UNIVERSITY OF EDUCATION, WINNEBA

Teachers' use of traditional games in teaching numeracy in the Banda District

FATAWU ALHASSAN

(7231900018)

A thesis submitted to the Department of Early Childhood Education, Faculty of Applied Behavioural Science in Education, submitted to the School of Graduate Studies, in partial fulfilment of the requirement for the award of the degree of Master of Education (Early Childhood Education) in the University of Education, Winneba

NOVEMBER, 2024

DECLARATION

I, **Fatawu Alhassan**, hereby declare that this thesis with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original research and has not been submitted, either in parts or in whole for another degree in this University or elsewhere.

Signature: .....

Date: .....

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis/dissertation as laid down by the University of Education, Winneba.

Name of Supervisor: Salome Praise Otami (Ph.D)

Signature: ……

Date: …….

DEDICATION

I dedicate this work to my family.

ACKNOWLEDGEMENT

My profound gratitude goes to my supervisor, Salome Praise Otami (Ph.D.) for her dedication, timeless guidance and direction throughout this thesis. I also express my appreciation to all the lecturers of the Department of Early Childhood Education for their expertise as far this programme is concerned. I am also grateful to all the early childhood teachers in the Banda District for their contributions in responding to the interviews in the study. Special thanks to my wife for her immense support throughout my education. Finally, I am grateful to my children, my family for their morale support throughout this programme and to everyone who in one way or the other contributed to the success of this dissertation. I say Ayekoo.

TABLE OF CONTENT

ABSTRACT

The purpose of the study was to explore teacher's use of traditional games in teaching and learning of numeracy in early childhood centres in the Banda District. The case study design was adopted for the study. The study used the purposive sampling technique to select thirteen (13) kindergarten teachers in the Banda District. The instrument used for the collection of data was semi-structured interview guide. The data from the interview were analysed thematically. The study revealed that the use of traditional songs and rhymes, cultural arts and craft as well as traditional games activities are some of the ways through which traditional games can be used in the teaching and learning of numeracy. Also, availability of indigenous teaching and learning resources, parental involvement, and ability to enhance easy understanding as well as teacher training were some factors that influenced teacher's use of traditional games. Again, lack of in-service training and professional development, classroom management as well as time constraints as some of the challenges to the use of traditional games in teaching numeracy. Continuous professional development, availability of indigenous teaching and learning materials, active parental involvement were some of the strategies that could be used to improve the use of traditional games-based pedagogy in teaching numeracy in kindergarten centres in the Banda District. The study therefore recommended that teacher pre-service training emphasize the importance that comes with the use of the traditional games-based pedagogy, provision of adequate teaching and learning materials for teachers and young children, encourage open communication between educators and parents to promote a shared understanding of the value of play-based pedagogy in nurturing well-rounded learners within the Banda District.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Numeracy is essential in early childhood education, laying a foundation for academic success and life skills. Education Scotland (2019) highlights numeracy as a vital component of mathematics that enables broader curriculum access (Campbell, Gray, MacIntyre, & Stone, 2020). It involves applying mathematical knowledge to daily challenges at home, work, and in society (Doig, McRae, & Rowe, 2003). Numeracy merges mathematical understanding with problem-solving and communication abilities crucial for community functioning (Purdie, Reid, Frigo, Stone, & Kleinhenz, 2011).

Skills such as counting, recognizing numerical symbols, understanding magnitude, and solving basic arithmetic problems are pivotal in early math development and later academic achievement (Hamukonda, 2021; Aunio & Räsänen, 2016; Nogus & Domeless, 2021). Comprehending and manipulating numbers empowers individuals to be productive and engaged members of society, requiring abilities to interpret and evaluate numerical data (Cheung, Dulay, Yang, Mohseni, & McBride, 2021). Watts, Duncan, Siegler, and Davis-Kean (2014) emphasize the critical link between early math skills and future success, underscoring numeracy as a modern essential akin to literacy for optimal daily functioning. This early emphasis on numeracy skills is crucial for later academic and life outcomes.

Research consistently highlights that early mathematical skills are crucial indicators of later academic success, stressing the importance of building a strong numeracy

foundation in young learners (Ginsburg, Lee, & Boyd, 2008). Developing these skills early ensures children are well-equipped to achieve their full educational potential.

Incorporating traditional games into numeracy instruction is an effective strategy for engaging young learners. Yekple, Vinyo, and Kumah (2021) emphasize that such culturally relevant pedagogies capture children's interest and promote active participation. Nabie and Akayuure (2014) also underscore the value of using culturally responsive teaching methods across various subjects, including numeracy. Insights from Ghana's curriculum reforms between 1987 and 2004 reflect this approach, where integrating indigenous knowledge into formal education helped contextualize mathematics instruction and rooted it within children's social experiences (Akayuure & Ali, 2016; Nabie, 2015).

