their physical health and nutrition while ensuring they are protected from harm. Early development is fueled by caring and emotionally attuned interactions with caregivers, which provide the mental stimulation and security essential for children to cultivate vital life skills and curiosity.

A healthy child engages in their development from the moment they are born, exploring their environment, acquiring communication skills, and relatively quickly beginning to formulate their own theories and concepts about how the world operates. The extent to which a child's learning preferences interact with supportive environments will influence the speed at which they acquire knowledge. A child's background plays a crucial role in their learning and growth. Young children actively construct knowledge by integrating new ideas and concepts with their existing understanding. Educators have the opportunity to foster this eagerness to learn and nurture a willingness to learn that will prepare children for lifelong active engagement in their educational journeys.

According to NEP 2020, “The overall aim of ECCE will be to attain optimal outcomes in the domains of physical and motor development, cognitive development, socio-emotional-ethical development, cultural/artistic development, and the development of communication and early language, literacy, and numeracy through flexible, multi-faceted, multi-level, play-based, activity-based, and inquiry-based learning. It also includes a focus on developing social capacities, sensitivity, good behaviour, courtesy, ethics, personal and public cleanliness, teamwork, and cooperation”.

The experiences children encounter during the formative years have a lasting impact on their development and continue to shape them throughout their lives. This period is often described as a ‘critical’ or ‘sensitive’, as it is essential for the development of core functions such as vision, hearing, language, numeracy, and socio-emotional skills. Therefore, early childhood represents a key opportunity to lay a strong foundation for holistic growth and learning.

In many preschools, the curriculum is designed to introduce children to the world around them through a variety of subjects that encourage exploration and discovery. Students begin by developing language and literacy skills through storytelling, singing, and phonics, which help them communicate more effectively. They are also introduced to environmental awareness, where they learn about nature, the weather, and their community. Creative subjects like art and music are emphasized to improve fine motor skills and allow for self-expression. Additionally, physical education and group play help children develop coordination and social teamwork. Together, these subjects provide a well-rounded education that prepares children for more formal schooling while building their confidence and curiosity. Every subject taught in these early years is important, but among these, the development of basic numerical skills is particularly vital for a child's future academic success.

Basic numerical skills refer to a child's ability to understand and apply core mathematical concepts. Early numeracy intervention plays a vital role in building the mathematical foundation for young children. The preschool years are especially significant for nurturing key numeracy skills that are essential for later success in Mathematics and overall academic performance. When children face difficulties in acquiring these skills at an early stage, it can lead to long-term challenges in their academic journey. The foundation of all the learning is based on these early years. Right early year foundation helps in reducing the dropout rate, stagnation and improves outcome in all levels of learning. "Pre-primary education gives children a solid foundation upon which all learning depends on, making every stage of education that follows more efficient and more productive" (UNICEF India, n.d.). Early childhood education also gives importance to literacy and numeracy development through play-based learning methods.

In early period, children learned basic numeracy skills such as counting, sequencing, comparing through playing games. Indigenous games are physical activities that are originated by native groups and are often transmitted through oral tradition and played without global standard rules (Traditional Sports Games, 2025). When children learn through games, they actively participate and understand the concepts easily, also learning becomes more enjoyable. Indigenous games not only help in understanding our culture but also helps in the holistic development especially in the early years. Indigenous games make the learners actively engage with their mind, body and soul. Through indigenous games learners learn in a fun way. Most of the indigenous games require only low-cost materials which are locally available and also eco-friendly. These games integrate the environmental and educational importance to the learners. When indigenous games are included in pre – primary education it helps the children know about their culture along with mathematical concepts. Playing these games also help in the overall development of the children.

India's wide rural geography is home to a variety of indigenous games that reflect the country's diverse ethnic and historical heritage. The historical, cultural and social fabric of India is embodied in the traditional Indian games. These games, which have their roots in ancient literature and customs such as kabaddi, Kho – Kho and Chaturanga go beyond simple amusement to enhance mental, physical and spiritual health. Through mental and physical activities, these games have been particularly successful in fostering overall well – being. They are also becoming more widely acknowledged for their educational worth, fostering abilities like planning and teamwork.

Indigenous games have great capacity to educate individuals effectively in different aspects of their growth and development (Asrial et al.,2020). These games

improve observational, math and other soft skills. Playing helps people develop a number of critical skills that are crucial to their development from childhood to adulthood. Many skills, including logical reasoning, thinking, forming relationships, sharing, perseverance, attention, basic mathematics, aiming for physical health, balancing attitude and acceptance are developed through the unique design of these indigenous games. These games serve as educational tools in this way.

Indigenous games include both indoor and outdoor games as well as group and individual games. While playing, it improves observational skills, develop thinking, reasoning, gross motor skill, sensory skill, hand – eye and leg co – ordination, socio – emotional skill such as cooperation, acceptance, sharing and leadership. Indigenous games teach the learners about win – lose, tolerance and patience by overcoming challenges. It helps in developing team spirit, unity among the team, showing respect to the opposite team, self – respect and acceptance of their mistakes. In educational scenario, it also strengthens the basic mathematics such as counting, spatial understanding, sequencing, comparing and other basic skills.

Indigenous games of Tamil Nadu are rich in culture, giving ancestral knowledge and integrate values. Games such as pallankuzhi, paandi (hopscotch), nooran kuchi, dhayam were once an essential part of people's life. They help in promoting physical development, logical thinking, co – operation and other socio – emotional values. These games include fewer material resources such as seeds, sticks, stones and boards which are easily accessible to everyone. Other than promoting the cultural and social values, these games help in understanding the basic numerical skills especially among pre - primary children. The link between commonly played childhood games and native traditions can serve as a strong foundation for developing early arithmetic skills.

Indigenous games play an important role in keeping children's culture alive and helping their thinking skills grow. These games are not just for fun – they also help children learn important skills like counting, solving problems, and thinking carefully. When local traditions are included in play, it supports brain development and builds a strong sense of cultural identity. Playing such games can also help young children develop a good understanding of basic Mathematics.

1.1 NEED AND SIGNIFICANCE OF THE STUDY

Indigenous games naturally help children learn and grow in many areas of development. They are especially useful for building important life skills, like how to interact and cooperate with others. Games act as a strong catalyst in fostering the multi-dimensional growth of a child in the domains of physical space, social and emotional, sensory -motor, communicatory, cognitive, conceptualization, understanding/cognitive processing, executive function and perceptual readiness for educational activity and the development in auditory, literacy and mathematical competencies. In India, children often play indigenous games such as five stones, Pallanguzhi, Paandi, hide and seek, spinning tops, ludo, Goli, snake and ladder, seeds game, and sack race. These games play an important role in helping children develop different skills through fun and meaningful play.

One of the most significant way kids learn and grow is via play. Because play requires children to think, engage and use their innate curiosity and exploration skills, it aids in the development of numerical skills. Playful learning activities produced better results than non – playful learning activities, especially for young children. Deeper comprehension, persistent engagement, and long – term academic achievement can be fostered when numeracy training is adapted to the developmental features of the

children, especially through interactive approaches like counting games. Play gives kids the chance to investigate mathematical concepts like counting, ordering, grouping and pattern recognition in organic and interesting ways, according to Ginsburg et al. (2008).

Many Indigenous games use natural materials, which expose children to different textures, shapes, and weights. These experiences help children learn to recognize and differentiate between textures even before they are able to describe them with words. Sensory experiences like these play a vital role in children's early development. Indigenous games provide children with a rich learning experience by supporting the development of motor skills, sensory abilities, and hand-eye coordination. They also promote essential thinking skills, such as counting, number recognition, and critical thinking. Playing these games enhances mathematical understanding and creates joyful moments that encourage bonding across generations within families, especially among primary and upper primary children. For children with mathematical difficulties, Indigenous games offer multiple cognitive benefits. They help improve sensory awareness, physical skills, fine and gross motor abilities, and coordination. These games also teach children to handle success and failure calmly, improve focus, boost strategic thinking, speed up mental processing, and build basic math skills. Additionally, they support analytical thinking, teamwork, turn-taking, number sense, memory, and social interaction—making them powerful tools for both learning and development.

NEP 2020 emphasized integration of indigenous games in education for holistic development, yet, very less exploration with regard to indigenous games has been carried out and received less attention from the community of researchers. Therefore, this study aims to explore how indigenous games can be effectively used to create a

supportive and engaging learning environment for enhancing basic numerical skills among UKG children.

This study examines the following concerns:

1. Is there a significant difference between pre -test and post – test scores of basic numerical skills among pre – primary children?

2. What is the effectiveness of indigenous games on improving the basic numerical skills among pre – primary children?

3. What are the benefits of using indigenous games as a teaching strategy in pre – primary education?

4. Can including indigenous games help children master basic numerical skills while also making them feel happy and involved?

1.2 STATEMENT OF THE PROBLEM

In today’s digital age, children are increasingly exposed to screens through mobile phones, tablets, and televisions, which limits their involvement in active, hands-on, and culturally meaningful play. This shift toward digital entertainment is gradually replacing traditional games that once played a crucial role in supporting children's holistic development. Indigenous games, deeply rooted in local culture and traditions, offer valuable learning experiences that encourage physical activity, sensory development, social interaction, and early thinking skills. These games naturally promote basic mathematical concepts such as counting, number recognition, comparison, and sequencing in an enjoyable and engaging manner. In light of these concerns, the present study aims to identify to what extent indigenous games can improve basic numerical skills among pre-primary children. Hence the study

undertaken is **"Effectiveness of Indigenous games on basic numerical skills among pre -primary children"**.

1.3 OPERATIONAL DEFINITION OF THE KEY TERMS

Effectiveness

Effectiveness refers to measuring how well indigenous games help pre-primary children enhance their numerical skills.

Indigenous Games

Indigenous games refer to local or traditional games that children play in their own culture or community.

Basic numerical skills

Basic numerical skills refer to foundational mathematical abilities such as counting, number recognition, comparison, and sequencing.

Pre – primary children

Pre-primary children here refer to children studying in the age group 5 to 7 years. In this study, children refer to the children studying in UKG class in Yettacode Nursery and Primary school.

1.4 OBJECTIVES OF THE STUDY

1. To assess the level of attainment of basic numerical skills of UKG children before intervention.
2. To assess the level of attainment of basic numerical skills of UKG children after intervention.

3. To prepare lesson transcripts based on indigenous games for enhancing basic numerical skills among children in Upper Kindergarten (UKG).
4. To test the effectiveness of indigenous games in improving basic numerical skills such as counting, recognition, comparing and sequencing.
5. To compare the mean pre – test ad post – test scores of basic numerical skills of UKG children with respect to
    - Pre number concept
    - Counting
    - Comparing
    - Recognition and
    - Sequencing

1.5 VARIABLES OF THE STUDY

Independent variable

Indigenous games

Dependent variable

Basic numerical skills

1.6 HYPOTHESES OF THE STUDY

1. The level of attainment of basic numerical skills of UKG children is at moderate level before intervention.
2. The level of attainment of basic numerical skills of UKG children is at moderate level after intervention.
3. There exists no significant difference in the mean pre-test and post test scores of basic numerical skills of UKG children.

4. There exists no significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to
    - Pre number concept
    - Counting
    - Comparing
    - Recognition and
    - Sequencing

1.7 METHODOLOGY IN BRIEF

1. Method Adopted

Pre - Experimental method was adopted for conducting the study.

2. Experimental Design

One group Pre - test Post-test Pre – experimental design was used for the present study.

3. Population

The population of UKG children who are studying in various schools of Kanyakumari district in Tamil Nadu during the academic year 2025 -2026.

4. Sample

The present study was conducted on a sample of 21 UKG students.

5. Sampling technique

Purposive sampling technique was used in the present study.

6. Tools used

- Lesson transcripts based on Indigenous Games.
- Numerical Skill Test

7. Statistical technique

In the present study the following statistical techniques were used

- Percentage analysis
- Wilcoxon signed rank test

1.8 DELIMITATIONS OF THE STUDY

1. The study was limited to the geographical area of Kanyakumari district.
2. The study was limited to children who are studying in UKG class.
3. The sample was limited to 21 students only.
4. The study was limited to assessing only the basic numerical skills.

1.9 ORGANISATION OF THE CONTENT

Chapter I: Introduction

Chapter one provides background to the study, by giving brief discussions of early childhood education, basic numerical skills, indigenous games. It also provides brief discussions on methodological choices such as population, sampling, data analysis, definition of key terms and delimitation of the study.

Chapter II: Literature review and Theoretical framework

The chapter provides a detailed and comprehensive review of related literature on indigenous games, game-based learning and discusses the theoretical framework,

describing the theories that explain the role of indigenous games enhancing early learning among preschool children.

Chapter III: Methodology

The chapter discusses the research design and methodology employed in the study. The chapter explains the population and sampling, data collection and analysis.

Chapter IV: Data Analysis and Interpretation

The chapter presents the findings of the study and a detailed interpretation of the findings.

Chapter V: Discussion of Findings, Conclusion and Recommendations.

The chapter discusses the findings, conclusion, educational implications of the study and suggestions for the further research.

CHAPTER – II

REVIEW OF RELATED LITERATURE

2.1 – THEORETICAL FRAMEWORK

2.2 – RELATED STUDIES

2.2.1 – STUDIES RELATED TO INDIGENOUS GAMES

2.2.2 – STUDIES RELATED TO BASIC NUMERICAL SKILLS

2.2.3 – STUDIES LINKING INDIGENOUS GAMES AND BASIC NUMERICAL SKILLS

2.3 – CRITICAL REVIEW

CHAPTER II

REVIEW OF RELATED LITERATURE

The process of systematically locating, identifying and analyzing papers that contain information relevant to the study subject is known as the review of related literature. Review of related literature also used to describe the written portion of a research plan or report that addresses the examined documents. Articles, abstracts, reviews, monographs, dissertations, other research reports and electronic media are example of these documents. Finding out what has already been done in relation to the topic is the main goal of reviewing the literature. Review of literature provides the comprehension and insight to organize the topic logically.

Review of literature also provides the research hypotheses and suggestions of future research helps in justify the present study of the investigator. Finding research methodologies and particular data collection methods that have or have not been successful in investigations is another crucial goal of literature review. This helps one to gain experiences from other researchers and avoid mistakes.

Importance of Early Childhood Education

Early Childhood Education (ECE) gives young children the foundational information and abilities they will need to successfully transition to school and become competent adults. It ensures that young children will be healthy and capable of achieving when they start school. Assessment of children's learning should start from the preschool so that the evaluation becomes accurate, valid and reliable. Children who obtain early childhood education will be more prepared to learn in terms of physical wellness, psychomotor abilities and language proficiency.

ECE helps the children to be ready for the next school year and provides a peaceful transition to school life, they will feel less tension and worry. As a means to prepare children for self – directed learning, ECE enables parents and educators to understand about the child's expectations and particular difficulties. The goal of ECE is to create an individualized, adaptable and engaging environment that meets young children's developmental needs and preferred learning styles. ECE provides children lots of opportunity to engage with friends and adults without putting too much pressure on them. It also makes sure that all educational activities are engaging and age appropriate so that children are encouraged to spend part of their day at school.

ECE uses functional play to improve young children's psychomotor skills through educational toys and other items. Young children are encouraged to learn about the world through functional play by using their senses of taste, smell, hearing, vision and sight. Constructive play support young children's vocabulary development through social interactions with peers and elders. Children's arithmetic abilities such as quantity, measurement, weight, height, size, sorting, matching, seriation, classification and other concepts that involve mathematical language and numeracy are improved by constructive play.

Indigenous games

Indigenous games are common physical activities that are passed down informally from one generation to the next and have their foundation in a particular cultural or regional setting. These games are culturally grounded, community – based and frequently connected to holidays, customs and everyday life. Indigenous games and numerous folk games were tools for social learning, discipline and physical

conditioning in addition to entertainment. These games are inclusive and accessible since they developed naturally from regional settings and cultural demands.

Indigenous games in India generally follows simple and adaptable rules, minimal equipment usage, accessible and inexpensive, a focus on enjoyment and involvement, encouragement of collaboration, moral cultural principles incorporated into the game. Indigenous games are flexible and inclusive, enabling participation from people of all ages, genders and skill levels. Indigenous games have long been utilized to promote the development of reading and numeracy abilities.

Some of the indigenous games played in India are:

Oru kodam thanni

Oru kodam thanni is an indigenous game mostly played by the girls in rural areas and in schools. In this game two kids have to hold their hands up in the air making an arch. Other children have to pass through the two children singing the rhyme “oru kodam thanni oothi oru poo poothatham” continuing till “patthu kodam thanni oothi pathu poo poothatham”. The child who enters the arch when the rhyme ends that is “patthu kodam thanni oothi pathu poo poothatham” will be caught by the two children.

Poo parika varugirom

“Poo parrika varugirom” is a rhyme-based game played by the children in schools and with their neighborhood friends.to play this game there should be two groups with same number of players on both groups. Each group has to select some topic like animals, fruits or flowers.the group leader of each team has to give names to each member of the group according to the topic they selected. One group has to come forward singing the song “poo parrika varugirom varugirom indha madhathil” and the opponent group will come forward singing “endha pookal vendumo vendamo indha

madhathil". Leaders from first group has to ask the names from the second group. The member from the second group come forward and the rest of the members and the same goes to another group, the group which pulls the other group first will be the winner.

Kulai kulaiyai munthirikai

Kulai kulaiyai mundhirika is the game played by most of the children in their school days. This game starts with children sitting in a circle (it can be big or small) according to the number of children. One child runs around the circle with cloth or branch of leaves in the hand while singing the song "kulai kulaiyai mundhirika" then the child can leave the cloth or leaves behind any one of the children and that children should get up and chase the first child before sitting in the vacant place. This process will continue till the catcher catch the running one.

Nooran Kuchi

Nooran kuchi is a pickup stick game which involves 10 sticks with different sizes and one big stick totality of 11 sticks. For playing this game one circle should be drawn, inside that 11 sticks should be dropped. If any one of the sticks touches the circle then the player has to drop it again. After dropping the sticks, the player has to pick the sticks one by one without shaking other sticks. If there is any disturbance of the sticks noticed by the player then the next player will get the chance. Each stick is provided with ten points and the big stick has 100 points. One with high points is considered as winner.

Dhayam

Dhayam is one of the traditional indoor games of Tamilnadu. Dhayam is played using board or the pattern can be drawn on the floor and was played by 4 members. Each has 6 pieces or coins and they have to roll the dayam or dice and if they get one,

they can move their piece or coin. The player has to move their pieces in clockwise direction. If two players have landed their coin in the same place tha opponent player can cut the coin and that coin should begin from the first place. This process will continue till the one who takes all their coin home is announced as winner.

Odi vilayattu

Odi vilayatu is commonly played game in schools and near houses with neighbourhood friends. Commonly there will be a catcher and the other children will run around. Catcher have to catch the children, the first one caught will be the next catcher.

Pallanguzhi

Pallanguzhi is a widely played indigenous game of TamilNadu. It is a two-player board game which commonly has 14 pits. Tamarind seeds or stones or other type of seeds can be used to play pallanguzhi. In the beginning of the game each pit is filled with six seeds, one who start the game can take seeds from any one of the pits and dropping the seeds in the successive pit in counterclockwise direction after dropping the last seed, they can take the seeds from next pit and continue the process until there is an empty pit. If there is an empty pit after dropping the last seed then the player can collect all the seeds from the next pit. Then the opponents turn will begin and they proceed the process. The game will end when all the seeds were collected.

Paandi or Nondi (Hopscotch)

Paandi or Nondi is a hopping game with simple rules widely played in rural parts of TamilNadu. This game is played in different versions with different names. The main rule of this game is to hop without stepping on the lines. If the player stepped in the line they have to go back and the chance will be given to another person. There is

no limit to number of players in the game, only one player can play at one time and everyone gets their turn to play the game. This game has several patterns and it has series of rounds. A small flat stone or broken pot piece can be used to throw in the boxes to mark the box. The first one to complete the series will be the winner.

In addition to the games mentioned above, numerous indigenous games are played in different parts of India. These games vary across regions and are often known by different names, reflecting the cultural diversity of the country.

Indigenous games are pertinent tools that aid in teaching specific educational concepts, including counting, measuring, sounds, reading and vocabulary (Madondo & Tsikira, 2022). According to Moloi (2020), children learn mathematical concepts of seriation, measurement, numbers and counting through indigenous games such as kgati (board game) without realizing that learning is taking place. Through indigenous games teachers can make learners actively participate in classroom activities (Kancanadana et al., 2021).

2.1 THEORETICAL FRAMEWORK

Theoretical framework is a framework that represents the study's hypothesis and/or is based on an established theory in a field of study (Adom et al., 2018). The researcher frequently borrows this design to construct his/her own research project. The researcher is guided by the theoretical framework to ensure that his or her final contribution is scholarly and academic and stays within the bounds of established theories. The theoretical framework is connected to the research problem being studied and acts as the investigations focal point. As a result, it directs the selection of a researcher's data analysis strategy and research design. Therefore, a theoretical

framework is a synthesis of the ideas, claims and concepts of experts in the subject of study that a person has decided to pursue (Babale & Lawal, 2021).

Piaget's theory of cognitive development (1952)

Jean Piaget (1896 – 1980) was a Swiss psychologist, renowned for his research on child development. According to piaget (1954), cognitive development of a person takes place by constant interaction with his physical and social environment. Certain ways of thinking that are quite simple for an adult are not so simple for a child. The process of cognitive development proceeds through an orderly sequence of stages. With the process of natural growth, the cognitive structure of a child develops.

Cognitive development involves much more than simply accumulating new facts and concepts in our minds. Piaget argued that our cognitive processes undergo significant changes, gradually from the moment we are born until we reach maturity, as we continuously attempt to understand our surroundings. He identified four interacting factors: biological growth, experience through activity, social interactions and equilibration that shape the evolution of our thinking (Piaget, 1970a). Among these, maturation is one of the most crucial influences, referring to the natural progression of biological changes that are encoded in our genes. Parents and educators have limited influence on this particular aspect of cognitive growth aside from ensuring that children receive the necessary nourishment and care for good health. Activity is another factor that influences development. As children grow physically, they gain an increasing ability to interact with and learn from their surroundings. For instance, when a child's coordination reaches a sufficient level, they might learn about balance through play on a seesaw. Piaget proposed that our cognitive growth is shaped by social transmission, which involves learning from others. Without this social transmission, we would have

to rediscover all the knowledge our culture provides. Individuals have an inherent inclination to organize their thought processes into psychological frameworks. These frameworks serve as methods for understanding and engaging with the world around us. Basic frameworks are continually merged and refined to become more advanced and consequently more effective. Piaget referred to those frameworks as schemas. *Schemas* serve as the fundamental components of thought. They are structured systems of actions or ideas that enable us to mentally visualize or consider the objects and events around us. Schemas can be quite small and specific. As an individual's cognitive processes become more organized and new schemas emerge, behavior tends to become more advanced and better suited to the surroundings.

Beyond the inclination to structure their mental frameworks, individuals also inherit the ability to adjust to their environment. Two key processes involved in this adaptation are assimilation and accommodation. *Assimilation* occurs when individuals utilize their existing schemas to interpret events in their environment. *Accommodation* takes place when a person needs to modify their current schemas to deal with a new situation. Piaget described organizing, assimilating and accommodating as a difficult balancing act. The actual changes in thinking occur throughout the equilibration process, which is the act of seeking balance. The process of equilibration works as follows: if a specific schema is applied to an event or scenario and it is successful, equilibrium exists. If the strategy does not yield a satisfactory outcome, disequilibrium exists. This encourages us to continue looking for a solution through assimilation and accommodation, as a result, our thinking evolves and progresses.

Piaget identified four stages of cognitive development: sensorimotor, pre - operational, concrete operational, and formal operational. Piaget felt that everyone goes through the same four stages in precisely the same order.

Sensori motor stage (Birth to 2 years)

The sensorimotor stage refers to the child's ability to think through various senses, including sight, hearing, movement, touch, and taste and so on. During this time, the infant learns object permanence, which is the understanding that items exist in the environment whether the baby perceives them or not. The onset of logical, goal-directed behaviors is the second significant accomplishment of the sensorimotor stage. Learning to reverse actions is a fundamental aspect of the sensorimotor stage.

Pre – operational stage (2 to 7 years)

By the end of the sensorimotor stage, the kid can use a variety of action schemas. The stage following sensorimotor is known as preoperational, because the kid has not yet mastered certain mental operations but is working toward mastery. The first sort of thinking that is not related to action is the symbolic representation of action schemas. The ability to develop and employ symbols - words, gestures, signs, images, and so on is thus a significant accomplishment of the preoperational period, bringing youngsters closer to mastering the mental activities of the following stage. As the infant progresses through the preoperational stage, the emerging ability to think about objects in symbolic form is somewhat confined to thinking in one direction only. It is quite difficult for the toddler to "think backwards". Many challenging tasks for the preoperational child need reversible thinking, such as matter conservation. Conservation is the notion that the amount or quantity of anything remains constant even if the arrangement or appearance changes, as long as nothing is added or taken away. According to Piaget, preoperational children are egocentric, they see the world and other people's experiences through their own eyes. Piaget's definition of egocentricity does not indicate selfishness; rather, it suggests that children frequently imagine that everyone else shares their thoughts,

reactions, and views. Very young children are focused on their own views and how the situation looks to them.

According to Piaget, children in the Preoperational Stage (2-7 years) exhibit rapid progress in symbolic thinking and imagination. Their thinking is intuitive rather than rational, and concrete, hands-on exercises are more effective than abstract training for them. Play becomes an important modality of learning because it allows youngsters to explore their surroundings, imitate real-life scenarios, and construct meaning via active participation. Active engagement and hands-on learning are more successful than traditional methods of instruction. Play-based learning, in particular, offers a natural and engaging setting in which children can develop cognitive skills.

In this setting, indigenous games are effective teaching aids. These games are based on children's cultural backgrounds and include activities like counting, grouping, comparing, and problem solving, all of which are necessary components of basic numerical skills. Children can internalise number concepts in a meaningful and engaging way by playing these games repeatedly. Indigenous games provide a relevant framework for children's learning by promoting both developmental progress and the acquisition of basic numerical skills. In these games, children typically follow a natural learning sequence: they first receive guidance from adults or peers through demonstrations and explanations of rules, then experiment through trial and error while actively participating in the game, and finally achieve independence by developing strategies and creatively modifying rules. This trend depicts how toddlers learn through active interaction. Games such as snakes and ladders, fire in the mountain, and "Oru Kudam Thanni Oothi" encourage children in learning. When properly constructed, these games allow for counting, sequencing, and interaction, promoting the development of basic numerical skills in pre-primary children.

Concrete operational stage (7 to 11 years)

The fundamental characteristics of this stage include the acknowledgement of the logical stability of the physical universe, the realisation that elements can be changed or transformed while retaining many of their original properties, and the understanding that these changes can be reversed. With complete mastery of identification, the learner understands that if nothing is added or removed, the material will remain the same. With an understanding of compensation, the learner understands that an apparent change in one direction can be offset by a change in another. With an awareness of reversibility, the student can mentally cancel out the alteration that has occurred. The capacity to mentally reverse a process now enables the concrete-operational learner to recognise that there are multiple ways to classify a collection of things. Seriation is the process of arranging items in an orderly manner from large to small, or vice versa. Understanding sequential relationships allows students to create logical sequences such as A <B <C (A is less than B is less than C), and so on. Children in the Concrete Operational Stage (7-11 years) develop logical thinking skills, allowing them to complete more difficult mathematical operations and engage in strategic thinking while problem solving and playing.

Formal operational stage (11 years to adult)

Formal thinking is reversible, internal, and structured in a system of interdependent elements; all previous operations and abilities are still in effect at the level of formal operations. But the emphasis of thought moves from what is to what could be. The formal thinker can use deductive reasoning to examine a hypothetical scenario. Inductive reasoning, or applying particular observations to determine universal principles, is another type of formal procedure. In order to conduct a valid

test of their hypotheses, formal-operational thinkers are able to formulate hypotheses, set up mental experiments to test them, and isolate or control variables. Games like Chaturanga or sophisticated Kabaddi versions can promote abstract planning and reasoning by formal operational stage.

According to Jean Piaget, infants learn actively rather than passively and acquire their knowledge and comprehension of their surroundings by first-hand experience (Bonel & Lindon, 2014). According to Piaget, toddlers pick up knowledge by copying others and turning that imitation into symbolic action. This implies that during active learning using indigenous games, kids can learn from both adults (their teachers) and their peers (other students). Teachers are therefore scaffolders, making sure to provide an environment and place that are appropriate for teaching and learning that is full of play activities utilising indigenous games. According to Madondo & Tsikira (2022), children build knowledge through interactions between members of their own age group and teachers or significant people at home and at school.

Lev Vygotsky's Sociocultural theory (1978)

Russian psychologist Lev Vygotsky lived from 1896 until 1934. Because he firmly felt that community is essential to the process of "making meaning," Vygotsky's ideas emphasise the vital significance of social interaction in the formation of cognition (Vygotsky, 1978). According to Vygotsky, human behaviour occurs in cultural contexts and cannot be comprehended in isolation. One of his main theories was that our unique mental processes and structures can be linked to how we interact with other people. Our cognitive structure and thought processes are truly shaped by these social interactions, which go beyond simple effects on cognitive growth. In fact, Vygotsky conceptualized

development as the transformation of socially shared activities into internalized processes.

Vygotsky explains how social processes shape learning and thinking, including the role of tools in learning and growth and the social sources of individual thought. According to Vygotsky, cultural tools both tangible and symbolic have a significant impact on cognitive development. Vygotsky focused on the resources that culture offers to facilitate thought. He held that psychological tools like language, signs, and symbols mediate all higher-order mental activities like reasoning and problem solving. Children share ideas and methods of thinking about or depicting concepts such as creating maps when they participate in activities with adults or more experienced peers.

According to Vygotsky, a child's interactions and conversations with more capable peers or adults in the culture help them develop cognitively. These individuals act as mentors and educators, giving the child the knowledge and assistance, they need to develop cognitively. According to Vygotsky, educators must do more than simply set up the surroundings to allow students to make their own discoveries. Teachers, parents, and other adults are crucial to a child's learning and development since they should help and lead them in their education.

Scaffolding: Providing information, prompts, reminders, and encouragement at the appropriate times and in the appropriate amounts is necessary for assisted learning, also known as guided participation in the classroom. After that, the students are gradually given more and more freedom to work independently.

Zone of Proximal Development (ZPD)

Vygotsky defined ZPD as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development

as determined through problem solving under adult guidance or in collaboration with more capable peers". According to Vygotsky, a child is on the limit of being able to solve some problems at any given stage of development. The zone of proximal development is when a youngster is unable to solve a problem on their own but can succeed when working with a more experienced peer or under the supervision of an adult. Since actual learning is possible, this is the area where instruction can be successful. People learn best when they collaborate with others, and learners acquire and internalise new ideas, psychological tools, and abilities through these kinds of combined endeavours with more experienced others.

Vygotsky makes reference to the idea that children stretch their bounds through play in order to solve problems and subsequently create knowledge in his concept of the zone of proximal development (ZPD) (Nilsson & Ferholt, 2014). Teachers need to be prepared with games and indigenous knowledge, as well as skills that will enable them to use play and effective teaching strategies and tools. According to Vygotsky, children learn best in social settings where they can complete tasks under supervision that they would not be able to complete on their own. The majority of indigenous Indian games are team-oriented and inherently promote cooperative learning. Children work within the ZPD as they plan and interact with peers, developing their skills via peer support and collaborative problem-solving.

Scaffolding: By explaining the rules, providing advice, or demonstrating both offensive and defensive tactics, teachers or older pupils can scaffold games.

Internalisation: As children learn new abilities and go from guided play to independent play, external support gradually diminishes.

This idea was important to the study because it eventually encourages self-control and early learning abilities in pre-schoolers which are crucial for a child's overall development.

Gardner's theory of multiple intelligences (1983)

Gardner claims that intelligence is the capacity to solve an issue or perform a task that is valued in one or more cultures. The framework developed by Howard Gardner emphasises the diversity of intelligence, including linguistic, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, musical, and naturalist.

Linguistic intelligence: Individuals with high language abilities are able to comprehend others and communicate their ideas in both their mother tongue and occasionally other languages.

Logical-mathematical intelligence: Kids enjoy working with numbers, solving puzzles, asking questions, and conducting experiments. Analysing the data, using logic, creating tables and graphs, and organising the facts logically are all advised.

Spatial intelligence: Visual images help children learn quickly. They enjoy puzzles and are adept at deriving information from diagrams and maps.

Bodily kinesthetic intelligence: The ability to solve difficulties with one's entire body or specific bodily parts. It is the capacity to coordinate physical motions with cerebral skills.

Musical intelligence: It encompasses the capacity to recognize and compose musical pitches, tones, and rhythms.

Interpersonal intelligence: The capacity to understand people is a component of interpersonal intelligence. Individuals with high levels of this intelligence are able to figure out the motives, feelings, and desires of others.

Intrapersonal intelligence: A person with high intrapersonal intelligence has a better understanding of themselves. It involves having the ability to comprehend oneself and value one's emotions, anxieties, and driving forces.

Naturalist intelligence: The original seven were added with the naturalist intelligence. It has to do with a person's capacity to distinguish between different living entities. Individuals with high levels of this intelligence are good in categorising rocks, grass, plants, minerals, and animals.

The application of the theory of multiple intelligences aids in structuring an educational process that will consider various learning styles, which necessitate the involvement of various intelligence types in order to get to know and learn something in the way that is most convenient for him. This will encourage the child to learn and get the required experience.

Gardner's Theory of Multiple Intelligences, which suggests that people have a variety of intelligences, broadens our understanding of human intellect beyond conventional IQ tests (Gardner, 1983). Multiple intelligences are simultaneously engaged in traditional Indian games (Mehta & Kumar, 2025).

Indigenous games help in incorporating creativity, culture and cognition into the classroom. They provide a natural setting for the development of many intelligences while also strengthening basic numerical skills like counting, sequencing and also helps in developing problem solving. These games give students concrete experiences by

incorporating mathematical thinking into play. It can be mapped to different intelligences in a holistic educational framework.

Bodily – Kinesthetic: Games like Nondi, Odi vilayatu and Oru Kodam Thanni Oothi develop agility, balance and physical coordination.

Logical – Mathematical: Games such as Dhayam, Pallankuzhi, Nooran kuchi and kulai kulaiyai munthirrikai demand counting, probability and logical reasoning.

Interpersonal: Group games like Jodi pura, poo parika varugirom and odi vilayatu foster collaboration, communication and teamwork.

Intrapersonal: Strategy based games like Dhayam and Nooran Kuchi require patience, self – regulation, strengthening focus and self – awareness.

Through Gardner's theory of Multiple Intelligences, indigenous games can be recognized as effective educational tools that foster various types of intelligence while also enhancing numerical skills. They support comprehensive development by involving the physical, cognitive, emotional, and social aspects of learning, ensuring education transcends mere rote learning and is enriched by hands-on and cultural experiences. Consequently, indigenous games are not just traditional leisure activities but also instructional approaches that, viewed through Gardner's lens, connect cultural heritage with contemporary teaching methods and provide joyful and meaningful learning opportunities.

How the three theories supported the study

While Piaget emphasizes the stages of individual cognitive development, Vygotsky's sociocultural view stresses the importance of peer interaction and guided learning (ZPD), and Gardner broadens the perspective to include multiple intelligences;

these frameworks together confirm that learning is both interactive and influenced by context. Indigenous games reflect these principles by:

- Offering hands-on, developmentally appropriate challenges (Piaget)
- Promoting social collaboration and guided discovery (Vygotsky)
- Engaging various intelligences—cognitive, kinesthetic, interpersonal, and intrapersonal (Gardner).

By integrating these theories, the combination of individual exploration, social interaction, and diverse cognitive domains not only enhances skill development but also maintains cultural identity. Essentially, indigenous games function as ‘laboratories’ for holistic growth, intertwining cognitive, social, and moral aspects within a culturally meaningful setting.

Piaget’s stage-based perspective indicates that children understand counting, sequencing, and classification more effectively when these concepts are incorporated into tangible play experiences. According to this theory, teachers are the most important role models for students. Teachers were therefore acting as scaffolders, giving kids suitable and supportive learning settings through playful activities.

Lev Vygotsky's sociocultural theory emphasised the relevance of culture, social experiences, and the ZPD in promoting complete child development. This was significant since traditional games are culturally rooted and are enjoyed socially by people who play them. The various traditional games also allow students to play games with the help of teachers and classmates until they have mastered a certain ability, such as counting. It also focuses on guided learning illustrates how peers and mentors facilitate mathematical reasoning during collaborative games, such as keeping score or planning moves.

Gardner's framework also indicates that logical-mathematical intelligence is inherently engaged in activities like dice games, counting sticks, or dealing with probability, while bodily-kinesthetic and interpersonal intelligences create the experiential and social environments where numerical reasoning flourishes. Therefore, indigenous games not only reflect cultural depth but also act as dynamic educational resources that combine cognitive growth with essential numerical skills.

2.2 RELATED STUDIES

The review of related studies is a systematic effort made by the researcher to collect, examine and analyze all relevant existing information. Its purpose is to understand what work has already been completed and to identify gaps or areas that have not yet been explored in the chosen research topic.

The investigator collected studies related to indigenous games and basic numerical skills. The related studies reviewed by the investigator are classified under the following three categories

1. Studies related to Indigenous games

2. Studies related to Basic numerical skills

3. Studies linking indigenous games and basic numerical skills

2.2.1 STUDIES RELATED TO INDIGENOUS GAMES

Mehta and Kumar (2025) examined the educational potential of traditional Indian games in their article "Revitalizing Traditional Indian Games in Contemporary Education: A Cultural and Holistic Paradigm,". The study aimed to explore how traditional Indian games, deeply rooted in the country's cultural heritage, can be integrated into contemporary educational frameworks to support holistic development,

including cognitive, social, emotional, and character education. The paper adopted a conceptual research design, synthesizing theoretical perspectives from Piaget's cognitive development theory, Vygotsky's sociocultural theory, and Gardner's theory of multiple intelligences, alongside recent empirical findings on play and learning, to situate traditional games within 21st-century learning paradigms. Data sources were drawn from cross-cultural literature, educational theory, and existing quantitative and qualitative studies on learning outcomes associated with traditional games. Through descriptive and interpretive analysis, the authors highlighted the universal benefits of traditional games for inclusive and culturally relevant education, emphasizing their role in cultural preservation, character formation, and engagement with contemporary curricula. The study advocated for a balanced curriculum that incorporates traditional Indian games to foster culturally grounded education that meets modern educational standards while calling for further empirical research to validate and measure long-term educational impacts.

Yeptho, Shitire, and Yadav (2025) explored the "Educational Implications of Naga Indigenous Games,". The study aimed to investigate how indigenous games, deeply embedded in the cultural traditions of the Naga community in Northeast India, can inform and enrich educational practices by fostering physical, social, and cognitive development. Using a qualitative conceptual approach drawing on both primary sources (interactions with community elders knowledgeable about traditional games) and secondary literature, the researchers documented the historical, cultural, and educational significance of Naga indigenous games. Data were gathered through literature review and interviews and discussions with cultural informants, enabling a rich understanding of how these games contribute to life skills such as teamwork, agility, resilience, community participation, and respect for cultural heritage. The study

employed descriptive and interpretive analysis to synthesize evidence on the pedagogical value of indigenous games, highlighting that integrating such culturally grounded play into formal and informal education can support holistic development, strengthen cultural identity, and align with broader educational goals such as those espoused in policy frameworks like NEP 2020.

Kumar (2025) conducted a conceptual study titled "Principles and Global Relevance of Bhāratīya Khel (Indian Games)." The study examined the historical, cultural, and educational significance of traditional Indian games, collectively known as Bhāratīya Khel. The study highlighted that traditional games such as Kabaddi, Kho-Kho, Chaturanga, and Mallakhamb are deeply rooted in Indian culture and philosophy, drawing values from ancient texts like the Rig Veda, Mahābhārata, and Nāṭyaśāstra. These games were found to promote not only physical fitness but also mental discipline, strategic thinking, and social interaction. The author emphasized that such games contribute to holistic development by fostering qualities like endurance, cooperation, and self-regulation, while also serving as tools for cultural transmission across generations. The study further noted that the popularity of digital entertainment has led to a decline in the awareness and practice of traditional games. However, recent government and educational initiatives aim to revive these games by integrating them into modern educational frameworks. The study stressed that incorporating Bhāratīya Khel in education can enhance student engagement, promote cultural identity, and support overall development.

Dr. Shahanawaz Khan (2023) examined the cultural and educational significance of indigenous games in India using a conceptual and descriptive approach. The study aimed to understand the role of traditional games as part of India's cultural heritage and their contribution to child development. The study highlighted that

indigenous games have historically been an integral part of children's daily lives and have contributed to their physical, social, emotional, and cognitive development. These games promote active participation, cooperation, teamwork, and experiential learning, thereby supporting holistic development. The author emphasized that indigenous games also serve as a medium for transmitting cultural values, traditions, and social norms across generations. The study further pointed out that indigenous games are gradually declining due to factors such as modernization, globalization, urbanization, and the increasing dominance of organized and international sports. As a result, children are becoming less exposed to culturally rooted play activities. To address this issue, the study suggested that indigenous games should be integrated into the school curriculum with proper policy support and community involvement to ensure their preservation and educational use.

Soni (2022) explored the significance of using indigenous toys and games in early years education in the article "Significance of using indigenous toys and games in early years: A child's way to learn and grow,". The study aimed to examine how indigenous toys and games contribute to holistic child development, particularly in cognitive, social, emotional, and motor domains. Drawing on qualitative evidence and literature synthesis, the author discussed the cultural, pedagogical, and developmental value of indigenous play materials that are familiar to children within their community contexts. The analysis highlighted how such play resources support active engagement, problem-solving, symbolic thinking, language development, and social interaction, all of which are foundational to early learning processes. The findings underscored that integrating indigenous games and toys into early years curricula not only enhances children's interest and participation but also fosters culturally relevant learning

experiences that align with children's lived experiences, thereby making learning meaningful and contextually grounded.

Madondo and Tsikira (2022) conducted a study titled "Traditional Children's Games: Their Relevance on Skills Development among Rural Zimbabwean Children Aged 3–8 Years,". The study aimed to examine the role of traditional children's games in promoting holistic development among young learners in rural Zimbabwe. The study adopted a grounded theory approach and involved ten early childhood educators selected from rural schools across five provinces. Data were collected through multiple methods, including questionnaires, face-to-face interviews, and classroom observations, ensuring validity through triangulation. The findings revealed that traditional games are deeply rooted in children's socio-cultural context and play a significant role in developing a wide range of skills, including cognitive abilities, language development, social interaction, creativity, and practical life skills. The study emphasized that indigenous games provide meaningful and engaging learning experiences, as they are familiar to children and connected to their everyday lives. The researchers concluded that traditional games are valuable instructional tools in early childhood education and recommended that educators should actively integrate them into classroom practices. The study also highlighted that skills developed through indigenous games are sustainable and transferable to real-life situations.

Kancanadana, Saputri & Tristiana (2021) conducted a study on "The Existence of Traditional Games as a Learning Media in Elementary School." The objective of the study was to examine the role and relevance of traditional games as an effective learning medium in elementary education. The study adopted a descriptive research design, utilizing literature review and observational insights from educational settings. Data was collected from conference proceedings and related academic sources

focusing on traditional games and their application in classrooms. The findings of the study revealed that traditional games serve as an engaging and interactive learning tool that supports cognitive, social, and physical development among children. It also indicated that incorporating such games into teaching enhances student participation and makes learning more enjoyable and meaningful.

Losini (2020) examined traditional children's games of Tamil Nadu with a focus on their cultural, social, and educational significance. The study adopted a descriptive and sociological approach to document indigenous games that were once integral to children's daily lives and community interactions. Through qualitative analysis of traditional play practices, the author highlighted how these games contributed to children's physical development, social cooperation, moral values, and cultural identity. The study emphasized that traditional games promote skills such as teamwork, discipline, leadership, problem-solving, and emotional regulation while simultaneously transmitting cultural heritage across generations. The findings underscored the concern that modernization and digital entertainment have led to the gradual disappearance of these games, resulting in a loss of valuable informal learning opportunities. The study concluded by advocating for the revival and integration of traditional games into educational and social contexts, particularly in schools, to preserve cultural values and enhance holistic child development. While the study provided rich cultural insights, it remained largely descriptive and did not empirically assess the impact of traditional games on specific learning outcomes such as literacy or numeracy, indicating scope for experimental research in this area.

Moloi (2020) conducted a study on "Decolonising the Teaching of Mathematics in Rural Learning Ecologies by Using Indigenous Games." The objective of the study was to explore how indigenous games can be used as a tool to decolonize mathematics

teaching and make it more relevant and meaningful in rural contexts. The study employed a qualitative research approach, drawing on observations and contextual analysis within rural learning environments. Data was gathered through field-based insights and literature related to indigenous knowledge systems and mathematics education. The findings of the study revealed that integrating indigenous games into mathematics instruction helps learners connect mathematical concepts with their cultural experiences. It also emphasized that such practices promote engagement, improve understanding, and challenge the dominance of Western-centric teaching methods.

Chopra and Khanna (2019) examined "Play as a Mechanism of Promoting Emergent Literacy among Young Children: The Indian Context,". The study aimed to analyse the role of play in fostering emergent literacy skills among young children, particularly within the Indian educational and cultural context, where traditional and informal play experiences remain prevalent. Using a qualitative, conceptual research approach, the authors reviewed literature and contextual evidence to discuss how play experiences - including storytelling, symbolic play, and culturally rooted games - provide opportunities for young children to engage with language, print awareness, narrative skills, and emergent reading behaviours. The analysis underscored that play creates meaningful and socially embedded contexts for children to practise language use, experiment with symbolic representation, and interact with peers and adults in literacy-rich activities. The findings highlighted that integrating play into early childhood settings can support children's initial literacy development by making learning intrinsically motivating, culturally relevant, and aligned with children's natural modes of exploration and communication. Overall, the study reaffirmed that play is a foundational mechanism for promoting emergent literacy among young children in the

Indian context, calling for educators to intentionally design play-based learning opportunities within early years curricula.