By utilizing traditional games, educators can make numeracy lessons more relatable and engaging, transforming abstract concepts into meaningful, culturally familiar activities. This approach not only fosters deeper understanding but also positions mathematics learning within the cultural and social frameworks that resonate with children's lived experiences.

The 2020 educational reform policy document repeated the inclusion of indigenous knowledge and artefacts in the teaching and learning of Mathematics (Ministry of Education, 2020). These moves aimed at contextualizing mathematics within students' socio-cultural domain seek to make mathematics more meaningful and relevant. These have underscored the potential of traditional games/games and located mathematics within the social domain of the child as alternative instructional tools for classroom interactions. These eventually impact several socio-economic issues, such as African

identity, cultural diversity, education and training, accessibility to resources, international relations, and economic growth (Tachie & Galawe, 2021).

Traditional games are deeply rooted cultural practices that serve as artistic expressions of a community's heritage (Daru et al., 2019). Agbagbla (2018) describes these games as playful activities derived from the child's immediate socio-cultural environment. They are semi-structured forms of play developed by local and indigenous people, blending traditional cultural elements with modern-day influences. In many developing countries, traditional games offer valuable resources for teaching numeracy (Ali, 2021). Examples include "Ampe," "Asorba and Nkro," "Pilolo," "Sansakroma," "Merepe kwan ako," and "Pinpina and Panpana."

Research shows that early-grade learners grasp numeracy concepts more effectively when these lessons are grounded in familiar cultural practices, such as traditional games (Yekple, Vinyo, & Kumah, 2021). Moloi, Mosia, Matabane, and Sibaya (2021) similarly note how South African games like *morabaraba* (a strategy board game), *kgati* (skipping rope), and *diketo* (a coordination game) enhance learners' understanding of numeracy through real-life connections. Manzunzu (2022) emphasizes that using indigenous games helps students relate mathematical concepts to everyday experiences.

In Ghana, traditional games like "Aḍifɔfɔ" (Pebble picking), "Papa kple Dada" (Father and Mother), and "Tolovi" (Push and Measure) aid in teaching size, shape, patterns, counting, numeral recognition, and matching quantities (Yekple et al., 2021).

These indigenous games do not necessitate a high level of numeracy. The arithmetic core of the games is not always obvious to players. As a result, teachers must highlight some of the mathematical concepts as students play these games. The use of these games in the classroom to teach numeracy will assist students in developing some

mathematical concepts (Bhuda, 2021; Owusu-Mensah & Baffour, 2015). Traditional games/games keep learners interested in learning and encourage multi-sensory learning behaviour in them. Indigenous games enable a multisensory range of scaffolding, assessment, and responsive feedback for coaching (Yekple et al., 2021). Moloi (2015) describes how traditional games/games create meaningful and practical situations in which mathematical skills can be applied. Because most children enjoy playing games, these indigenous games may unintentionally develop intrinsic motivation for mathematics.

Traditional games have the potential to deconstruct mathematics as an abstract and difficult field of study (Nabie, 2011). This also addresses the concern about making numeracy classroom activities solely abstract, remote, and largely disconnected from the children's experiences. For effective numeracy teaching and learning, efforts should be made to reintroduce and reintegrate culturally informed mathematics. Thus, incorporating African mathematics into educational curricula and supplementing it with modern technological knowledge stems from indigenous knowledge systems (traditional games/games) (Turugari, 2022). In online teaching and learning, this technological knowledge has been transformed into digital knowledge. This makes teaching and learning more enjoyable and fun (Akayuure, 2021).

According to Tachie and Galawe (2021), the high failure rate among many learners may be due to a large percentage of teachers in schools failing to incorporate traditional games/games into their teaching. Traditional games/games have an impact on a variety of socioeconomic issues in the lives of many Africans, including African identity, cultural diversity, education, and training, access to resources, international relations, and economic growth. Learners, particularly those from disadvantaged backgrounds,

are unable to apply current teaching methods in our schools because they do not relate to their daily activities.

To meet the demand for education reform, the Ghana Education Service has since promoted traditional games/games through competitions in Banda District schools. However, these reform intentions continue to be a challenge for teachers who are in charge of incorporating traditional games/games into numeracy classrooms. Research finding reveals that although many teachers may be aware of advantages of using traditional games/games, "few experienced them at the point where their pedagogical skills are developed" for classroom practices (Nabie, 2015).

Observations point to a lack of teacher knowledge and a lack of numeracy books, teaching guides, and resources depicting Ghanaian cultural games. Furthermore, the use of indigenous games in classrooms and teaching experiments aimed at mathematical analysis remain limited (Akayuure & Ali, 2016). Traditional games/games that learners engage in are an aspect of their culture. According to Waller and Davis, (2014) incorporating traditional games/games into the teaching and learning of numeracy is important because young children learn through play. Recognizing the importance of traditional games/games in teaching learners' numeracy, it is critical to assess how teachers use them in Banda District early childhood education centres.