Pramanik and Bhattacharya (2019) examined "Play and Indigenous Games of Children: A Cultural Heritage of Western Odisha, India" with the aim of documenting and analysing the traditional play and indigenous games of rural children as expressions of cultural heritage and knowledge transmission. The study was conducted among school-going children in rural pockets of Western Odisha, including areas such as Kalahandi, Bolangir, Sambalpur, Sonepur, Sundergarh, and Athamallik, where traditional games remain prevalent amidst changing lifestyles. A qualitative ethnographic approach was used, involving purposive sampling of children, teachers, and community members from multiple primary schools in Tangarpali village and surrounding areas. Data were collected through interview schedules, participant and non-participant observations, case studies, and group discussions to capture detailed information about the types of indigenous games played, their rules, and their cultural significance. The researchers employed descriptive and interpretive analysis techniques to examine how these games reflect socio-cultural values, rituals, and daily life experiences and how they have evolved over time. The findings highlighted that indigenous games not only provide entertainment but also serve as vehicles for cultural transmission, fostering knowledge of social norms, cooperation, leadership, and community identity among children, while simultaneously revealing the impact of modernization on traditional play practices.

2.2.2 STUDIES RELATED TO BASIC NUMERICAL SKILLS

Fokides and Konstantopoulou (2026) conducted a study on *"Enhancing kindergarten students' basic spatial and mathematical skills through digital games: A*

*case study."*The objective of the study was to examine the effectiveness of digital game-based learning in improving kindergarten students' spatial and mathematical skills. The study adopted a case study approach, focusing on a group of young learners exposed to structured digital game interventions designed to support early mathematics learning. Data was collected through assessments, observations, and performance evaluations before and after the intervention. The findings of the study revealed that digital games significantly enhanced students' spatial awareness and basic mathematical understanding. The study also highlighted that interactive digital environments increase student engagement, motivation, and active participation in learning.

Idris, Jamil, and Narayanasamy (2026) conducted a study on "Preschool educators' pre-numerical skill pedagogical challenges." The objective of the study was to examine the challenges faced by preschool educators in teaching pre-numerical skills to young children. The study focused on identifying difficulties related to instructional methods, teacher preparedness, and classroom practices in early mathematics education. A qualitative research approach was adopted, where data was collected through interviews, surveys, or classroom observations involving preschool teachers. The findings of the study revealed that educators face several challenges, including lack of adequate training, limited teaching resources, and difficulty in applying effective pedagogical strategies for numeracy development. The study also emphasized the need for professional development and improved instructional support to enhance early numeracy teaching.

Abdurakhmonova (2025) investigated the effectiveness of game-based learning in enhancing arithmetic skills among primary school students. The study employed a quasi-experimental pretest–posttest control group design to examine the

impact of educational games on learners' arithmetic performance. The sample consisted of 48 Grade 2 students, who were divided into an experimental group and a control group. The experimental group received instruction through game-based learning strategies, while the control group was taught using traditional teaching methods. Data were collected using a Mathematics Achievement Test, and the results were analyzed through descriptive and comparative statistical techniques. The findings revealed a significant improvement in arithmetic skills among students in the experimental group when compared to those in the control group. The study also highlighted increased learner engagement and motivation as key outcomes of using educational games in mathematics instruction. The study concluded that game-based learning is an effective pedagogical approach for developing arithmetic skills among young learners. However, the research focused primarily on arithmetic achievement and did not explore broader learning domains or long-term retention, suggesting the need for further studies in diverse contexts and subject areas. The findings provide empirical support for integrating game-based approaches into primary mathematics education.

Meitei, Singh, and Singh (2024) conducted a study titled "Practical Pedagogical Approaches: Integrating Play-Based and Experiential Learning at Pre-Primary Education as per NEP 2020 and NCF-FS 2022." The study examined effective pedagogical practices for early childhood education in India in alignment with recent policy frameworks. The study highlighted that play-based and experiential learning approaches are essential for developing foundational skills among young children. It emphasized strategies for enhancing language, literacy, and numeracy skills, including number sense, basic operations, and spatial understanding through activity-based learning. The study also stressed the importance of creating stimulating learning environments with indoor and outdoor play spaces, along with the use of inquiry-based

activities to promote problem-solving and critical thinking. The authors further discussed the role of teachers in facilitating meaningful learning experiences and identified challenges such as lack of resources, insufficient teacher training, and limited parental involvement. The study suggested that integrating culturally relevant and play-based approaches, as recommended by NEP 2020 and NCF-FS 2022, can support holistic development in early childhood education.

Karunashree & Anuradha (2024) conducted a study on "Early Numeracy among Pre-School Children: Impact of Teacher's Knowledge and Practices – A Critical Analysis of Reviews." The objective of the study was to analyze how teachers' knowledge and classroom practices influence the development of early numeracy skills among pre-school children. The study adopted a review-based methodology, critically examining existing research studies related to early numeracy and teaching practices. Data was collected from various secondary sources, including journals and research publications, and analyzed through a systematic review approach. The findings of the study revealed that teachers' conceptual understanding, instructional strategies, and classroom interactions play a crucial role in shaping children's early numeracy skills. It also highlighted that effective teaching practices significantly enhance mathematical readiness among young learners.

Nazmin Sultana (2023) conducted an exploratory study titled "Teaching Mathematics through Play Pedagogy in Government Pre-primary Classrooms,". The main objective of the study was to explore how play-based pedagogy is implemented in government pre-primary classrooms and to understand its role in supporting early mathematics learning. The study adopted a qualitative exploratory research design, focusing on government pre-primary classrooms. The sample consisted of pre-primary teachers and classrooms selected through purposive sampling. Data were collected

using classroom observations, teacher interviews, and document analysis to capture teaching practices and classroom interactions related to play-based mathematics instruction. The qualitative data were analyzed using thematic analysis, which enabled the identification of patterns related to instructional strategies, learner engagement, and challenges faced by teachers. The findings revealed that play pedagogy encouraged active participation, conceptual understanding, and interest in mathematics among young learners; however, limitations such as lack of training, instructional materials, and structured guidance were also identified, indicating the need for systematic support to effectively integrate play-based approaches in government pre-primary mathematics classrooms.

Olabisi Adedigba (2023) conducted a study titled "Enhancing Numeracy Instruction through Games in Pre-primary Classrooms,". The study aimed to examine the effectiveness of game-based instructional strategies in improving numeracy skills among pre-primary pupils. A quasi-experimental research design was employed, involving an experimental group taught using game-based numeracy activities and a control group taught through conventional instructional methods. The sample consisted of pre-primary pupils selected from schools in Ilorin, Nigeria. Data were collected using a numeracy achievement test developed to assess pupils' understanding of basic mathematical concepts. Descriptive statistics were used to summarize the data, while Analysis of Covariance (ANCOVA) was employed as the main inferential statistical technique to control for pre-test differences and to determine the effect of game-based instruction on pupils' post-test numeracy performance. The findings revealed that pupils exposed to game-based learning demonstrated significantly higher numeracy achievement than those taught through traditional methods, indicating that games serve

as an effective pedagogical strategy for enhancing numeracy learning at the pre-primary level.

Andersen, Kiverstein, Miller, and Roepstorff (2022) presented a theoretical study titled "Play in Predictive Minds: A Cognitive Theory of Play." The study aimed to explain the role of play in learning using the Predictive Processing (PP) framework. They proposed that play is a behaviour in which individuals actively seek or create situations that involve a moderate level of novelty and complexity. Through play, children encounter and resolve uncertainty or "prediction errors," which enhances learning and cognitive development. The study emphasized that play is associated with positive emotions because individuals experience satisfaction when they successfully reduce uncertainty. It also highlighted that children act as active learners who shape their environment through play, thereby promoting exploration, problem-solving, and knowledge construction.

The National Council of Educational Research and Training (NCERT) (2022) developed Toy-Based Pedagogy as a foundational teaching and learning resource under the Department of School Education and Literacy, Government of India, aligning with the principles of the National Education Policy (NEP) 2020. The Toy-Based Pedagogy handbook aims to integrate experiential and play-based learning across school stages, with a special emphasis on the foundational years of education, where toys and indigenous games are positioned as core pedagogical tools to enhance conceptual understanding, creativity, imagination, and holistic development. The document outlines strategies for mapping toys and playful activities to competencies across subjects and highlights the importance of locally available and culturally relevant materials to make learning meaningful and contextually grounded. It also provides guidance on implementing toy-based activities in classrooms, designing learning

corners, and preparing teachers through capacity building, while encouraging the use of indigenous games and puzzles for skill development in literacy, numeracy, and cognitive domains. By emphasizing sensory experiences, learner engagement, and problem-solving through play, the handbook positions toy-based pedagogy as an essential mechanism to enrich curriculum delivery and foster joyful, inclusive, and context-responsive education in Indian schools.

2.2.3 STUDIES LINKING INDIGENOUS GAMES AND BASIC NUMERICAL SKILLS

Cygnet, A. B. (2025) conducted a study on "Effect of Mancala Game (Pallanguzhi) in STEM Education for Children with ADHD at Primary Level". The objective of the study was to examine the effectiveness of the traditional Mancala game, Pallanguzhi, as a teaching strategy in STEM education for primary-level children with ADHD. The study focused on improving attention, engagement, and basic mathematical understanding through game-based learning. An experimental or intervention-based approach was adopted, where students were exposed to structured Pallanguzhi activities integrated into STEM lessons. Data was collected through observation, performance assessments, and behavioral analysis. The findings of the study revealed that the use of Pallanguzhi significantly improved students' concentration, participation, and understanding of basic numerical and problem-solving skills. It also indicated that indigenous games can serve as effective inclusive teaching tools for children with special learning needs.

Grant Mwinsa and Murunwa Dagada (2024) carried out a study entitled "Efficacy of Indigenous Games on Literacy and Numeracy Development in Pre-schoolers in Zambia,". The study aimed to explore the effectiveness of indigenous

games in promoting literacy and numeracy development among pre-school children within the Zambian context. The researchers adopted a participatory action research design, emphasizing active involvement of participants in the teaching–learning process. The study sample comprised pre-school learners and teachers selected through purposive sampling from early childhood education centers in Zambia. Data were collected using participatory observations, interviews, and classroom interactions during the implementation of indigenous game-based activities. The collected qualitative data were analyzed using thematic analysis, allowing the researchers to identify recurring patterns and themes related to learners' engagement and skill development. The findings revealed that the use of indigenous games enhanced children's participation, understanding, and application of basic literacy and numeracy concepts, demonstrating that culturally grounded play-based approaches are effective in supporting early childhood learning.

Abioye, Oyegoke, Olatunji, and Adejare (2024) performed a study titled "Influence of Indigenous Games on the Mathematics Foundation Knowledge for Young Children in Afijio Local Government." The study aimed to examine the impact of indigenous games on the development of foundational mathematical skills among young children, with a focus on culturally relevant learning practices. The study was grounded in Lev Vygotsky's Theory of Play-Based Learning (1934) and adopted a mixed-method research design. A sample of 200 children was selected using stratified random sampling. Data were collected through questionnaires, standardized mathematics tests, and observations, ensuring reliability and validity of the instruments. The study assessed key numeracy skills such as counting, pattern recognition, spatial awareness, and problem-solving. The findings revealed that children who participated in indigenous games demonstrated significantly higher levels of mathematical

foundation knowledge compared to those who did not. The study emphasized that indigenous games provide meaningful, engaging, and culturally relevant learning experiences that enhance children's understanding of mathematical concepts. It also highlighted the role of such games in preserving cultural identity while promoting academic development.

Asmara, Andrini, Juwanto, Asfar, Jumri, and Yani (2024) conducted a study titled "Engklek: Ethnomathematics-Based Traditional Games in the Development of Teaching Materials to Build Mathematical Literacy Skills," published in the Journal of Pedagogi. The study aimed to examine the use of the traditional Indonesian game *Engklek* as an ethnomathematics-based learning tool for developing mathematical literacy skills. The study adopted a Systematic Literature Review (SLR) approach and analyzed research related to traditional games and mathematics learning. The findings revealed that integrating Engklek into mathematics instruction helps children understand mathematical concepts such as counting, geometry, spatial understanding, reasoning, and problem-solving through active participation and culturally meaningful experiences. The study emphasized that traditional games create enjoyable and engaging learning environments, reduce fear toward mathematics, and support mathematical understanding by connecting learning with children's cultural background. The researchers also highlighted the importance of integrating culturally relevant teaching strategies into classroom practices to preserve cultural heritage while enhancing learning outcomes.

Dr. M. Prabavathy and R. Sivaranjani (2023) carried out a study titled "Utilizing Traditional Game-Pallanguzhi as a Tool to Enhance the Basic Arithmetic Skill of Children with Mathematical Difficulties,". The primary objective of the study was to examine the effectiveness of the traditional indigenous game Pallanguzhi in

improving basic arithmetic skills among children with mathematical difficulties. The study adopted an experimental research design, involving children identified with difficulties in basic arithmetic operations. The sample comprised children who were exposed to instructional sessions using the traditional game Pallanguzhi as an intervention tool. Data were collected using basic arithmetic skill assessment tools designed to measure children's performance before and after the intervention. Appropriate descriptive and inferential statistical techniques were employed to analyze the data and determine the effectiveness of the intervention. The findings of the study revealed a significant improvement in the basic arithmetic skills of children after being taught using the Pallanguzhi game, indicating that traditional games can serve as effective, engaging, and culturally relevant instructional tools for supporting mathematics learning among children with mathematical difficulties.

Albina (2022) conducted an experimental study titled "Cultural Play Meets Pedagogy: An Experimental Study on Integrating Indigenous Games in Early Math Instruction,". The study aimed to examine the effect of integrating indigenous games into early mathematics instruction on young learners' mathematical achievement. A quasi-experimental research design was employed with a total sample of 60 pre-primary children, divided equally into an experimental group, which received instruction through indigenous games, and a control group, which received traditional instruction. Data were collected using four tools: a mathematics achievement test, classroom observation checklist, teacher interview schedule, and a learner engagement scale to assess children's performance, participation, and learning experience. Descriptive statistics were used to summarise the data, while Analysis of Covariance (ANCOVA) was applied to control for pre-test differences and determine the effect of the intervention on post-test mathematics scores. The findings revealed that children in the

experimental group demonstrated significantly higher mathematics achievement and engagement than those in the control group, indicating that culturally relevant play activities effectively enhance early mathematics learning and make instruction more meaningful and interactive.

Abdulkareem (2021) undertaken a study on "Effect of Indigenous Game Strategies on Primary School Pupils' Academic Performance in Numeracy in Ilorin East Local Government Area, Kwara State." The objective of the study was to examine the effect of indigenous game-based instructional strategies on the academic performance of primary school pupils in numeracy. The study adopted an experimental research design, involving control and experimental groups to compare traditional teaching methods with indigenous game-based approaches. Data was collected using achievement tests administered before and after the intervention. The findings of the study revealed that pupils taught using indigenous game strategies performed significantly better in numeracy compared to those taught using conventional methods. The study also highlighted that game-based learning increases engagement, motivation, and understanding of mathematical concepts among learners.

De Chambrier et al. (2021) performed a study titled "Enhancing Children's Numerical Skills through a Play-Based Intervention at Kindergarten and at Home: A Quasi-Experimental Study." The study aimed to examine the effectiveness of play-based numerical games in improving early number skills among young children. The study adopted a quasi-experimental design involving 569 kindergarten children aged 4–6 years from 46 classes. The intervention was implemented over a period of 12 weeks, where one group engaged in numerical games at school, another group engaged in games both at school and at home, and a control group followed regular instruction. Data were collected through pre-test and post-test measures of numerical ability and

analyzed using advanced statistical methods. The findings revealed that play-based interventions significantly enhanced children's numerical skills. Children who participated in game-based activities at school showed greater improvement compared to the control group, particularly among average and high-performing students. Additionally, involving families by providing games for home use was especially beneficial for low-achieving children, helping them make greater progress. The study highlighted the importance of integrating play-based learning both in school and home environments to support early numeracy development.

Asrial, Syahrial, Maison, Kurniawan, and Perdana (2020) carried out a study titled "A Study of Traditional Games 'Engklek' in Mathematics for Elementary School." The study aimed to examine teachers' awareness and understanding of integrating the traditional game Engklek into mathematics teaching at the elementary level. The study adopted a mixed-method approach using a sequential explanatory design. Data were collected from 34 elementary school teachers through observation sheets and interviews. The findings revealed that while teachers possessed a general awareness of traditional games, they lacked sufficient understanding of how these games could be effectively integrated into classroom instruction, particularly in mathematics learning. The study highlighted that traditional games like Engklek have the potential to support mathematical learning by promoting concepts such as counting, sequencing, spatial understanding, and logical thinking through active participation. The researchers emphasized that integrating traditional games into teaching not only enhances student engagement and learning but also contributes to the preservation of cultural heritage. However, the study pointed out a gap in teachers' pedagogical knowledge regarding the practical implementation of such games in classroom settings.

2.3 CRITICAL REVIEW

Review of research studies and literature related to the problem under investigation is an essential process that provides deeper insight into the issue, broadens understanding of general principles and concepts and sharpens the researcher's perspective. The investigator reviewed 30 studies relevant to the present research. This review helped in gaining a comprehensive understanding of the nature and scope of the problem. The investigator critically analysed various aspects of the selected studies, including research designs, methodologies, sampling techniques, tools used for data collection and the recommendations provided for further research. To the best of the investigator's knowledge, there are limited studies focusing on the use of indigenous games for teaching early numeracy among pre – primary children. Furthermore, in the Indian context, very few research studies have explored this area. Therefore, the investigator made an attempt to examine the effectiveness of indigenous games on the development of basic numerical skills among pre – primary children.

CHAPTER – III

METHODOLOGY

3.1 – METHOD ADOPTED FOR THE STUDY

3.2 – CONSTRUCTION AND VALIDATION OF NUMERICAL SKILL TEST

3.3 – STATISTICAL TECHNIQUES USED FOR THE STUDY

CHAPTER III

METHODOLOGY

According to John W. Best (Pandey & Pandey, 2015), research is considered to be the more formal, systematic intensive process of carrying on the scientific method of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of results or conclusion.

Research methodology is an essential component of scholarly research. It encompasses the structured and thorough process of designing, executing, analyzing, and presenting research. This includes selecting and employing suitable methods and techniques to gather and interpret data, as well as assessing the validity, reliability, and ethical implications of the research outcomes. It assists researchers in planning, organizing, and conducting their research in a systematic and consistent way. Furthermore, it aids researchers in avoiding or minimizing errors, biases, and ethical concerns that could undermine the research results. It enables researchers to enhance the existing body of knowledge in their discipline and beyond. Additionally, it allows researchers to compare and contrast their work with other studies and to identify gaps and opportunities for future research.

The scope of research methodology refers to the extent and boundaries within which the research process operates, defining the areas covered and outlining what researchers can achieve through its application. It provides a structured approach to identifying and refining the research problem and objectives, ensuring that the study remains focused and relevant. it is applicable across various disciplines while recognizing limitations such as time, resources, and bias. It helps in guiding systematic research and contributes to both theoretical and practical knowledge.

3.1 METHOD ADOPTED FOR THE STUDY

A good research design acts as a link between theoretical ideas and real - life findings. It helps researchers collect and analyze data in a systematic manner. The methods used for analysis should match the nature of the data collected. This ensures that the findings of the study are accurate and meaningful.

A research design serves as a blueprint that guides the entire research study. It is essential for establishing the framework of a research project, functioning as a guide for both data collection and analysis. The effectiveness of any research project is largely determined by how well its research design aligns with the research problem. As noted by Creswell & Creswell (2023), it encompasses the convergence of philosophy, inquiry strategies, and particular methods to form the foundation for a study.

` The present study is concerned with investigating the "Effectiveness of indigenous games on basic numerical skills among pre – primary children". Therefore, the investigator followed an experimental method for the study.

Design of experimental study

The experimental method can be characterized as the study of the relationships between variables, both changed and measured. It merely allows the researcher to improve the settings under which they observe, resulting in more exact results. Best (1959) defines experimental research as "The description and analysis of what will be or what will happen under carefully controlled conditions".

Experimental study is a scientific procedure, which produces more precise, accurate and reliable outcomes. It is a methodical and logical approach to answering the problems. It is a method that investigates the effect of a dependent variable on an

independent variable. It allows the researcher to link a given consequence to a specific antecedent rather than a broad set of antecedents.

The design selected for the present study was One group pre – test post – test design. The one group pre – test post - test deign was chosen for this study for a variety of pedagogical and practical reasons. First, it allowed the investigator to establish a clear baseline of the children's current numerical skills prior to implementing the intervention. Second, because the study was conducted in a natural school context, this design ensured that all participants received the educational benefits of the indigenous games while adhering to ethical principles of equal opportunity in the classroom. Finally, since the focus was on the attainment levels of a single sample, using the group as its own control minimized variability and allowed for a direct assessment of the intervention's efficacy.

A one-group pretest-posttest design is a type of study design commonly used by behavioral researchers to assess the impact of a treatment or intervention on a specific population. This study design is distinguished by two characteristics. The first aspect is the utilization of a single set of participants. This feature indicates that all participants are given the same treatments and assessments. The second feature is a linear ordering, which necessitates the evaluation of a dependent variable before and after a treatment is executed. In pretest-posttest study designs, the effect of a treatment is measured by calculating the difference between the first and second assessments of the dependent variable (pretest and posttest).