According to a study by Akayuure, and Ali (2016) when learners' cultural treasures from home are relegated to the margins of the classrooms, numeracy learning becomes less productive for those learners. Traditional games/games are among the cultural treasures of learners. This implies that, in order to improve numeracy learning, teachers must incorporate traditional games/games into their teaching practices (Akayuure & Ali, 2016). Furthermore, Bender, (2017) asserts that the use of traditional games/games

to teach numeracy is original and unique, and that if used within a specific culture and society, it would produce excellent results.

Dewah and Van-Wyk (2014) observed that, many Zimbabwean educators are unaware of the connections between numeracy and the surrounding world. Many teachers do not have time to research and implement strategies to help students of all ethnicities in their classrooms. According to Tachie and Galawe (2021), in South Africa, teachers rarely incorporate traditional games/games into their numeracy teaching and learning.

1.2 Statement of the Problem

At the early childhood stage, when the foundation phase is solidified, numeracy learning can become engaging and less daunting (Owusu-Mensah & Baffour, 2015). The use of traditional games in numeracy education serves to simplify concepts, alleviate math-related anxiety, and make learning more culturally pertinent. Despite these advantages, many educators lack the pedagogical skills necessary to effectively incorporate indigenous games into numeracy instruction. Only a small proportion of teachers can apply their knowledge of traditional games to classroom practices. The majority are unfamiliar with the numeracy content embedded within these games and struggle with adapting them to suit numeracy lessons. According to Owusu-Mensah and Baffour (2015), the value of integrating indigenous knowledge from students' daily experiences into academic settings is often unrecognized or underappreciated, and traditional methods of understanding may be disregarded by some educators.

This challenge appears to mirror the situation in Banda District, where anecdotal evidence suggests that numerous early-grade teachers lack comprehensive knowledge of traditional games and consequently show little interest in leveraging them for numeracy instruction. Many of these teachers do not understand how to seamlessly

integrate indigenous games into the teaching process to make numeracy lessons more effective at this foundational stage. Nabie (2011) highlights that there remains uncertainty regarding how many teachers are familiar with traditional games or understand their impact on numeracy teaching and learning.

According to the researcher's teaching experience at the Banda District early childhood education centre, one major drawback for the use of traditional games/games in numeracy classroom is the inability of most early grade teachers to identify the numeracy in the traditional games/games and consequently incorporate them when teaching specific numeracy content. Teachers do not use traditional games when teaching numeracy, but prefer to use them when they feel learners have become bored. (Smith & Brown, 2020)

Although the idea of using traditional games/games to teach numeracy is not familiar to most basic numeracy teachers, they need to be encouraged to utilize learners' culturally related games as a vehicle for learning to make education relevant and meaningful (Moloi, 2015). So, using traditional games/games to teach numeracy would not only arouse the child's interest but also demystify the perceived difficulty of learning numeracy. Several studies in Ghana (Owusu-Mensah & Baffour, 2015; Ali, 2016: Akayuure &; Yekple et al., 2021: Tangkur et al., 2022) have investigated the use of traditional games/games in mathematics education. However, there is little information on teachers' use of traditional games/games in teaching numeracy in the Banda District and the challenges thereof. Which this study seeks to bridge the literature gap

1.3 Purpose of the Study

The purpose of the study was to examine how teachers' use of traditional games in teaching numeracy at early childhood education centres in Banda District.

1.4 Research Objectives

The following objectives guided the study.

1. Investigate the types of traditional games used in teaching numeracy at the early childhood education centres in Banda District.
2. Examine reasons why the teachers use traditional games in teaching and learning numeracy at the early childhood education centres in Banda District.
3. Identify the barriers that teachers face in using traditional games to guide pupils to learn numeracy at early childhood education centres in Banda District.

1.5 Research Questions

The following questions were set as a guide to the study.

1. What types of traditional games do teachers use in teaching numeracy at the early childhood education centres in Banda District?
2. What factors influence teachers use of traditional games in teaching and learning numeracy at the early childhood education centres in Banda District?
3. What barriers do teachers face when using traditional games in teaching and learning numeracy at early childhood education centres in Banda District?

1.6 Significance of the Study

The study's findings will help in identifying the right kinds of indigenous games that are suitable for the teaching of numeracy in the Banda District. It will further enlighten pre-school teachers in the district on the various forms of indigenous games and how they will be able to use them at the right time in order to enhance the learners

understanding of numeracy by enlightening the teachers in the study area on how to use traditional games/games to improve students' understanding of numeracy.