The one group pre - test post - test design can be represented as:

$$O_1 \; \mathcal{X} \; O_2$$

Where

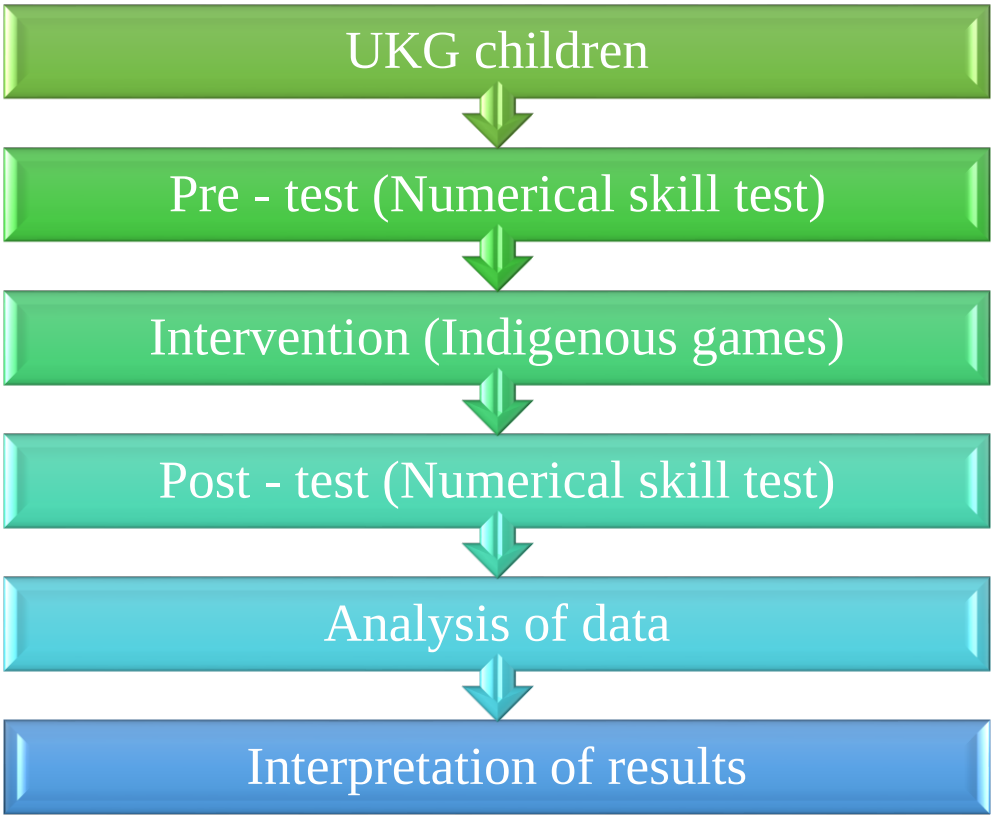
$\mathcal{X}$ – Experimental group

O_1 – Pre – test

O_2 – Post – test

Figure 3.1

Diagrammatic representation of one group pre – test post – test design



Variables of the study

Variable is a concept that can take on several quantitative values. The primary goal of the scientific investigation is to investigate the functional link between the variables. A variable is a quantity that varies between individuals. The quantity varies

from person to person. When the hypothesis and its implications are thoroughly studied, two distinct factors can be identified. They are

a) Independent variable.

b) Dependent variable.

Independent variable

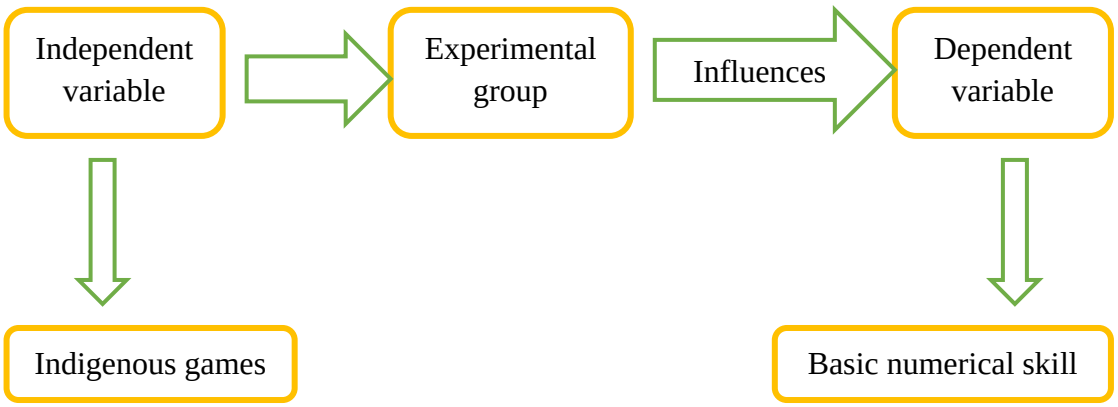
An independent variable is the input variable that contributes to a specific outcome. It is a stimulus that influences a reaction, an antecedent, or a factor that can be altered to affect the outcome. These are the variables that the researcher has influence over. This "control" can involve modifying current variables or introducing new ones in the research context. In this study, the method of teaching is an independent variable. The experimental group was treated with indigenous games in teaching.

Dependent variable

The dependent variable is the outcome or reaction caused by the effect of the independent variable, which the researcher wishes to predict or explain. Changes in the dependent variable are thought to be caused by the independent variable. In this study, basic numerical skill is a dependent variable.

Figure 3.2

Design of experimental study



Population

The population, also known as the target population, is the entire group or set of individuals, objects, or events that have certain characteristics and are of interest to the researcher. It refers to the larger population from which a sample is obtained. The research population is defined by the study's aims as well as the individual qualities or attributes being investigated. For the present study the population of UKG children who are studying in various schools of Kanyakumari district in Tamil Nadu during the academic year 2025 -2026.

Sample

A sample is a small segment of a population chosen for observation and analysis. It is a collection of a subset of the population's objects or individuals chosen specifically to represent the population. For the present study, the sample consists of 21 students studying in UKG from Marthandam Educational district of Kanniyakumari District in Tamil Nadu.

Sampling

Sampling is the process of selecting a subset of subjects or units from the entire population connected to the field of study for the purpose of conducting research. Researchers employ the sampling method when it is not possible to study every single element of the target population. The investigator adopted purposive sampling technique to select a sample and 21 UKG students from Yettacode Nursery and Primary school were selected as samples.

Tools used for the study

The tools used in the study were,

I. Lesson transcripts based on indigenous games for enhancing basic numerical skills.

II. Numerical skill test was conducted and validated by the investigator and guide.

I. Lesson Transcripts

The intervention was delivered through a series of structured lesson transcripts specifically developed by the investigator to integrate indigenous games with early numerical skill development. These transcripts served as a standardized guide to ensure consistency during the teaching – learning process. Each lesson transcript was organized into the following sections:

Learning outcomes

This section defines the session's precise behavioral and numerical objectives. It emphasizes measurable improvements in the child's skill, such as counting accuracy, number recognition, amount comparison (more/less), and one-to-one correspondence.

Preparation and materials

This section discusses the physical environment and the specific resources needed for the intervention. It includes setting up the classroom floor and preparing manipulatives for the game.

Teacher modeling

This phase represents the “I Do” stage of instruction. The teacher demonstrates the game’s mechanics and mathematical logic aloud, providing a clear visual and auditory model. This includes demonstrating how to handle materials, move in specific directions and count items systematically.

Guided practice

This is the "We Do" stage where children engage with the materials in pairs or small groups under direct supervision. The investigator provides immediate feedback, ensuring that the children follow the correct game rules while applying the mathematical concepts accurately.

Independent working time

This "You Do" phase allows children to practice and reinforce their skills autonomously. It encourages peer-to-peer interaction, where children help one another with counting, sequencing, comparing, fostering a collaborative learning environment.

Assessment and consolidation

The session concludes with a formal review. This includes reflective questioning to evaluate the child’s understanding and solidify the concept of number values.

List of games

Pallankuzhi	Oru kodam thanni oothi
Number hug	Poo parika varugirom
Clapping numbers	Kulai kulaiyai munthirikaa
Where shall I stand?	Fire in the mountain
Track race	Paandi/Nondi (hopscotch)
Collect, bring and arrange	Zigzag hopscotch
Seed counting and pebble grouping	Nooran kuchi

Dhayam	Odi Vilayatu
Jodi pura	Paramapadham
Kulam Karai (in or out)	Bank

II Numerical Skill Test

The investigator constructed and validated the tool and employed the Numerical Skill test as the tool for collecting the data.

3.2 CONSTRUCTION AND VALIDATION OF NUMERICAL SKILL TEST

The Numerical Skill Test was developed by Dixi T. M. and Dr. Raghi P. Nair (2026), aimed to measure the numerical skill of UKG students.

For the construction of the Numerical skill test the investigator adopted the following steps.

1. Planning of the test
2. Item writing
3. Item editing
4. Arrangement of items
5. Draft test
6. Preliminary try - out
7. Pilot Study
8. Scoring
9. Item analysis
10. Item selection
11. Final test

1. Planning of the test

The Numerical Skill Test was developed by Dixi T. M. and Dr. Raghi P. Nair (2026) to measure the numerical skills of UKG students. While planning the test, the investigator referred to the ECCE Curriculum for the Foundational Stage and the NCF 2022 (Textbook-Based) guidelines. Based on these frameworks, five major components of numerical skills were identified, namely pre-number concepts, counting, comparing, recognition, and sequencing. A total of 35 items were prepared, with each item carrying one mark.

2. Item Writing

The items of the Numerical Skill Test were prepared after a thorough review of relevant literature related to early numeracy and foundational learning. The investigator collected appropriate materials and constructed a variety of items to assess the identified numerical skills. All the items were developed based on the five major components selected for the test. Clear and specific instructions were provided for each item, and the respondents were required to answer the items accordingly. The drafted items were then subjected to item editing by the investigator to ensure clarity, simplicity, and appropriateness for UKG students.

3. Items Editing

During item editing, the investigator first examined the relevance of each item in relation to the objectives and components of the test. The clarity, simplicity, and age-appropriateness of the items were carefully reviewed. After this initial editing, the test was submitted to the research supervisor for review. Based on the feedback received, ambiguous and irrelevant items were revised or removed. The final set of items was rewritten using simple, clear, and meaningful language suitable for UKG students.

4. Arrangement of items

In this step, the investigator carefully arranged all the edited and finalized items in a logical sequence. The completed test comprised a total of 35 items, with each item carrying one mark.

5. Draft test

The draft form of the Numerical Skill Test was prepared by presenting all the draft items clearly and neatly. The respondents were given clear instructions, including how to answer, mark, or indicate their responses for each item.

6. Preliminary tryout

The draft form of the Numerical Skill Test was administered to five UKG students to examine the practicability of the tool, including the time required for completion, the difficulty level of the items, and the clarity of the instructions. The time allotted for completing the test was set at 25 minutes for each student. Following the administration, the investigator reviewed the students' responses to assess the time taken, identify any ambiguous or confusing items, and determine whether any further modifications were necessary.

7. Pilot Study

The investigator conducted the pilot study for the draft version of the Numerical Skill Test from 24 – 11 – 2025 to 26 – 11 – 2025. The test was administered to a sample of 100 UKG students to examine its practicality, clarity, and overall functioning.

8. Scoring

A scoring key was prepared for each item of the Numerical Skill Test. Each correct response was awarded one mark, while an incorrect response was given a score of zero.

9. Item analysis

Item analysis is the process of examining students' responses to each test item in order to determine the quality and effectiveness of both individual items and the test as a whole. For this purpose, the investigator employed Ebel's Method of Item Analysis (Ebel & Frisbie, 1999). The answer scripts were first arranged in descending order of total scores. The top 27% of the scripts were identified as the Upper Group, and the bottom 27% were identified as the Lower Group for further analysis.

Following the grouping of the answer scripts, the investigator calculated the Difficulty Index and Discriminative Power of each item using standard formulas.

$$\text{Difficulty Index (DI)} = (RH+RL)/(N_1+N_2)$$

$$\text{Discriminative Power (DP)} = (RH-RL)/N$$

Where,

RH – Number of responses in the Upper Group

RL – Number of responses in the Lower Group

N – Number of students in the Upper or Lower Group

N_1 – Number of students in Upper group

N_2 – Number of students in Lower group

The details of item analysis were given.

Table 3.1

Selected items for Numerical Skill Test

Item Number	Discriminating power	Difficulty index	
1	0	1	Not accepted
2	0.07	0.96	Not accepted
3	0.03	0.98	Not accepted
4	0.48	0.46	Accepted
5	0.55	0.68	Accepted
6	0.25	0.83	Not accepted
7	0.40	0.5	Accepted
8	0.37	0.55	Accepted
9	0.37	0.55	Accepted
10	0.44	0.66	Accepted
11	0.37	0.59	Accepted
12	0.18	0.90	Not accepted
13	0.03	0.98	Not accepted
14	0.44	0.59	Accepted
15	0.37	0.55	Accepted
16	0.33	0.68	Accepted

17	0.14	0.85	Not accepted
18	0.62	0.64	Accepted
19	0.37	0.55	Accepted
20	0.37	0.55	Accepted
21	0.18	0.90	Not accepted
22	0.11	0.94	Not accepted
23	0.37	0.62	Accepted
24	0.59	0.66	Accepted
25	0.33	0.53	Accepted
26	0.37	0.62	Accepted
27	0.29	0.81	Accepted (Revise)
28	0.37	0.62	Accepted
29	0.37	0.51	Accepted
30	0.33	0.57	Accepted
31	0.37	0.55	Accepted
32	0.25	0.87	Accepted (Revise)
33	0.40	0.57	Accepted
34	0.25	0.87	Accepted (Revise)
35	0.22	0.25	Not accepted

- Green colour indicates excellent items.
- Yellow colour indicates good items.
- Pink colour indicates items that need revision.

10. Item Selection

Item selection involves examining and choosing appropriate items based on the students' responses. Items were retained for the final test based on their Difficulty Index and Discriminative Power, ensuring that only items meeting the specified criteria were included.

Interpretation

Difficulty Index

0.30 – 0.70	Acceptable range
< 0.30	Too difficult (reject / revise)
> 0.70	Too easy (reject / revise)

Discriminative Power

> 0.40	Excellent item (Select)
0.30 – 0.39	Good item (Select)
0.20 – 0.29	Marginal (Revise)
< 0.19	Poor item (Reject)

11. Final Test

After completing the data analysis, the investigator selected the appropriate items to form the final version of the Numerical Skill Test. The final test comprised 25 items, and the final draft is presented here.

12. Establishing reliability and validity

Reliability and validity are essential to the effectiveness of any data gathering procedure.

Reliability

Reliability describes how consistently a method measure something. Reliable measurements are those that produce consistent results using the same methods and conditions. The reliability of a test can be assessed in different ways. For this study the reliability coefficient of the tool was found using the Split Half method. Using Pearson Product Moment correlation stated by Sharma (2003), 0.9130.

$$r = \frac{N\sum xy - \sum x \sum y}{\sqrt{N\sum x^2 - (\sum x)^2}\sqrt{N\sum y^2 - (\sum y)^2}}$$

Where,

r = Reliability coefficient of split half test.

x = Total score of odd items

y = Total score of even items

xy = Estimated reliability of the whole test.

N = Total number of students in group.

Reliability coefficient, $R = \frac{2r}{1+r}$

Where,

R = Reliability Coefficient

r = Reliability coefficient of split half test.

Table 3.2

Reliability result for Numerical Skill Test

Contents	**Results**
Number of Sample	100
Number of Items	35
Correlation between odd half and even half items	0.6714
Reliability Coefficient	0.8034

The split half reliability coefficient has been calculated. From the table, it shows that the Pearson correlation between the odd half and even half items was found to be 0.67. This reveals that the Numerical skill test possesses reliability coefficient of 0.80.

Validity

Validity refers to how accurately a method measures what it is intended to measure. It is the capacity to perform an accurate study using the appropriate equipment and conditions to create acceptable and reliable findings that can be replicated.

The two types of validities established for this tool were face validity and content validity.

Face validity

Face validity considers how suitable the content of a test seems to be on the surface. The tool was presented to a panel of experts, and according to their opinions, it was found to measure the intended objectives effectively. A close look at the item of the scales shows that each item adequately represents the variable under study. Thus, the tool possesses face validity.

Content validity

Content validity assesses whether a test is representative of all aspects of the construct. To produce valid results, the content of a test, survey or measurement method must cover all relevant parts of the subject it aims to measure. The content validity of the present scale was established through a systematic analysis of the subject area by an expert in the field of education and technology. Based on the expert's opinion, the scale was considered to have adequate coverage of the content. Such comprehensive coverage of the content indicates the validity of the scale.

Procedure adopted for experimentation

The investigator followed four steps for conducting the experiment using indigenous games of UKG students. The four steps are as follows,

i. Formation of the group of the study

The investigator selected one intact class of UKG students for the study. The selected group was treated as experimental group. A total of 21 students constituted the sample for the study and were included in the experimental group.

ii. Administration of pre – test

The investigator established rapport with the students after giving a proper introduction about the purpose of the study. The pre-test was administered to the students before the commencement of the experiment. The completed Numerical Skill Test was scored using the scoring key, and the obtained scores were subjected to statistical analysis.

iii. Treatment

After the administration of the pre-test, the experimental group was taught using the experimental method for a period of 20 days. The lesson transcripts are enclosed in Appendix.

iv. Administration of post – test

After the completion of the teaching sessions for the experimental group, the post – test was administered to measure the numerical skill of the students. The same Numerical Skill Test was used for both the Pre- test and Post – test of the experimental group.

3.3 STATISTICAL TECHNIQUES USED FOR THE STUDY

Statistical techniques play an important role in all types of research. Appropriate statistical methods help the researcher to analyze and interpret the data of the study effectively and meaningfully.

For the analysis of the data the following statistical techniques were used.

i. Percentage analysis

Percentage analysis is used to make a comparative study of data expressed in fractions. It represents values per hundred and is always calculated out of 100.

The following levels are used in percentage analysis:

- High level – Scores equal to or greater than (Mean + 1 SD)
- Low level – Scores equal to or less than (Mean − 1 SD)
- Average level – Scores lying between (Mean + 1 SD) and (Mean − 1 SD) are considered as average level scores.

ii. Wilcoxon signed rank test

The Wilcoxon Signed-Rank Test is a non-parametric statistical test used to compare two related samples or repeated measurements on a single group to determine whether there is a significant difference between them. It is used as an alternative to the paired t test when the data do not satisfy the assumptions of normality.

The formula for calculating the Wilcoxon Signed-Rank Test is:

$$Z = \frac{T - \mu_T}{\sigma_T}$$

Where,

T – The test statistic

μ_T – The mean of the ranks, calculated as $\mu_T = \frac{n(n+1)}{4}$

σ_T – The standard deviation of the ranks, calculated as $\sigma_T = \sqrt{\frac{n(n+1)(2n+1)}{24}}$

n – the number of paired observations.

CHAPTER – IV

ANALYSIS AND INTERPRETATION OF DATA

4.1 – DESCRIPTIVE STATISTICS

4.2 – PERCENTAGE ANALYSIS

4.3 – INFERENTIAL STATISTICS

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

In a research study, data analysis and interpretation serve as the bridge between the raw information collected and the final conclusions of the work. Data analysis is a process that involves examining, and molding collected data for interpretation to discover relevant information, draw or propose conclusions and support decision-making to solve a research problem. This involves interpreting data to answer research questions and making research findings be ready for dissemination. Data analysis also serves as a reference for future data collection and other research activities. It is a methodological approach to apply statistical techniques for describing, exhibiting and evaluating the data. It helps in driving meaningful insights, form conclusions and support the decision-making process. Interpretation is the act of explaining the findings and attaching meaning to them within the context of the study. Thus, data analysis and interpretation serve as a means through which researchers can better understand the factors that explain the observations made during the study. It also provides a theoretical framework that can guide future researchers.

Data analysis serves as the essential link between raw information and meaningful conclusions. By organizing and examining the gathered data, researchers can identify key relationships that might not be visible at first glance. This chapter details those findings and offers an interpretation of what they mean for the study.

4.1 DESCRIPTIVE STATISTICS

Table 4.1

Summary of mean, median, SD of the pre – test and post test

	N	Missing	Mean	Median	SD	Minimum	Maximum
Pre	21	0	18.6	19	3.16	9	22
Post	21	0	23.9	24	1.22	21	25

From table 4.1, the mean pre – test score of the children (M = 18.6) is lower than the mean post – test score (M =23.9), indicating an improvement in the basic numerical skills after the intervention. The median pre – test score (19) is also lower than the median post test score (24), further supporting the improvement. The standard deviation decreased from 3.16 in the pre – test to 1.22 in the post – test, suggesting that the scores become more consistent after the intervention. This indicates not only improvement in the central tendency but also a reduction in the variability of basic numeracy skills among the children.

4.2 – PERCENTAGE ANALYSIS

HYPOTHESIS – 1

The level of attainment of basic numerical skills of UKG children is at moderate level before intervention.

Table 4.2

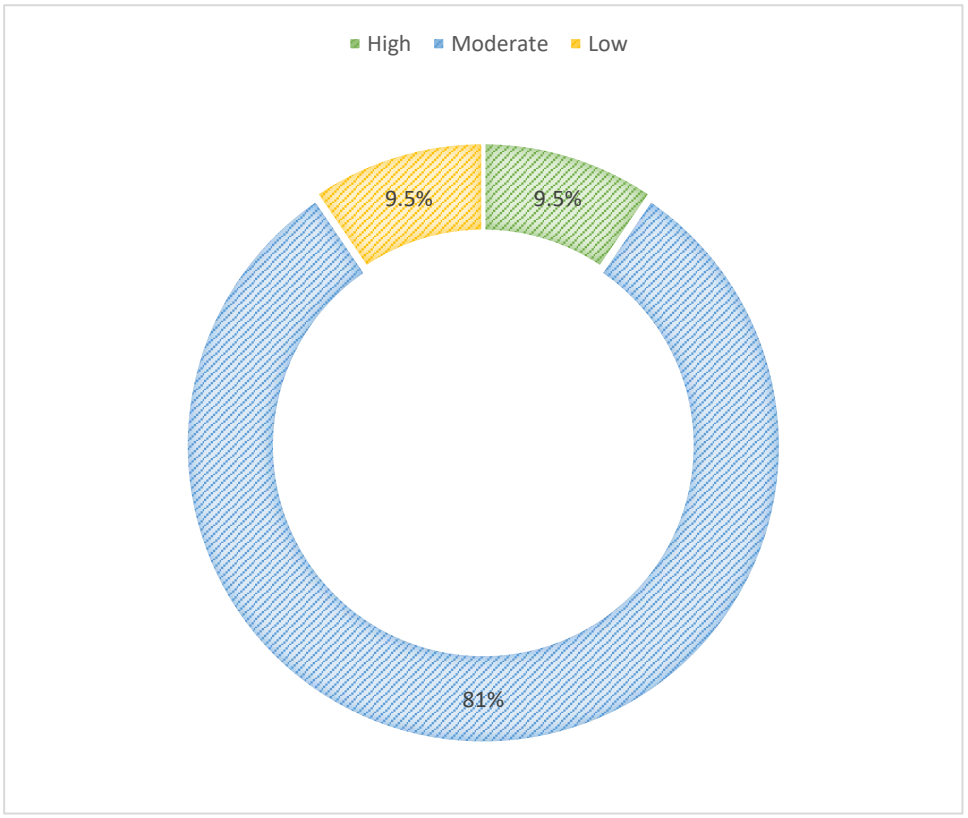
Percentage distribution of different level of basic numerical skills before intervention

Level	Counts	% of Total	Cumulative %
High	2	9.5%	9.5%
Moderate	17	81.0%	90.5%
Low	2	9.5%	100.0%

From table 4.2, it is clear that 9.5% of the UKG children have a high level of basic numerical skills, 81.0% of the children have a moderate level of basic numerical skills, and 9.5% of the children have a low level of basic numerical skills before the intervention. This indicates that the majority of the children are at a moderate level, thereby supporting the hypothesis that the level of attainment of basic numerical skills of UKG children is at a moderate level before the intervention.

Figure 4.1

Percentage distribution of different level of basic numerical skills before intervention



HYPOTHESIS – 2

The level of attainment of basic numerical skills of UKG children is at moderate level after intervention.

Table 4.3

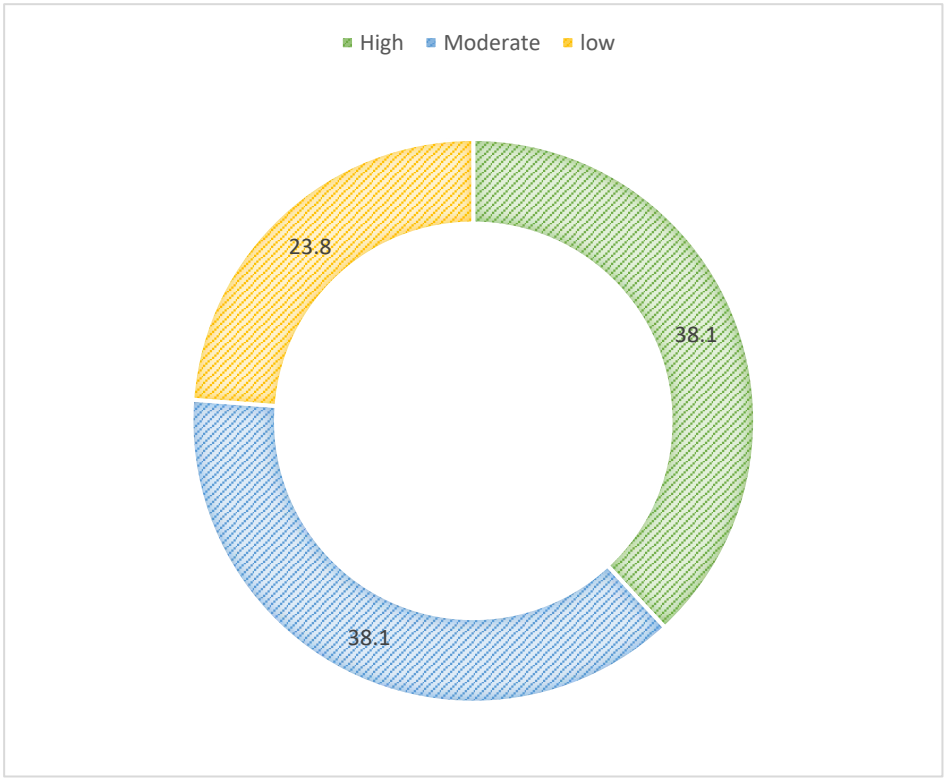
Percentage distribution of different levels of basic numerical skills after intervention

Level	Counts	% of Total	Cumulative %
High	8	38.1%	38.1%
Moderate	8	38.1%	76.2%
Low	5	23.8%	100.0%

From table 4.3, it is clear that 23.8% of the UKG children have a low level of basic numerical skills, 38.1% of the children have a moderate level of basic numerical skills, and 38.1% of the children have a high level of basic numerical skills after the intervention. This indicates that the children are distributed equally between moderate and high levels, suggesting an improvement in their level of attainment after the intervention.

Figure 4.2

Percentage distribution of different level of basic numerical skills after intervention



4.3 – INFERENTIAL STATISTICS

HYPOTHESIS – 3

There exists no significant difference in the mean pre-test and post test scores of basic numerical skills of UKG children.

Table 4.4

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children.

		Statistic	p	Remark
Post	Pre	231	<.001	Significant

From table 4.4, the Wilcoxon Signed-Rank test yielded a W value of 231 with a p-value of less than .001. Since the p-value is lower than the 0.05 level of significance, it indicates that there is a statistically significant difference between the pre-test and post-test scores. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a), which states that there is a significant difference between the two measures, is accepted. This suggests that the intervention had a significant effect on the basic numerical skills of the children.

HYPOTHESIS – 4

There exists no significant difference in the mean pre – test ad post test scores of basic numerical skills of UKG children with respect to

- Pre number concept
- Counting
- Comparing
- Recognition and
- Sequencing

Table 4.5

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Pre number concept.

		Statistic	p	Remark
Post	Pre	153	<.001	Significant

From the table 4.5, it is clear that the Wilcoxon Signed-Rank test yielded a W value of 153 with a p-value less than .001, which is significant at the 0.05 level. This indicates that there is a significant difference between the pre-test and post-test scores with respect to Pre number concept.

Table 4.6

Summary of mean, median and SD with respect to Pre number concept

	N	Mean	Median	SD	SE
Post	21	3.76	4	0.436	0.0952
Pre	21	2.19	2	0.981	0.2140

Figure 4.3

Comparison of Mean scores of Pre number concept before and after intervention

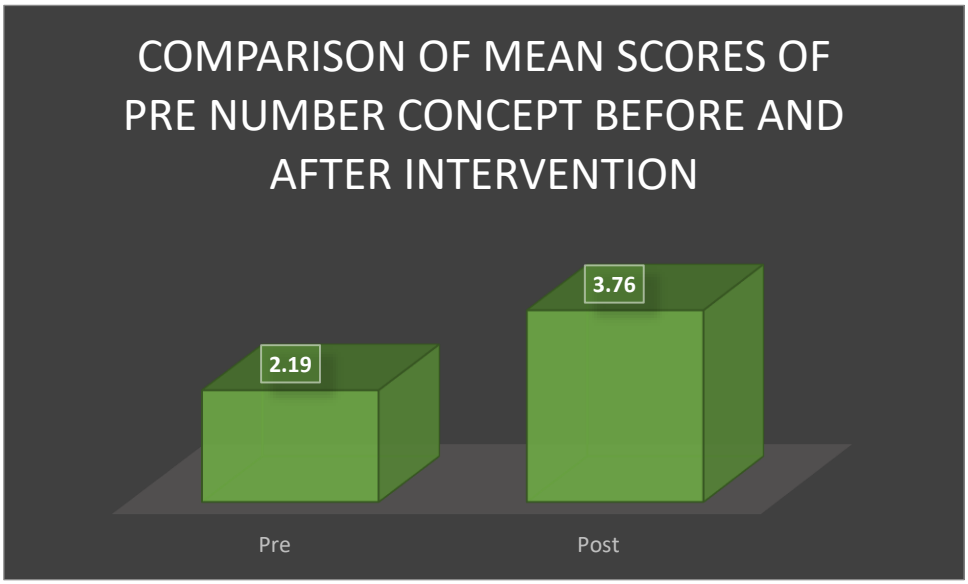


Table 4.7

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Counting.

		Statistic	p	Remark
Post	Pre	184	<.001	Significant

From the table 4.7, it is clear that the Wilcoxon Signed-Rank test yielded a W value of 184 with a p-value less than .001, which is significant at the 0.05 level. This indicates that there is a significant difference between the pre-test and post-test scores in counting.

Table 4.8

Summary of mean, median and SD with respect to Counting

	N	Mean	Median	SD	SE
Post	21	7.67	8	0.730	0.159
Pre	21	6.24	7	1.480	0.323

Figure 4.4

Comparison of Mean scores of counting before and after intervention

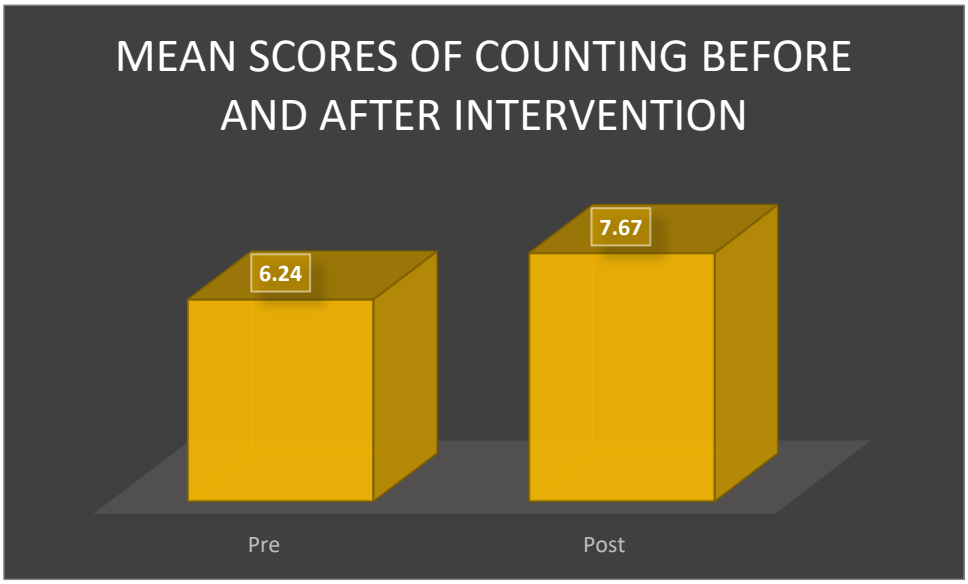


Table 4.9

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Comparing.

		Statistic	p	Remark
Post	Pre	120	<.001	Significant

From the table 4.9, it is clear that the Wilcoxon Signed-Rank test yielded a W value of 120 with a p-value less than .001, which is significant at the 0.05 level. This

indicates that there is a significant difference between the pre-test and post-test scores in comparing.

Table 4.10

Comparison of Mean scores of comparing before and after intervention

	N	Mean	Median	SD	SE
Post	21	3.67	4	0.483	0.105
Pre	21	2.76	3	0.831	0.181

Figure 4.5

Comparison of Mean scores of comparing before and after intervention

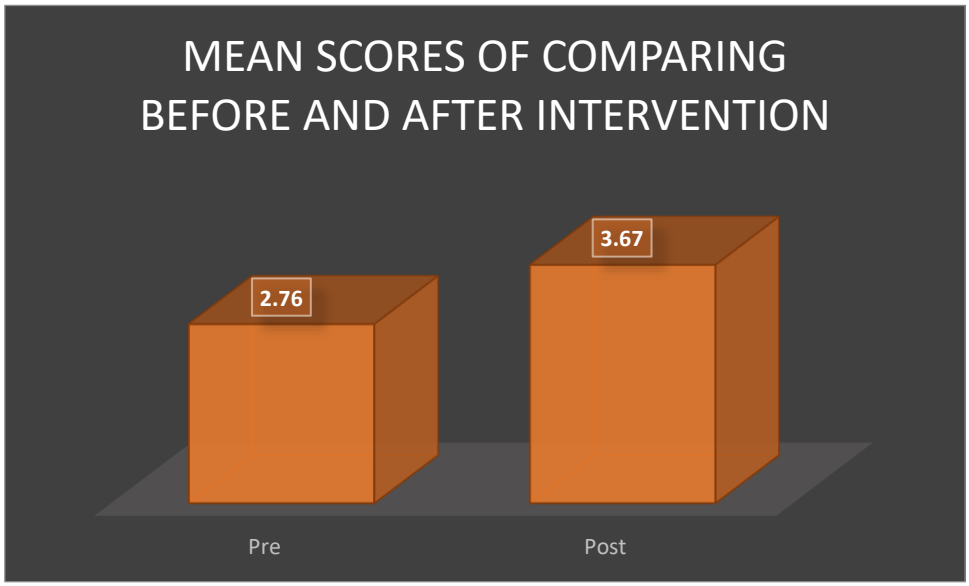


Table 4.11

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Recognition.

		Statistic	p	Remark
Post	Pre	45.0	.008	Significant

From the table 4.11, it is clear that the Wilcoxon Signed-Rank test yielded a W value of 45.0 with a p-value of .008, which is significant at the 0.05 level. This indicates that there is a significant difference between the pre-test and post-test scores in recognition.

Table 4.12

Comparison of Mean scores of recognition before and after intervention

	N	Mean	Median	SD	SE
Post	21	4.95	5	0.218	0.0476
Pre	21	4.24	5	1.044	0.2279

Figure 4.6

Comparison of Mean scores of recognition before and after intervention

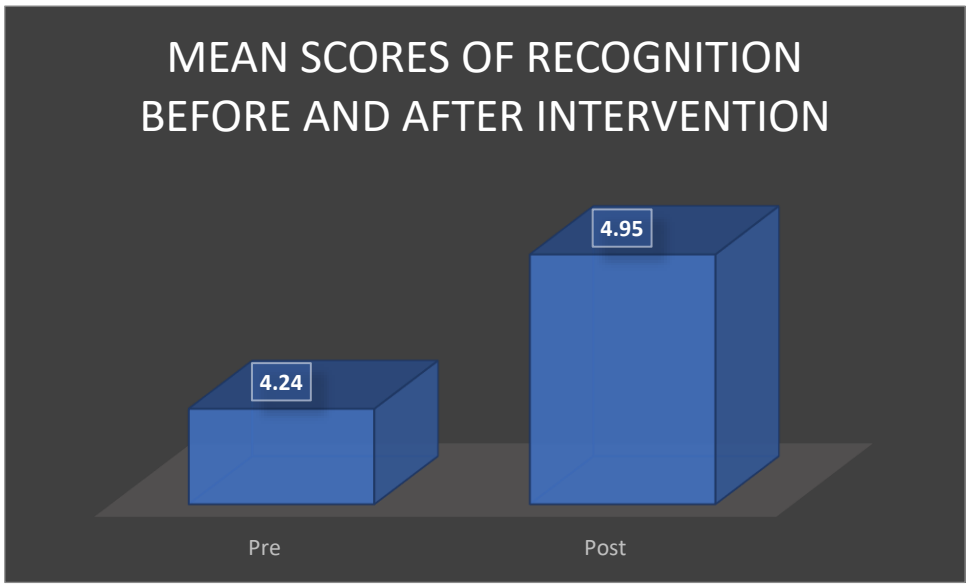


Table 4.13

Significance of difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Sequencing.

		Statistic	p	Remark
Post	Pre	66.0	.003	Significant

From the table 4.13, it is clear that the Wilcoxon Signed-Rank test yielded a W value of 66.0 with a p-value of .003, which is significant at the 0.05 level. This indicates that there is a significant difference between the pre-test and post-test scores in sequencing.

Table 4.14

Comparison of Mean scores of sequencing before and after intervention

	N	Mean	Median	SD	SE
Post	21	3.86	4	0.359	0.0782
Pre	21	3.14	3	0.910	0.1986

Figure 4.7

Comparison of Mean scores of sequencing before and after intervention

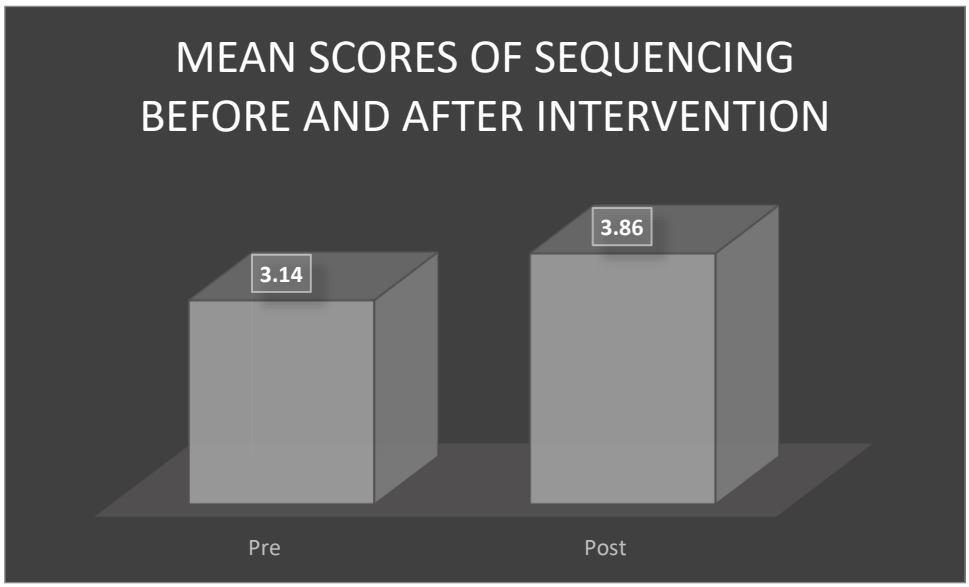


Table 4.15

Effect size

		Statistic	p	Effect Size
Post	pre	231	<.001	1.00

From table 4.15, it is evident that the effect size measured using rank biserial correlation is 1.00. This indicates a very strong effect of the intervention, suggesting that the use of indigenous games had a substantial impact on improving the basic numerical skills of the children.

Table 4.16

Gain score

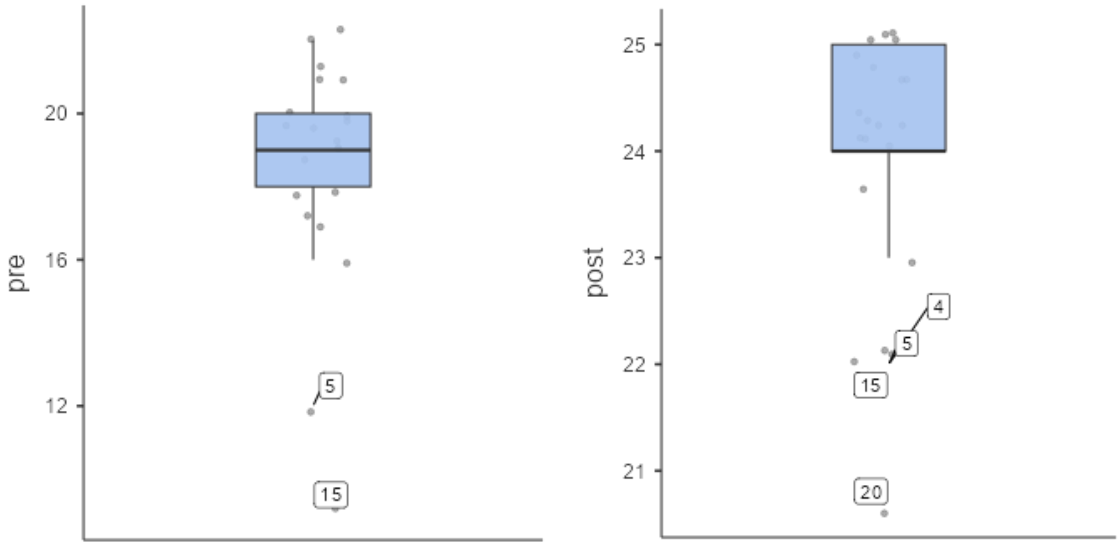
	N	Missing	Mean	Median	SD	Minimum	Maximum
Gain Scores	21	0	5.33	5	2.58	2	13

From table 4.16, it is evident that the mean gain score of the children is 5.33, indicating an overall improvement in basic numerical skills after the intervention. The median gain score of 5 further shows that most children experienced a similar level of progress. The standard deviation of 2.58 indicates a moderate level of variation in the gain scores, suggesting that the improvement varied among the children. The minimum

gain score of 2 and maximum gain score of 13 indicate that all children showed improvement, though the extent of improvement differed. This shows that, the gain scores reflect a positive and consistent improvement in the basic numerical skills of the children following the intervention.

Figure 4.8

Comparison of pre – test and post -test scores



The boxplots illustrate a comparison between pre-test and post-test scores of the children, showing a clear improvement after the intervention. In the pre-test, the scores are more widely spread, indicating greater variability in the children's initial performance, with a lower median and a few low outliers reflecting weaker numerical skills among some children. In contrast, the post-test scores are more closely clustered, showing reduced variability and increased consistency, with a higher median indicating overall improvement in performance. Although a few lower outliers are still present, most scores are concentrated at the higher end, suggesting that the intervention was effective in enhancing the basic numerical skills of the children.

CHAPTER – V

FINDINGS AND CONCLUSION

5.1 – THE STUDY IN RETROSPECT

5.2 – OBJECTIVES OF THE STUDY

5.3 – HYPOTHESES FRAMED FOR THE STUDY

5.4 – METHODOLOGY IN BRIEF

5.5 – FINDINGS OF THE STUDY

5.6 – CONCLUSION

5.7 – EDUCATIONAL IMPLICATIONS OF THE STUDY

5.8 – SUGGESTIONS FOR FUTURE RESEARCH

CHAPTER V

FINDINGS AND CONCLUSION

The final step in any scientific investigation is to design appropriate generalizations for the respective populations and reach findings, which allow for the development of valuable ideas. This final phase necessitates determined and rational thinking since it summarizes the study's findings and compares them to the initial premise. Generalizations drawn from the data should be consistent with the facts and not violate existing natural rules. Along with the results and generalizations, suggestions for applying research findings in practical contexts are made, as well as proposals for future research improvements.

5.1 THE STUDY IN RETROSPECT

This chapter presents a brief report of the study in retrospect. The investigator obtained conclusion and valid generalizations based on the statistical analysis of collected data. The study under the investigation is entitled as Effectiveness of Indigenous games on Basic Numerical Skills among Pre – primary Children. This chapter attempts to summarize all the findings, conclusions and suggestions drawn from the present investigation.

5.2 OBJECTIVES OF THE STUDY

1. To implement a set of indigenous games for enhancing basic numerical skills among children in Upper Kindergarten (UKG).
2. To compare the basic numerical skills of UKG children before and after the intervention.

3. To assess the level of attainment of basic numerical skills of UKG children before intervention.
4. To assess the level of attainment of basic numerical skills of UKG children after intervention.
5. To compare the mean pre – test ad post – test scores of basic numerical skills of UKG children with respect to
    - Pre number concept
    - Counting
    - Comparing
    - Recognition and
    - Sequencing

5.3 HYPOTHESES FRAMED FOR THE STUDY

1. There exists no significant difference in the mean pre-test and post test scores of basic numerical skills of UKG children.
2. There exists no significant difference in the mean pre – test ad post test scores of basic numerical skills of UKG children with respect to
    - Pre number concept
    - Counting
    - Comparing
    - Recognition and
    - Sequencing
3. The level of attainment of basic numerical skills of UKG children is at moderate level before intervention.
4. The level of attainment of basic numerical skills of UKG children is at moderate level after intervention.

5.4 METHODOLOGY IN BRIEF

1. Method Adopted

Pre - Experimental method was adopted for conducting the study.

2. Experimental Design

One group Pre - test Post-test Pre – experimental design was used for the present study.

3. Population

Population for the present study consisted of UKG children who are studying in various schools of Kanyakumari district in Tamil Nadu during the academic year 2025 -2026.

4. Sample

The study was conducted on a sample of 21 UKG students who are studying in Yettacode Nursery and Primary school, Yettacode.

5. Sampling technique

Purposive sampling technique was used in the present study.

6. Tools used

- Lesson transcripts based on Indigenous Games.
- Numerical Skill Test

7. Variables of the study

Independent variable – Indigenous games

Dependent variable – Basic Numerical Skills

8. Statistical technique

In the present study the following statistical technique was used

- Percentage analysis
- Wilcoxon signed rank test

5.5 FINDINGS OF THE STUDY

1. The level of attainment of basic numerical skills of UKG children is at moderate level before the intervention.
2. The level of attainment of basic numerical skills of UKG children are distributed equally between moderate and high levels after the intervention.
3. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children. The finding is supported by the following result ($p < 0.001$) which is significant at 0.05 level.
4. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Pre number concept. The finding is supported by the following result ($p < 0.001$) which is significant at 0.05 level.
5. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Counting. The finding is supported by the following result ($p < 0.001$) which is significant at 0.05 level.

6. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Comparing. The finding is supported by the following result ($p < 0.001$) which is significant at 0.05 level.

7. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Recognition. The finding is supported by the following result ($p = 0.008$) which is significant at 0.05 level.

8. There exists significant difference in the mean pre – test and post test scores of basic numerical skills of UKG children with respect to Sequencing. The finding is supported by the following result ($p = 0.003$) which is significant at 0.05 level.

5.6 CONCLUSION

The present study aimed to examine the effectiveness of indigenous games in enhancing the basic numerical skills of UKG children. The findings revealed that, after the intervention, the level of attainment of basic numerical skills was distributed between moderate and high levels, indicating that the intervention was effective in improving the performance of all learners. The study also showed a significant difference between the mean pre – test and post test scores of UKG children, both overall and with respect to pre – number concepts, counting, comparing, recognition and sequencing. These findings suggest that basic numerical skills at the UKG level are highly responsive to appropriate and engaging learning experiences. The use of indigenous games provided children with meaningful, activity – based opportunities to learn, which aligns with play – based learning approaches and supports the idea that young children learn best through interaction and concrete experiences. The implementation of these indigenous games demonstrated that children were deeply involved, motivated and experienced joy throughout the learning process. Thus, the

study concludes that incorporating indigenous games in early childhood education can significantly enhance numerical skills and help children develop a strong foundation in mathematics. Such early interventions can also reduce future learning difficulties and anxiety related to mathematics, thereby supporting overall academic development.

5.7 EDUCATIONAL IMPLICATIONS OF THE STUDY

The findings of the present study revealed that indigenous games were effective in improving the basic numerical skills among UKG children. Based on the findings of the study, the following educational implications are suggested:

1. Indigenous games are more effective in improving basic numerical skills among UKG children. Therefore, indigenous games can be incorporated into pre – primary classrooms for teaching numerical concepts.
2. Indigenous games can increase children's participation, interaction and interest in learning mathematics.
3. Teachers can adopt indigenous games as a teaching method to make mathematics learning more meaningful and enjoyable for children.
4. Indigenous games can be used to improve specific numerical skills such as pre – number concepts, counting, comparing, recognition, and sequencing.
5. Schools can provide adequate opportunities, materials and space for conducting game – based learning activities.
6. Teacher education institutions can provide training to pre – primary teachers on the effective use of indigenous games in classroom teaching.
7. Curriculum planners can integrate indigenous games into the early childhood curriculum to promote experiential and child – centred learning.

8. The use of indigenous games can contribute to the holistic development of children by improving cognitive, social, emotional and physical skills.
9. Educational institutions can encourage the use of indigenous games as part of relevant teaching practices.
10. Parents can encourage informal numeracy activities at home through indigenous games such as counting objects, sorting items and comparing quantities to reinforce classroom learning.

5.8 SUGGESTIONS FOR FUTURE RESEARCH

The possible areas of research are suggested below.

1. The present study was conducted using a single – group pre – test post - test design. Future researchers can adopt a two – group non – equivalent group design for better comparison and validation of the findings.
2. A study can be conducted to examine the awareness of prospective teachers regarding teaching through indigenous games.
3. Future research can be undertaken to study the effectiveness of indigenous games on the holistic development of pre – primary children.
4. Research can be conducted to investigate the effectiveness of indigenous games among children with learning disabilities.
5. Future researchers can adopt a mixed method approach to obtain a deeper understanding of the effect of indigenous games on the basic numerical skills of children.

REFERENCES

REFERENCES

Abdulkareem, H. B. (2021). *Effect of indigenous game strategies on primary school pupils' academic performance in numeracy in Ilorin East Local Government Area, Kwara State* (Doctoral dissertation). Kwara State University. ProQuest Dissertations & Theses Global. (Publication No. 28643463)

Abdurakhmonova, M. G. q. (2025Engl). *The effectiveness of game-based learning in developing arithmetic skills among primary school students. International Journal of Pedagogics, 5*(11), 325–328. https://doi.org/10.37547/ijp/Volume05Issue11-76

Abioye, J. A. A. I., Oyegoke, D. A., Olatunji, S. O., & Adejare, S. A. (2024). *Influence of indigenous games on the mathematics foundation knowledge for young children in Afijio Local Government*. World of Science: Journal of Modern Research Technologies, 3**(3**), 139–149. https://univerpubl.com/index.php/woscience

Adedigba, O. (2023). *Enhancing numeracy instruction through games in pre-primary classrooms. Journal of Teaching and Learning in Elementary Education, 6*(1), 96–110. https://doi.org/10.33578/jtlee.v6i1.7984

Albina, A. P. (2022). *Cultural play meets pedagogy: An experimental study on integrating indigenous games in early math instruction*. *International Journal of Educational and Kinetic Studies, 1*(12), 72–?. https://doi.org/10.70333/ijeks-01-12-011

Andersen, M. M., Kiverstein, J., Miller, M., & Roepstorff, A. (2022). *Play in predictive minds: A cognitive theory of play*. *Psychological Review*. Advance online publication. https://doi.org/10.1037/rev0000399

Asmara, A., Andrini, V. S., Juwanto, Y. A., Asfar, A. M. I. T., Jumri, R., & Yani, A. (2024). *Engklek: Ethnomathematics-based traditional games in the development of teaching materials to build mathematical literacy skills.* Journal of Pedagogi, 1(6), 98–115. https://doi.org/10.62872/rg2kny19

Asrial, A., Syahrial, S., Maison, M., Kurniawan, D. A., & Perdana, R. (2020). *A study of traditional games "Engklek" in mathematics for elementary school. Jurnal Ilmu Pendidikan, 26*(1), 15–21. https://doi.org/10.17977/um048v26i1p15-21

Babale, D. B., & Lawal, K. (2021). *Informing disciplines, knowledge and practice: A review of how theory sculpts research. African Scholar Journal of African Sustainable Development (JASD-2), 21*(2), 287–296.

Best, J.W., & Khan, J.V., (2009), *Research in Education (10 th ed.).* Pearson Publishers.

Best, John, W. (2004). *Research in education* (ed.). Prentice Hall.

Bhandarkar, K. M. (2006). *Statistics In Education*. Neelkamal Publication. Pvt. Ltd.

Bonel, P., & Lindon, J. (2014). *Good practice in play work* (3rd ed.). Oxford University Press.

Bruce, T. (2018). *Early childhood education* (5th ed.). Hodder Education.

Chatterjee, S. K. (2000). *Advanced educational psychology*. Books & Allied (P) Ltd.

Chopra, N., & Khanna, I. (2019). *Play as a mechanism of promoting emergent literacy among young children: The Indian context*. *In Early Childhood Education.* IntechOpen. https://doi.org/10.5772/intechopen.82363

Cohen, L., Manion, L., & Morrison, K. (2009). *Research methods in education* (6. ed., reprint). Routledge.

Council, N. R. (2001). *Early childhood development and learning: New knowledge for policy*. National Academies Press.

Cygnet, A. B. (2025). *Effect of Mancala game (Pallanguzhi) in STEM education for children with ADHD at primary level.*

De Chambrier, A.-F., Baye, A., Tinnes-Vigne, M., Tazouti, Y., Vlassis, J., Poncelet, D., Giauque, N., Fagnant, A., Luxembourger, C., Auquière, A., Kerger, S., & Dierendonck, C. (2021). *Enhancing children's numerical skills through a play-based intervention at kindergarten and at home: A quasi-experimental study.* Early Childhood Research Quarterly, 54, 164–178. https://doi.org/10.1016/j.ecresq.2020.09.003

Dr. Shahanawaz Khan. (2023). *Indigenous games and indian culture: A conceptual and educational analysis.* Journal of Science Innovations and Nature of Earth, 75–76. https://doi.org/10.59436/jsiane.441.2583-2093

Fokides, E., & Konstantopoulou, C. (2026). *Enhancing kindergarten students' basic spatial and mathematical skills through digital games: A case study. Research and Practice in Technology Enhanced Learning, 21*, 042. https://doi.org/10.58459/rptel.2026.21042

Gomes, J., Pandey, S., & Pandey, R. (n.d.). *Reliability and validity in a research study. In Research methodology (Methods and techniques)* (p. 49). KD publications. ISBN 978-81-947839-7-8.

Howard Gardner, multiple intelligences and education. (n.d.). Infed.Org. https://infed.org/dir/welcome/howard-gardner-multiple-intelligences-and-education/

Idris, J., Jamil, N., & Narayanasamy, A. (2026). *Preschool educators' pre-numerical skill pedagogical challenges*. Journal of Education and Learning (EduLearn), 20(2), 746–753. https://doi.org/10.11591/edulearn.v20i2.23238

Iyabode, J. A. A., Oyegoke, A. D., Olatunji, O. S., Adejare, & Adigun, S. (2024). *Influence of indigenous games on the mathematics foundation knowledge for young children in Afijio Local Government.* World of Science: Journal on Modern Research Technologies, *3*(3), 139–149.

Kancanadana, G., Saputri, O. & Tristiana, V., 2021, '*The existence of traditional games as a learning media in Elementary School', in M.T. Hidayat* (ed.), Proceedings book international conference on early and elementary education 2021.

Karunashree, B., & Anuradha, K. (2024). *Early numeracy among preschool children—Impact of teachers' knowledge and practices: A critical analysis of reviews.* International Journal of Indian Psychology, 12(4), 1295–1303. https://doi.org/10.25215/1204.121

Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.

Kumar, A. (2025). *Principles and global relevance of Bhāratīya Khel (Indian games).* *2*, 47–72. https://www.researchgate.net/publication/396751322_Principles_and_Global_Relevance_of_Bharatiya_Khel_Indian_Games

Laziza, X. (2025). *The role of education in shaping future generations.* Zamonaviy Fan va Ta'lim Yangiliklari Xalqaro Ilmiy Jurnal, 3(2), 97–105.

Losini, A. M. M. (2020). *Tribute to traditional children games of Tamil Nadu*. **Global Journal of Human-Social Science: C Sociology & Culture, 20**(2), 1–6. Global Journals. https://globaljournals.org

Madondo, F. & Tsikira, J., 2022, '*Traditional children's games: Their relevance on skills development among rural Zimbabwean children age 3–8 years',* Journal of Research in Childhood Education 36(3), 1–15. https://doi.org/10.1080/02568543.2021.1982084

Manipur University, Meitei, A. P., Singh, Kh. K., Nambol L. Sanoi College, Nambol, Singh, N. I., & Ibotombi Institute of Education, Canchipur. (2024). *Practical pedagogical approaches: Integrating play-based and experiential learning at pre-primary education as per nep 2020 and ncf-fs 2022*. Edumania-An International Multidisciplinary Journal, *02*(04), 174–193. https://doi.org/10.59231/edumania/9082

Mehta, V., & Kumar, A. (2025). *Revitalizing traditional Indian games in contemporary education: A cultural and holistic paradigm*. *Integrated Journal for Research in Arts and Humanities, 5*(2), 207–215. https://doi.org/10.55544/ijrah.5.2.27

Meitei, A. P., Singh, K. K., & Singh, N. I. (2024). *Practical pedagogical approaches: Integrating play-based and experiential learning at pre-primary education as per NEP 2020 and NCF-FS 2022*. **Edumania: An International Multidisciplinary Journal, 2**(4), 174–193. https://doi.org/10.59231/edumania/9082

Moloi, T.J., 2020, *'Decolonising the teaching of mathematics in rural learning ecologies by using indigenous Games'*, Alternation 27(2), 125–150. https://doi.org/10.29086/2519-5476/2020/v27n2a7

Morgan, H. (2021). *Howard Gardner's multiple intelligences theory and his ideas on promoting creativity.* In F. Reisman (Ed.), Celebrating giants and trailblazers: A-Z of who's who in creativity research and related fields (pp. 124–141). London, UK: KIE Publications. https://files.eric.ed.gov/fulltext/ED618540.pdf

Mwinsa, G., & Dagada, M. (2024). *Efficacy of indigenous games on literacy and numeracy development in pre-schoolers in Zambia***. South African Journal of Childhood Education, 14(**1), Article 1555. https://doi.org/10.4102/sajce.v14i1.1555

National Council of Educational Research and Training. (2022). *Toy-based pedagogy*. Department of School Education and Literacy, Government of India. https://www.ncert.nic.in/pdf/notice/toy_based_pedagogy.pdf

Nilsson, M., & Ferholt, B. (2014). *Vygotsky's theories of play, imagination and creativity in current practice: Gunilla Lindqvist's "creative pedagogy of play" in U. S. kindergartens and Swedish Reggio-Emilia inspired preschools.* Perspectiva, 32(3), 919–950. https://doi.org/10.5007/2175-795X.2014v32n3p919

Prabavathy, M., & Sivaranjani, R. (2023). *Utilizing traditional game-Pallanguzhi as a tool to enhance the basic arithmetic skill of children with mathematical difficulties*. **Journal for Re Attach Therapy and Developmental Diversities, 6**(10s2), 1117–1129. https://jrtdd.com

Pramanik, R., & Bhattacharya, S. (2019). *Play and indigenous games of children: A cultural heritage of Western Odisha, India*. **Knowledge Cultures, 6**(2), 96–110. https://doi.org/10.22381/KC6220187

Rousselle, L., & Noël, M.-P. (2007). *Basic numerical skills in children with mathematics learning disabilities: A comparison of symbolic vs non-symbolic number magnitude processing. Cognition, 102*(3), 361–395. https://doi.org/10.1016/j.cognition.2006.01.005

Sharma, R. A. (2000). *Essentials of scientific behavioural research: Research, measurement and statistics*. Surya Publications.

Shi, S. (2006). *Literature review: An overview***.** https://web.cortland.edu/shis/651/LitRevOverview.pdf

Soni, R. (2022). *Significance of using indigenous toys and games in early years: A child's way to learn and grow. The Primary Teacher, 47*(2), 70–76.

Sultana, N. (2023). *Teaching mathematics through play pedagogy in government pre-primary classrooms: An exploratory study* (Master's thesis). BRAC Institute of Educational Development, BRAC University.

Woolfolk, A. (2004). *Educational psychology* (9th ed.). Pearson Education India.

Yeptho, V., Shitire, C., & Yadav, S. (2025). *Educational implications of Naga indigenous games*. Shodh Sari — An International Multidisciplinary Journal, *4*(1), 297–308. https://doi.org/10.59231/sari7794

APPENDICES

APPENDICES

Appendix – A: General data sheet

Appendix – B: Draft form of Numerical Skill Test

Appendix – C: Scoring key for Draft test

Appendix – D: Final form of Numerical Skill Test

Appendix – E: Scoring key for Final Test

Appendix – F: Lesson transcripts

Appendix – G: Photos of students engaging in indigenous games

Appendix – H: Article published

N.V.K.S.D. COLLEGE OF EDUCATION (AUTONOMOUS)

GENERAL SHEET

2026

Dear Students

I am excited to learn more about you. Your participation is indispensable for my dissertation entitled “Effectiveness of Indigenous Games on Basic Numerical Skills among Pre-Primary Children”. Some of your details are needed for my research. Your details will be kept confidential and used for research purposes only.

Thank You

Yours faithfully,

Dixi. T. M

M. Ed Student

PERSONAL INFORMATION

Name of the student :

Age :

Gender : Male / Female

Locale of the residence : Rural/ Urban

Type of management : Government / Aided / Private

Type of family : Join/ Nuclear

Birth order : First/ Second

Number of siblings : 0/1/ 2

N.V.K.S.D. COLLEGE OF EDUCATION (AUTONOMOUS)

Reaccredited by NAAC with 'A++' grade

(Affiliated to Tamilnadu Teacher Education University)

ATTOOR, KANYAKUMARI DISTRICT

NUMERICAL SKILL TEST (Draft form)

Prepared by Dixi & Raghi

(2026)

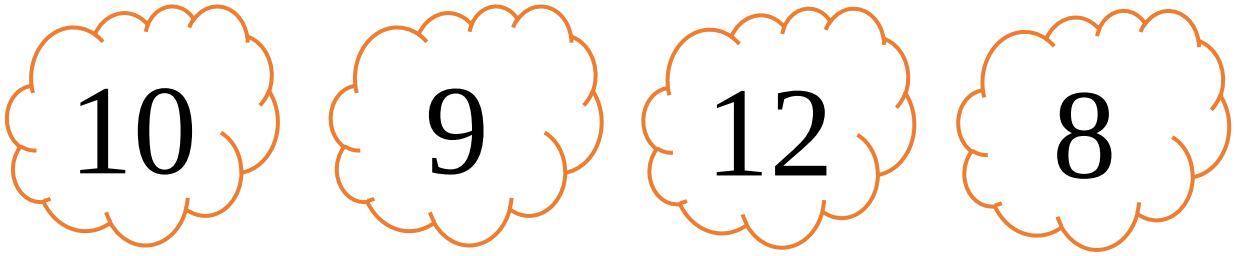
Instructions

The given test is to measure the basic numerical skill of UKG children. Please answer all the questions.

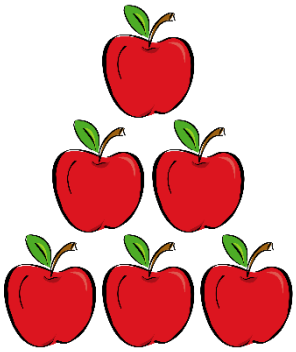
Time: **Total marks: 35**

1. Tick the **big** one

2. Find and color the number 12.

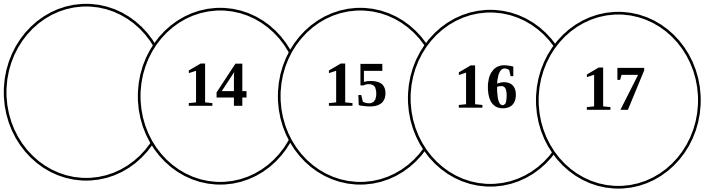


3. Count and write the number



4. Clap 4 times, then 6 times. Which had more claps?

5. What comes before?



6. Tick the square.

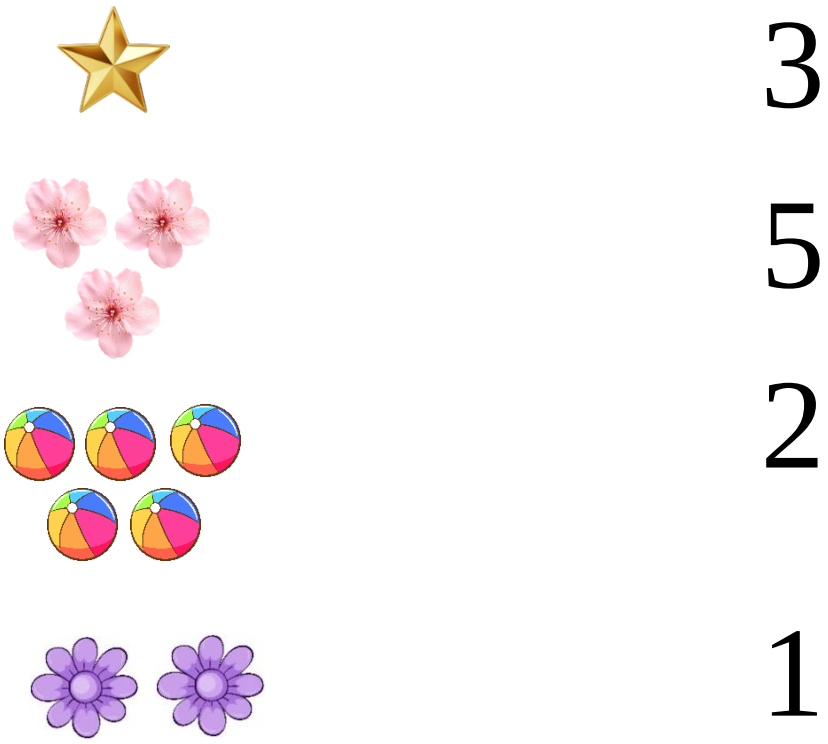
7. Where is the ball?

8. Count and write

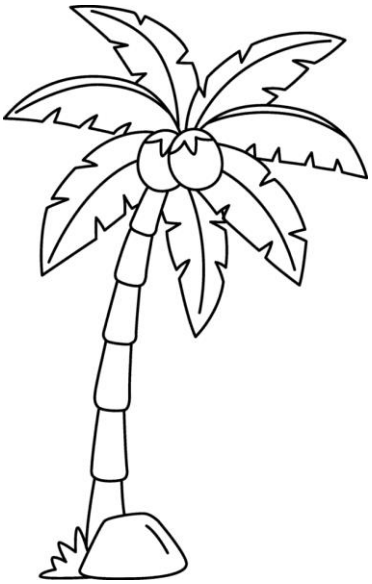
9. What number comes next?

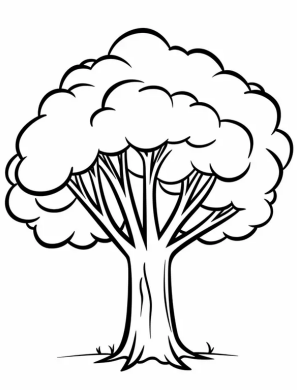
1 2 1 2 1 __

10. Draw lines to match each set of objects with correct number.



11. Color the **short** tree





12. What number is this on the card?

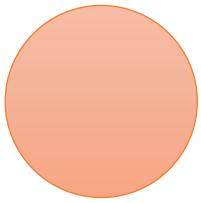
13. Circle the group that has more beads.

14. Which number is bigger, 10 or 3?

15. Colour the number that comes after 9.

11 10 12 13

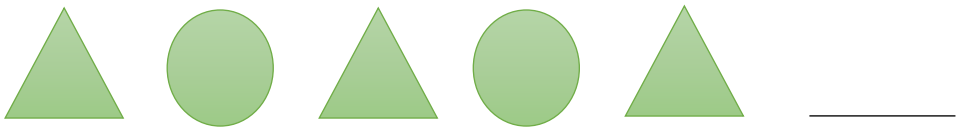
16. What shape is this?



17. Tick the picture where the cat is on the table.

18. Cross out the odd one

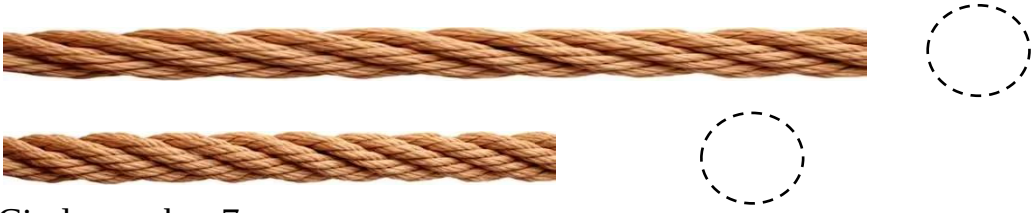
19. What comes next?



20. Match the number with number name

3	**Five**
5	**Three**
2	**Two**

21. Tick the **long** rope



22. Circle number 7.

4 5 6 7 8 9

23. Show me and count all of your fingers.

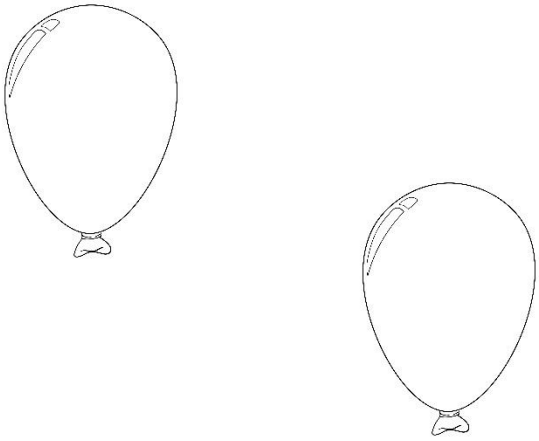
24. Tick the small number.

5 **8**

25. Arrange the number cards (1 – 5) in order, starting from 1.

26. Pick a card that shows triangle.

27. Colour the balloon that is up.

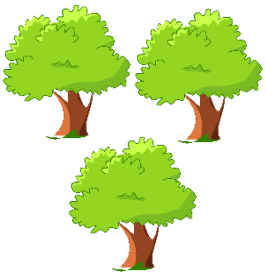


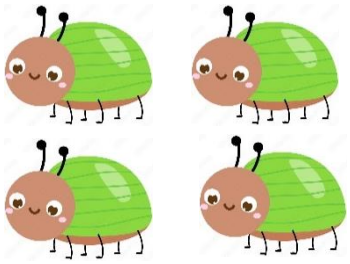
28. Put all the toys on one side and the books on the other.

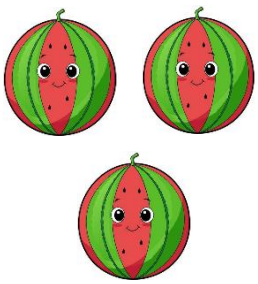
29. What letter comes next?

A B A B A __

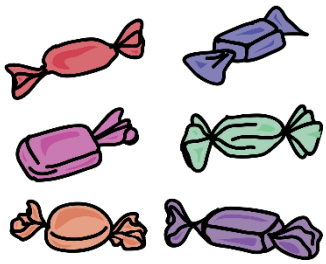
30. Draw lines to match sets with the same number of objects

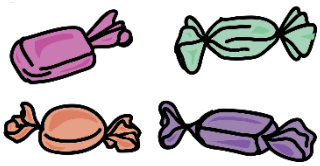




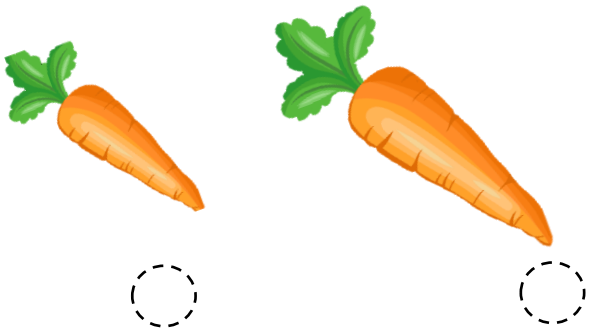


31.Circle the group which has more candies



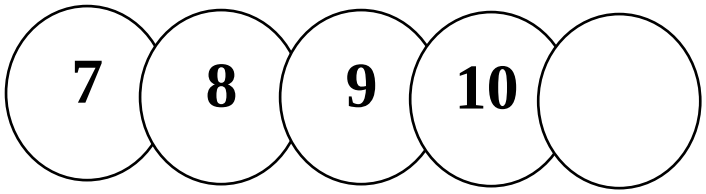


32. Tick the small carrot.



33. Tick the group that has few sticks.

34. What comes after?

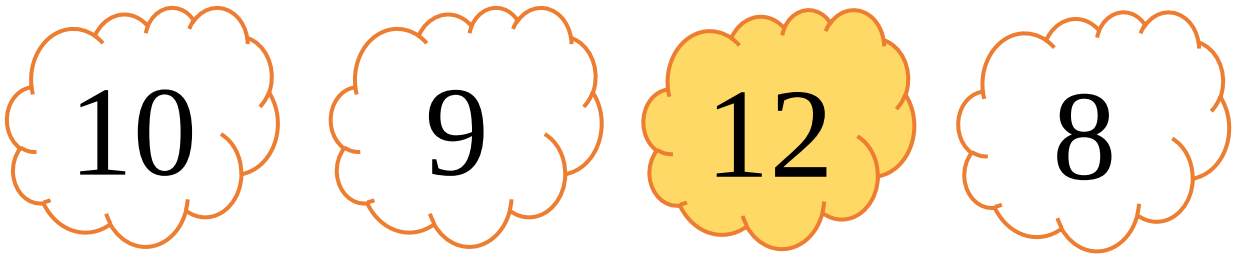


35. Tick the picture where the animal is in bottom.

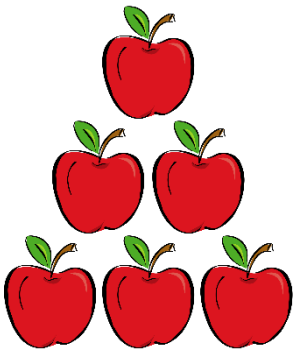
SCORING KEY (Draft form)

1. Tick the **big** one

2. Find and color the number 12.



3. Count and write the number

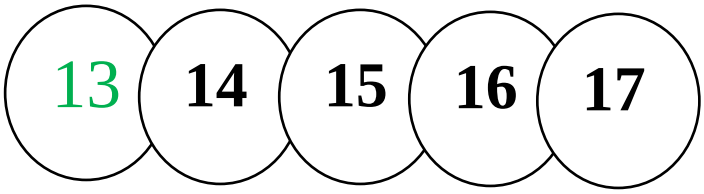


6

4. Clap 4 times, then 6 times. Which had more claps?

Marks based on the performance

5. What comes before?



6. Tick the square.

7. Where is the ball?

Ans: The ball is on the table

8. Count and write

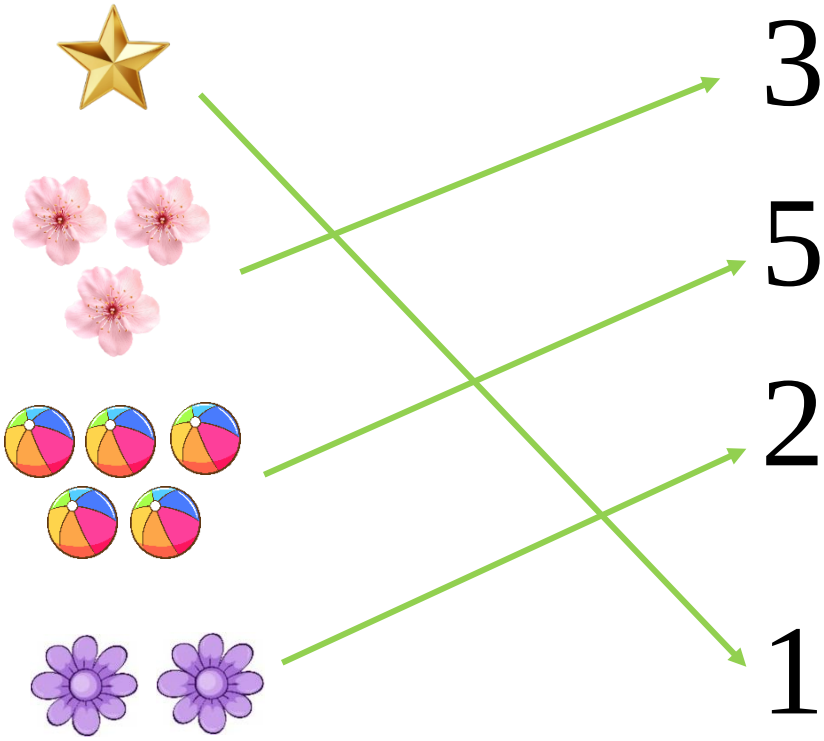
3

4

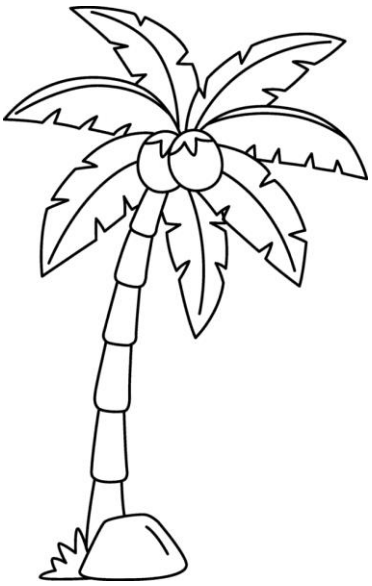
9. What number comes next?

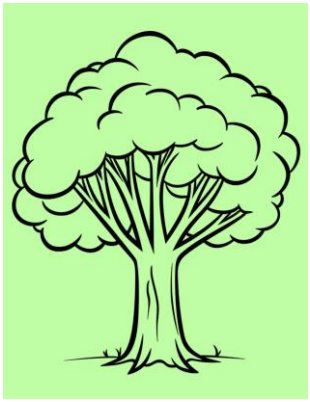
1 2 1 2 1 _2_

10. Draw lines to match each set of objects with correct number.



11. Color the **short** tree

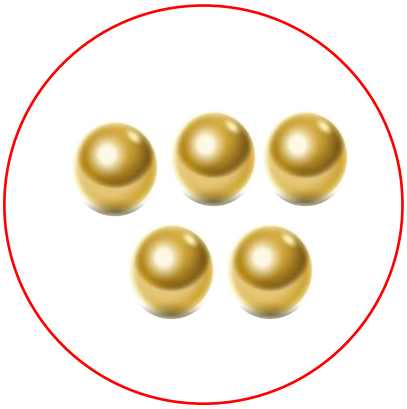




12. What number is this on the card?

Ans: 10

13. Circle the group that has more beads.



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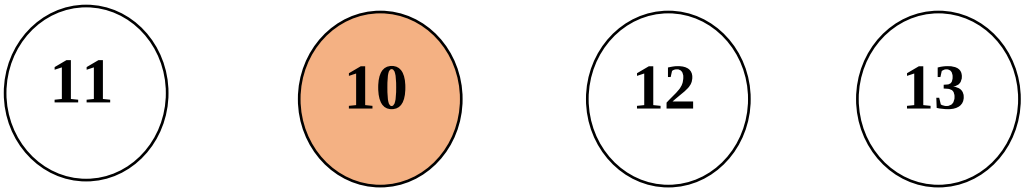
Ans: 10

15. Colour the number that comes after 9.



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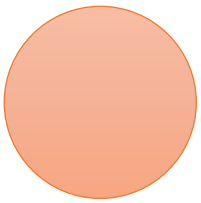
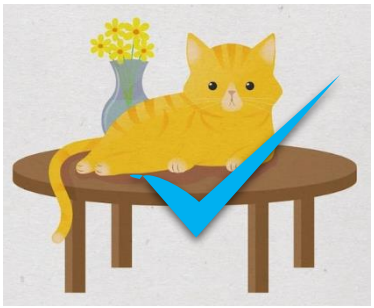


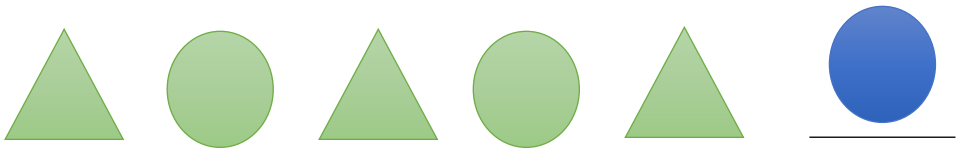
Ans: Circle

17. Tick the picture where the cat is on the table.



18. Cross out the odd one

19. What comes next?



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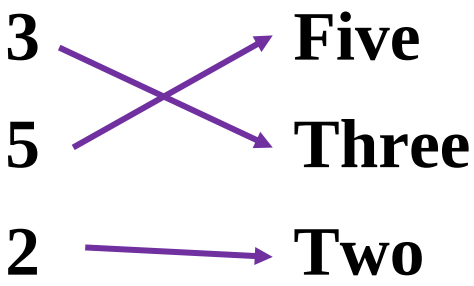
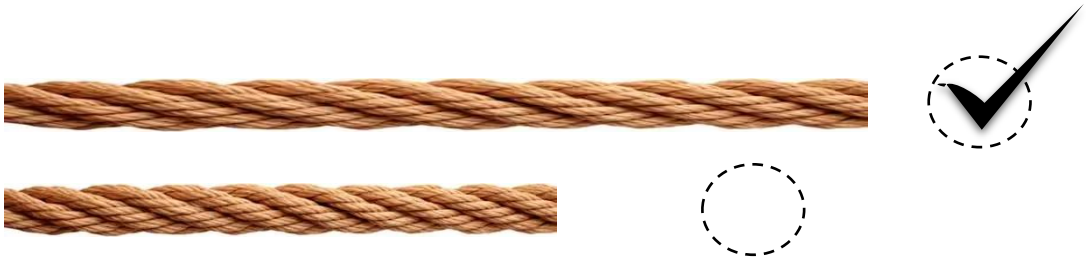


21. Tick the **long** rope



22. Circle number 7.

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23. Show me and count all of your fingers.

Mark awarded based on the performance.

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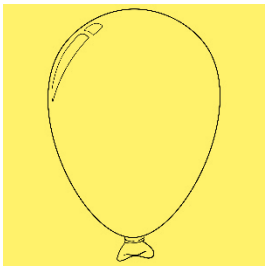

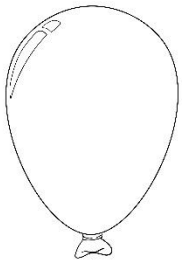

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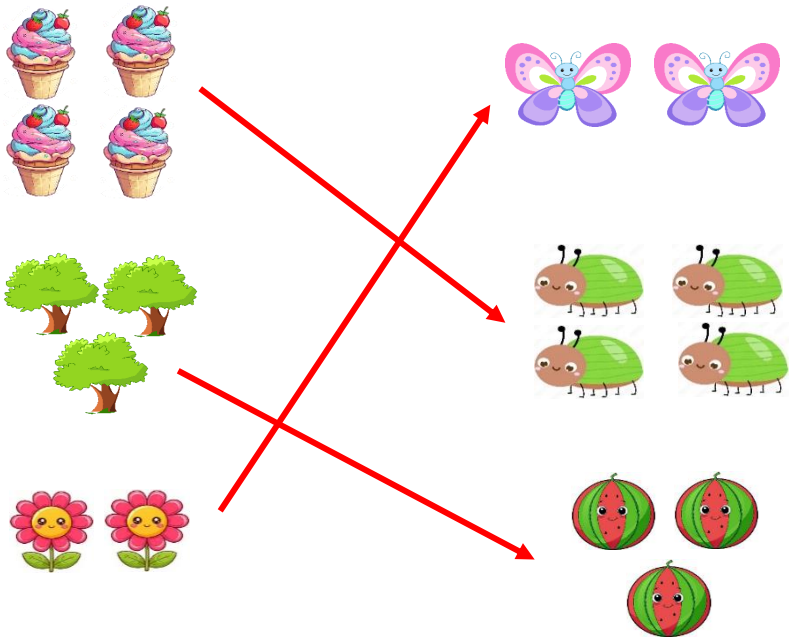

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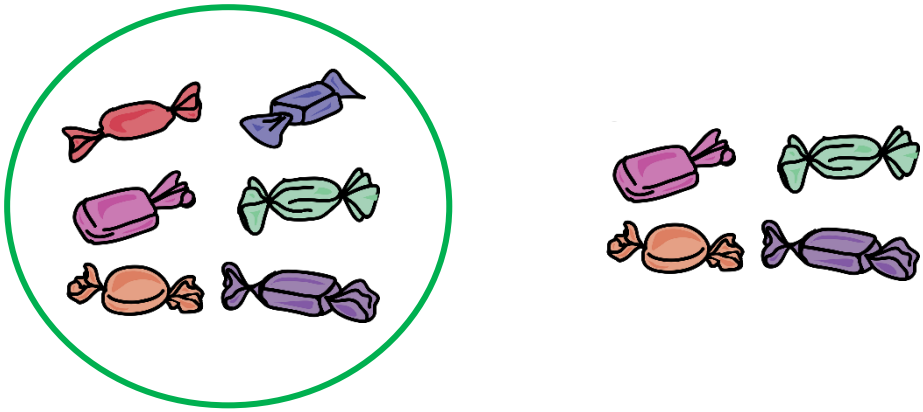
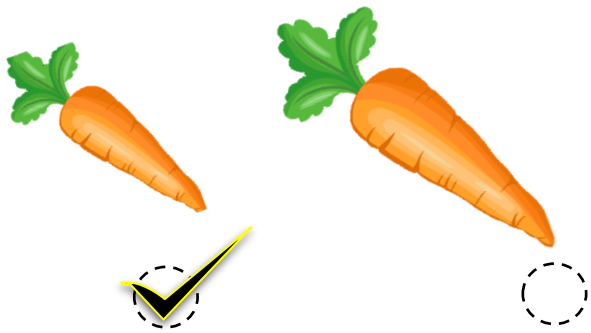


32. Tick the small carrot.



33. Tick the group that has few sticks.

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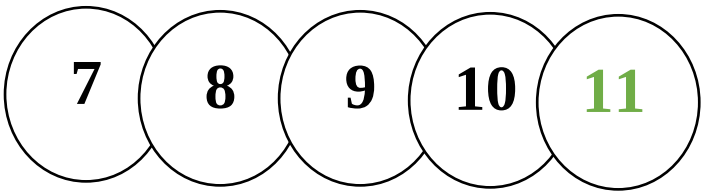

35. Tick the picture where the animal is in bottom.

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ATTOOR, KANYAKUMARI DISTRICT

NUMERICAL SKILL TEST

Prepared by Dixi & Raghi

(2026)

Instructions

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Time: **Total marks: 25**

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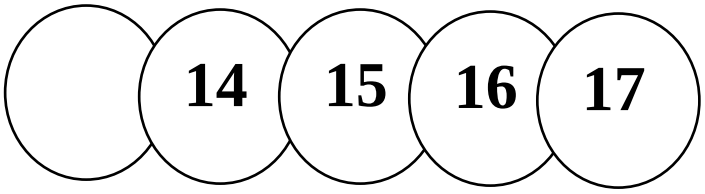


3. Where is the ball?

4. Count and write

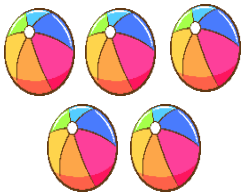
5. What number comes next?

1 2 1 2 1 __

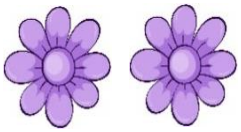
6. Draw lines to match each set of objects with correct number.

3

5

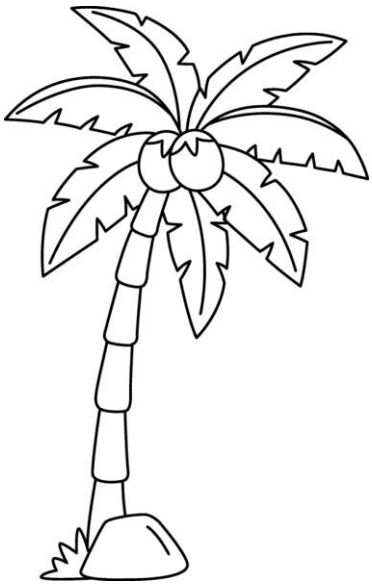


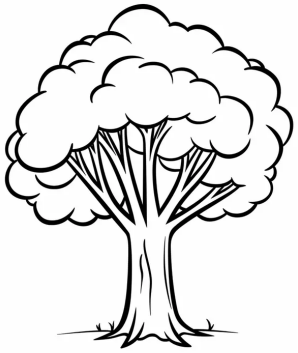
2



1

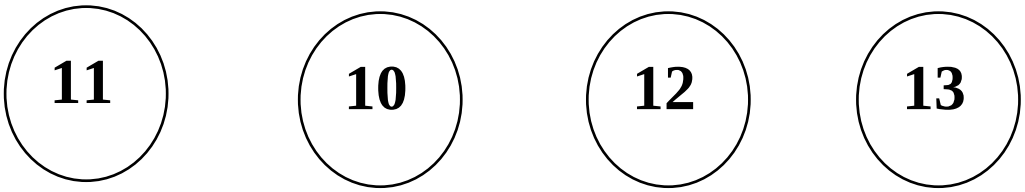
7. Color the **short** tree



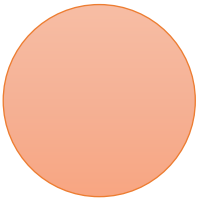


8. Which number is bigger, 10 or 3?

9. Colour the number that comes after 9.

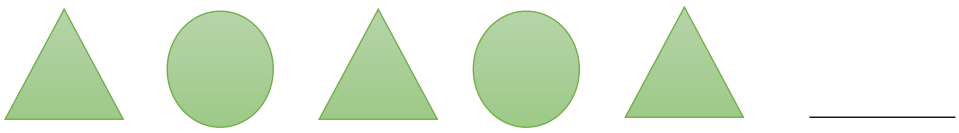


10. What shape is this?



11. Cross out the odd one

12. What comes next?



13. Match the number with number name

3	**Five**
5	**Three**
2	**Two**

14. Show me and count all of your fingers.

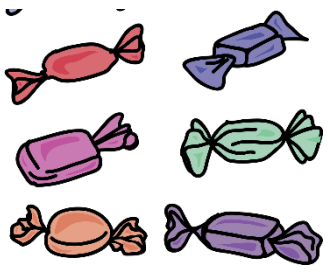
15. Tick the small number.

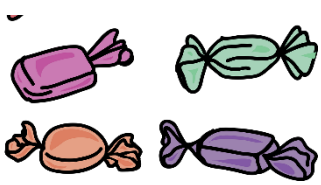
5	**8**
◯	◯

16. Arrange the number cards (1 – 5) in order, starting from 1.

17. Pick a card that shows triangle.

18. Circle the group which has more candies





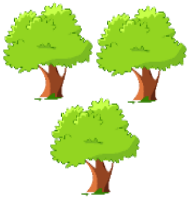
19. Put all the toys on one side and the books on the other.

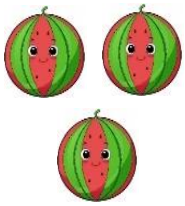
20. What letter comes next?

A B A B A __

21. Draw lines to match sets with the same number of objects





22. Tick the group that has few sticks.


23. Tick the picture in which the cat is inside the box

24. Circle the thick one.

25. Write the number between 16 and 18.

SCORING KEY

1. Clap 4 times, then 6 times. Which had more claps?

Mark awarded based on the performance

2. What comes before?

13 **14** **15** **16** **17**

3. Where is the ball?

Ans: The ball is on the table

4. Count and write

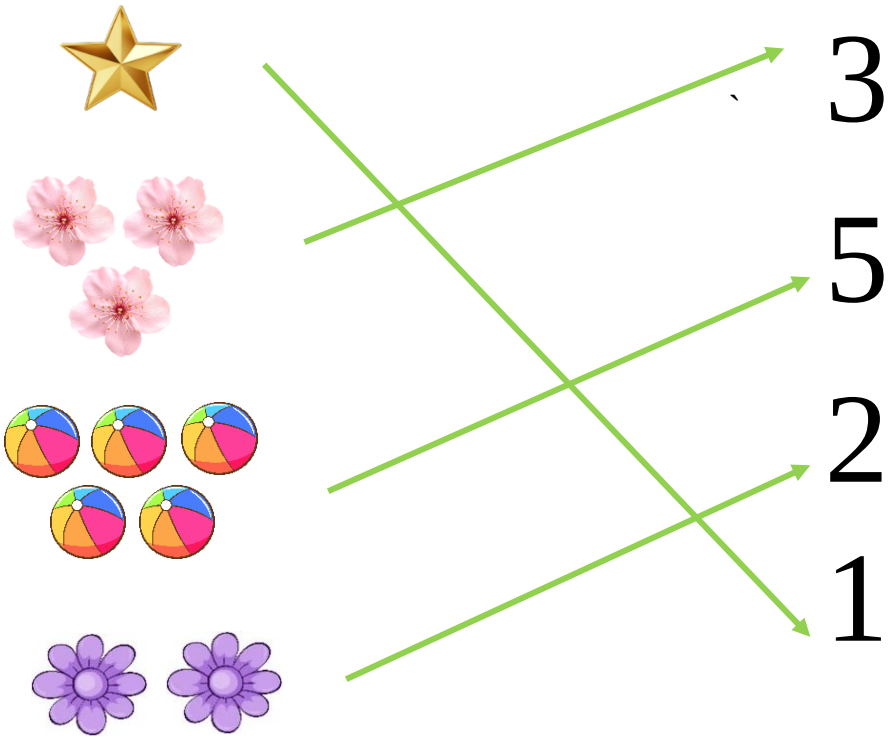
3

4

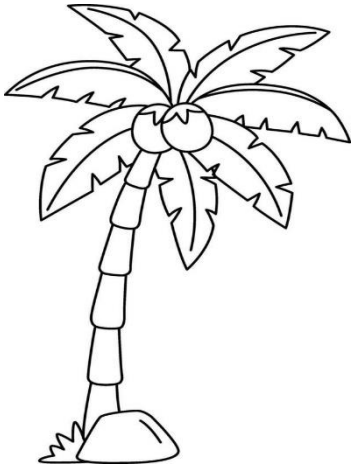
5. What number comes next?

1 2 1 2 1 _2_

6. Draw lines to match each set of objects with correct number.



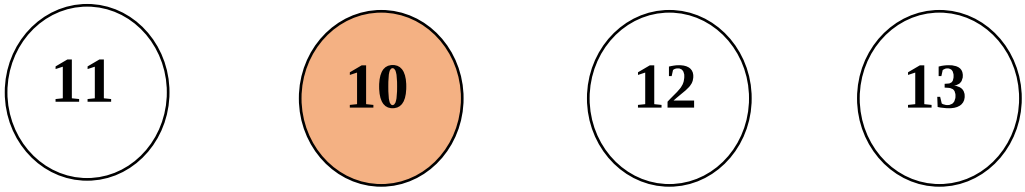
7. Color the **short** tree



8. Which number is bigger, 10 or 3?

Ans: 10

9. Colour the number that comes after 9.



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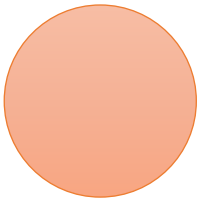
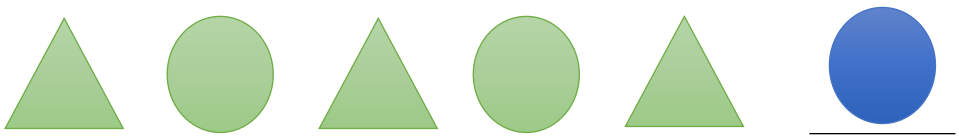


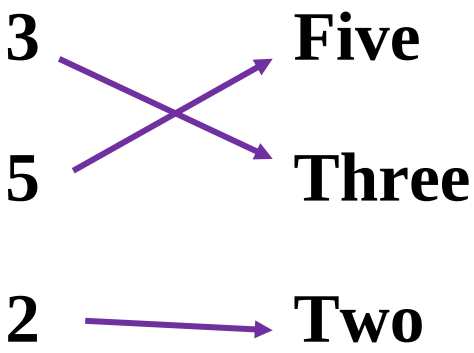
Ans: Circle

11. Cross out the odd one

12. What comes next?



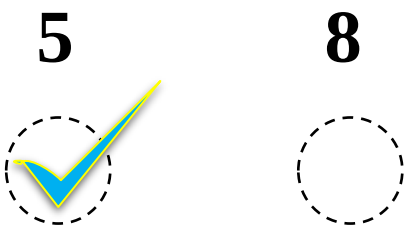
13. Match the number with number name



14. Show me and count all of your fingers.

Mark based on performance

15. Tick the small number.



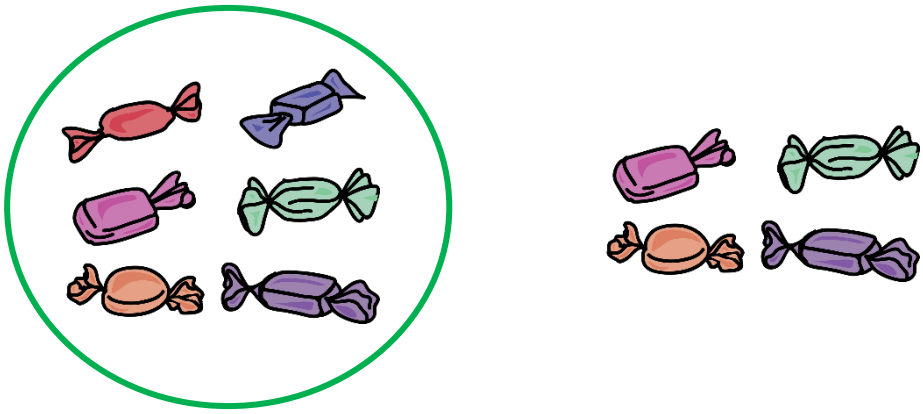
16. Arrange the number cards (1 – 5) in order, starting from 1.

Mark based on the performance

17. Pick a card that shows triangle.

Mark based on the performance

18. Circle the group which has more candies



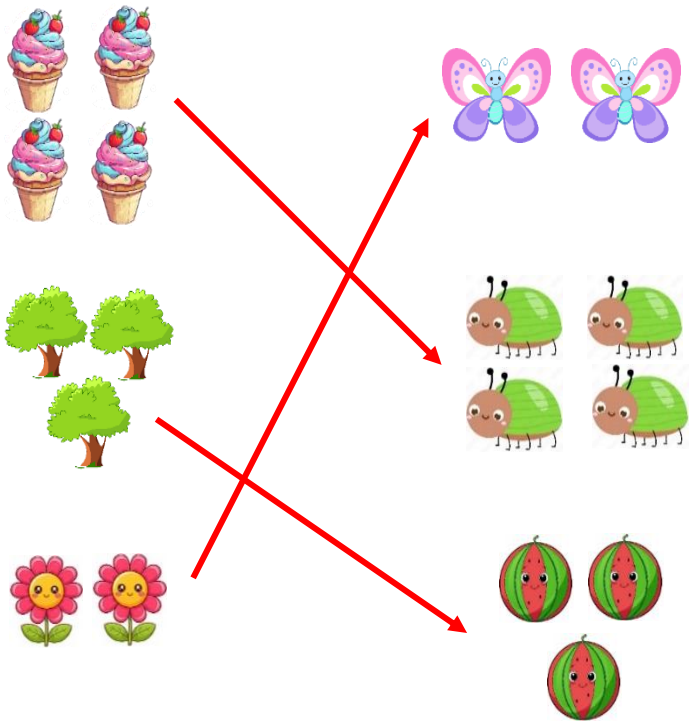
19. Put all the toys on one side and the books on the other.

Mark based on the performance

20. What letter comes next?

A B A B A _B_

21. Draw lines to match sets with the same number of objects



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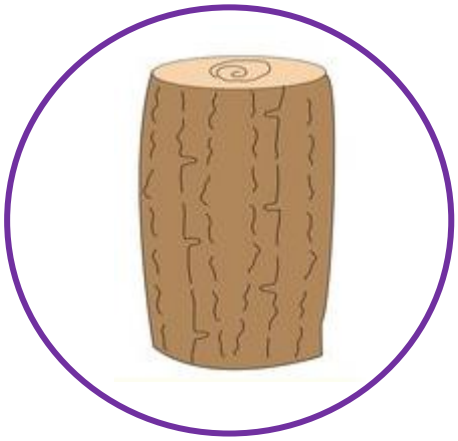
24. Circle the thick one.



25. Write the number between 16 and 18.

Ans: 17

Lesson Transcript – 1

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 24/02/26

Oru kodam Thanni is commonly played indigenous game by girls in rural areas and schools. The game is played in a group and involves singing a rhyme while children move rhythmically.

Learning outcomes

The child

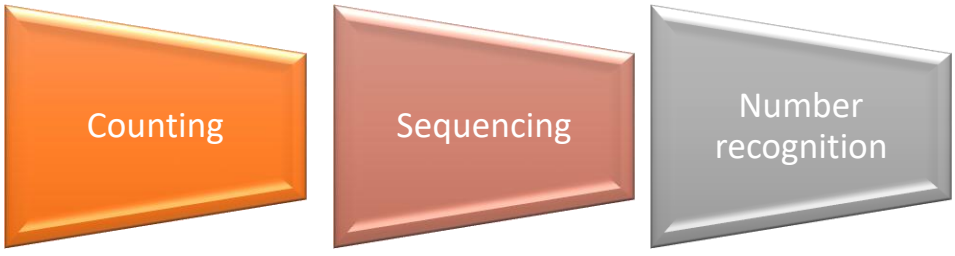
1. recites number from one to ten.

2. understands number sequence.

3. identifies repeating patterns in songs.

Numerical skills focused

Preparation



Arrangements

An open space is identified for playing the game.

Materials required

Nil

Procedure

The children are introduced to the song “oru kodam thanni oothi oru poo poothucham” and are encouraged to sing along.

Teacher modeling

Two children are randomly selected to form an arch by holding their hands in the air. They are shown how to pass through the arch while singing the song. They are also informed that when the song reaches the final line, the two children forming the arch lower their hands and catch the child passing through at that moment.

Guided practice

Two children are randomly selected to form an arch by holding their hands in the air. The remaining children line up and walk through the arch while singing the rhyme “ oru kodam thanni oothi oru poo poothucham, rendu kodam thanni oothi rendu poo poothucham, … patthu kodam thanni oothi patthu poo poothucham” together. As the song reaches the final line, the two children forming the arch lower their hands and catch the child passing through at that moment. The caught child is encouraged to form the arch in the next round. Throughout the activity, support and guidance are provided as needed.

Independent working time

The children are encouraged to sing and play the game independently. They are encouraged to take turns and actively participate when they are caught during the game.

Assessment

Observation is made to assess whether children actively participate in the game, follow the rules and sing the rhyme in sequence.

Consolidation

The children are asked to repeat the rhyme together. They are encouraged to find the first and last numbers in the song.

Follow up activity

The rhyme is recited while intentionally skipping a number, and the children are asked to identify which number is missing?

Lesson Transcript – 2

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 25/02/26

"Kulai kulaiyai mundhirika" is a game commonly played by children during their school days. The game begins with the children sitting in a circle. The size of the circle may be big or small depending on the number of children.

Learning outcomes

The child

1. identifies spatial positions such as behind, next to, and in front.
2. recognizes the shape.
3. counts the number of peers correctly.

Numerical skills focused

Preparation

Arrangements

The children are gathered in an open space. They are asked to sit in a circle.

Material required

Tree branch.

Procedure

The children are arranged to sit in a circle. One child is asked to hold the tree branch and stand near the circle.

Teacher modeling

The children are arranged in a circle. The game was demonstrated by holding the tree branch and running around the circle. That child had to pick up the tree branch and chase the child who placed it before the child sat in the vacant place.

Guided practice

The children are asked to play according to the game. They were guided to run in the same direction after placing the tree branch. The child behind whom the branch was placed was guided to pick it up and chase the other child.

Independent working time

The children ran around the circle, placing the tree branch behind one of their peers, after which they were chased by that peer. During this activity, the remaining children seated in the circle were instructed to count the number of children until they reached the vacant space.

Assessment

The children were observed while running to assess whether they counted their peers correctly and responded quickly when the branch was placed behind them.

Consolidation

The children were asked to remain seated and asked questions such as Who is sitting to the right of you? Who is sitting to the left of you? How many children are sitting in the circle?

Follow up activity

The children were asked to count the number of children sitting in the circle. Then, one child was asked to step aside from the circle. The children were asked, “how many children are in the circle now?”

Lesson Transcript – 3

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 02/03/26

Nooran kuchi is a pickup stick game which involves 10 sticks with different sizes and one big stick totality of 11 sticks.

Learning outcomes

The child

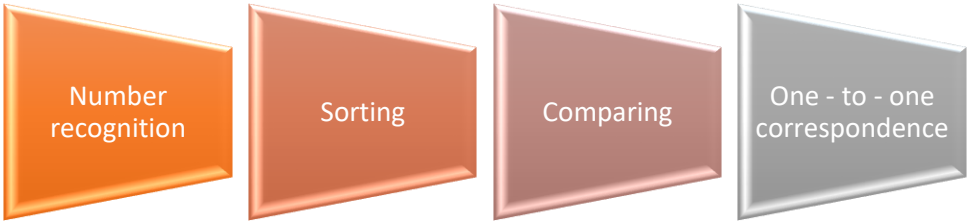
1. sorts the sticks by their length

2. compares the shortest and longest sticks.

3. compares their collected sticks with their peers.

4. recognizes that sticks have different point values.

Numerical skills focused



Preparation

Arrangements

A circle was drawn, and eleven sticks were picked up to play the game.

Material required

Chalk piece, eleven sticks.

Procedure

The children were gathered in the classroom. A circle was drawn on the floor, and the sticks were thrown inside the circle.

Teacher modelling

Eleven sticks were dropped inside the circle. The game was demonstrated by picking up the sticks one by one without disturbing the other sticks. If any stick touched the boundary of the circle or moved while another stick was being picked up, the turn was given to the next player.

Guided practice

The children were asked to gather near the circle drawn on the floor. One child was asked to drop the sticks inside the circle. The child picked up the sticks one by one with proper guidance. If a stick shook while being picked up, the turn was given to the next player.

Independent working time

The children were asked to play independently. They were instructed to pick up the sticks without disturbing the other sticks. They helped one another and carefully avoided dropping the sticks on the boundary line while ensuring that the remaining sticks were not shaken.

Assessment

The children were observed to determine whether they dropped the sticks correctly and picked them up properly.

Consolidation

The children were gathered and asked questions such as How many sticks do you have? Which stick is the shortest? Which stick is the longest?

Follow up activity

The class was divided into small groups, and the children were asked to compare the sticks they had collected.

Lesson Transcript – 4

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 03/03/26

Odi vilayatu is a commonly played game in schools and near houses with neighborhood friends. Usually, one child acts as the catcher, and the other children run around.

Learning outcomes

The child

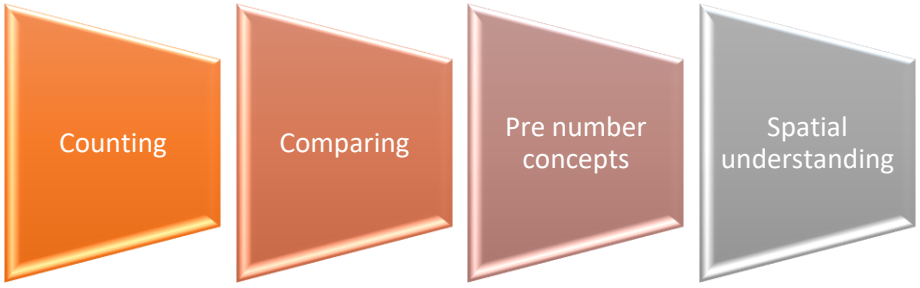
1. identifies the first, second and third winners.

2. identifies near vs far and fast vs slow.

3. counts the total number of children participates in the game.

4. identifies who is ahead and who is behind them.

Numerical skills focused



Preparation

Arrangements

An open space was identified for the odi vilayatu game.

Material required

Nil

Procedure

The children were gathered and asked to stand in a single line.

Teacher modelling

Ten children were asked to stand in a line, and one child was asked to chase them. The child had to catch all the members. The first child who was caught had to chase next.

Guided Practice

The children were asked to run around, and one child took the role of the chaser. The chaser was guided to catch all the members and was encouraged to say the ordinal position of each child caught (first, second, third, and so on).

Independent working time

The children played the game independently. The chaser chased all the children and identified the ordinal position of each child caught.

Assessment

The children were observed to assess whether they identified the correct ordinal positions and compared near versus far and far versus slow.

Consolidation

The children were gathered and asked questions such as

Who was caught first?

Who ran the fastest?

Who was standing nearby?

Follow up activity

The children were asked to run slowly in one round and fast in another round.

Lesson Transcript – 5

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 05/03/26

Learning outcomes

The child

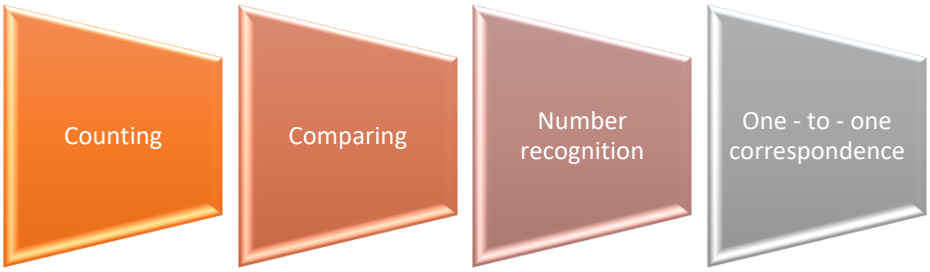
1. matches the number of leaves collected to the specific dots shown on the dice.

2. counts the number of leaves correctly.

3. recognizes the pattern repeated in the game.

4. compares who has more and who has less leaves.

Numerical skills focused



Preparation

Arrangements

Children were asked to gather in an open space.

Material required

Leaves, Dice.

Procedure

The children were gathered and asked to split into two groups.

Teacher modelling

Ten children were asked to form a group. Among them, one child was chosen as the banker who kept all the leaves in a box. The children were asked to take turns throwing the dice. They collected from the banker as many leaves as the number shown on the dice. After four or five rounds, each child added up his or her leaves. The child who had the highest number of leaves was given a chance to become the next banker.

Guided practice

The children were asked to form two groups. They were asked to take turns throwing the dice. They collected from the banker as many leaves as the number shown on the dice. After four/ five rounds, each child added up his/her leaves. The children were guided to take turns while throwing the dice.

Independent working time

The children played independently by throwing the dice and taking turns. They counted the leaves correctly and compared who had more leaves and who had fewer leaves. The child who had more leaves was given the opportunity to become the banker.

Assessment

The children were observed to check whether they took turns, counted the leaves correctly, and compared who had more and fewer leaves.

Consolidation

The children were gathered and asked questions such as

- How many leaves did you collect?
- Who has fewer leaves?
- How many leaves did the banker give when the dice showed a number?

Follow up activity

The children were asked to collect the leaves from two rounds and add the total number of leaves.

Lesson Transcript – 6

Name of the Prospective Teacher Educator : Dixi T M

Name of the school : Yettacode Nursery and Primary School

Standard : UKG

Number of pupils : 21

Duration : 45 minutes

Date : 06/03/26

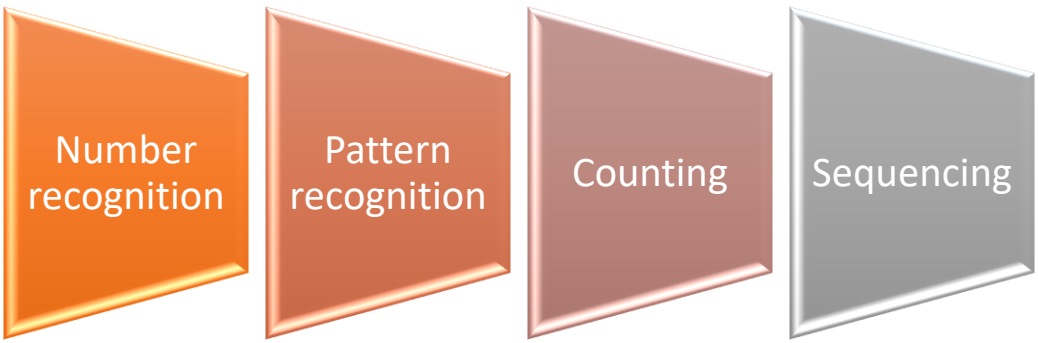
Paramapadham is a traditional Indian board game, which is the base to the modern snakes and ladders. The game represents the journey of life, where ladders show good actions and snakes show bad actions. The aim of the game is to reach the final position.

Learning outcomes

The child

1. identifies the numbers on the board from 1 to 100.
2. counts the number correctly.
3. sequences the numbers.
4. recognizes the pattern followed in the game.

Numerical skills focused



Preparation

Arrangements

Children were asked to gather in an open space.

Material required

Paramapadham board, Dice, coins.

Procedure

The children were gathered and paramapadham board was shown to them.

Teacher modelling

The paramapadham board was placed in front of the children and the rules of the game were demonstrated. All coins were first placed outside the board. A coin could enter the board only when the dice showed 1, and it was placed in the first cell. The coin was then moved according to the number shown on the dice. When the coin landed at the bottom of the ladder, it was moved to the top of the ladder. When the coin landed on the mouth of a snake, it was moved down to the tail of the snake. The player received another turn when the dice showed 1,5,6 or 12. It was also explained that if the number on the dice was greater than the number needed to reach the last cell, the coin could not be moved.

Guided practice

The children were asked to sit around the board and were guided to play the game. They were asked to take turns throwing the dice and move their coins according to the number shown. The children were supported in placing their coins on the board when the dice showed 1, and in moving the coins correctly across the cells. Guidance was also provided when a coin landed on a ladder or snake, and the children were reminded about the bonus turn when the dice showed 1,5,6 or 12.

Independent working time

The children played the game independently by taking turns throwing the dice and moving their coins on the board. They followed the rules of entering the board when 1 is obtained, climbing the ladder, and moving down the snake when required. The children also followed the rule of taking an additional turn when the dice showed

1,5,6 or 12. They continued the game until one player reached the final cell and completed the game.

Assessment

The children were observed to assess whether they recognized the numbers on the board, counted the cells correctly while moving the coins, followed the rules of the game, and took turns appropriately during the activity.

Consolidation

The children were gathered and asked questions such as

- How many cells did your coin move?
- On which number did your coin stop?
- Who reached the highest number on the board?

Follow up activity

The children were asked to observe two coins placed on different cells of the paramapadham board. They were encouraged to identify the numbers on the cells and compare them by answering questions such as which coin was on a bigger number ad which coin was on a smaller number.

Photos of students engaging in indigenous games

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