Furthermore, the study's findings will inform teachers about the benefits of using traditional games/games to teach numeracy and the need to include it as a method of teaching and not only fall on it at certain times during instruction by modifying their teaching methods in order to incorporate traditional games/games in teaching numeracy. The study will as well inform policymakers in developing a traditional games-based academic curriculum that will assist learners in the study area in learning numeracy. Furthermore, the study's findings will provide researchers and other stakeholders with the necessary research document as reference information as well as a guide for future research.

1.7 Delimitations of the Study

The study delimited to only teachers teaching in early childhood centres in Banda District and hence did not include all teachers in the district. In content, the scope of the study includes teachers' use of traditional games in teaching numeracy. At early childhood centres.

1.8 Limitations of the Study

The study was conducted at the time when schools were preparing for examinations and as a result the sample size of the teachers was affected. This also delayed the period of data collection as the day and time schedules for the interviews kept changing. Some respondents were not responsive to the questions as others were too hostile to the researcher and demanded payments to respond to the interviews and in the long run turned down the request of the researcher to answer the questions.

1.9 Operational Definition of Terms

Numeracy: Numeracy is the ability of learners in this study to understand and work effectively with numbers.

Traditional games/indigenous games: They are used interchangeably in this study to mean the same thing which refers to activities that are done for enjoyment that stem from traditions, environment, and cultural practices.

1.10 Organisation of the Study

The study is divided into five chapters, each of which thoughtfully considers the chapter heading. The first chapter is an introduction that covers the background to the study, the statement of the problem, the purpose of the study, the objectives, and research questions of the study, the significance of the study, the study's delimitations, operational definitions of terms, and the study's organisation. The second chapter is a review of the literature. It examines relevant literature to the study. The methodology chapter covers the research philosophy, research approach, research design, study area, population of the study, sample size and sampling procedure, data collection instruments, data collection procedure, data analysis procedure, and ethical considerations. The fourth chapter dealt with the findings and their discussion. The fifth and final chapter contains a summary, conclusions, and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0. Overview

This chapter reviews literature that are relevant to the current study. The chapter is divided into theoretical framework, conceptual framework, and empirical reviews.

Theoretical framework (Sociocultural Theory- Lev Vygotsky 1978)

- Concept of Play
- Types of Play
- Benefits of the use of Traditional Games
- Teachers' views on the use of traditional games in teaching numeracy
- Benefits derived from teachers' use of traditional games
- Barriers that teachers face when using traditional games to teach numeracy

2.1 Sociocultural Theory

Sociocultural Theory, developed by Lev Vygotsky, emphasizes the fundamental role of social interaction and cultural context in the development of cognitive functions. According to Vygotsky (1978), learning is inherently a social process, and knowledge is constructed through interactions within one's cultural and social environment. This theory highlights that cognitive development is heavily influenced by cultural artifacts, symbols, and activities, making culture a critical factor in shaping how children learn and think, which the cone of this study is

A key concept within this framework is the Zone of Proximal Development (ZPD), which refers to the difference between what a learner can do independently and what they can achieve with guidance or collaboration from more knowledgeable others, such

as teachers or peers (Vygotsky, 1978). Using indigenous play in teaching numeracy aligns with this idea, as culturally relevant play activities provide opportunities for scaffolding, where teachers can support and extend children's understanding and acquisition of mathematical concepts.

Another important aspect of Vygotsky's theory is mediation, where learning occurs through the use of tools, language, and signs that are culturally developed. Teachers act as mediators, using culturally meaningful activities such as indigenous games and play to make abstract concepts more concrete and accessible for learners (Vygotsky, 1986). These tools not only support cognitive development but also connect learning to students' lived experiences, making it more relevant and engaging and serving as a strong communication with this study.

Additionally, Vygotsky's emphasis on the importance of culture suggests that integrating local traditions and practices into teaching can significantly enhance learning outcomes. Indigenous play embodies culturally embedded knowledge and social norms, allowing children to learn in a familiar and supportive context (Rogoff, 2003). Thus, Sociocultural Theory provides a strong foundation for understanding how indigenous play can be effectively used to teach numeracy, as it recognizes the interplay between social interaction, cultural practices, and cognitive development.

Justification of the Theory

Sociocultural Theory is particularly justified for the study of using indigenous play to teach numeracy in the Sekyere East District because it emphasizes the role of culture in cognitive development. According to Vygotsky (1978), learning is a socially mediated process, where children acquire skills and knowledge through interactions with more experienced members of their community. In the context of numeracy

education, indigenous play serves as a culturally relevant tool that teachers can use to facilitate this social learning process.

The theory underscores the importance of using familiar cultural practices to support and scaffold children's learning within their Zone of Proximal Development (ZPD). Vygotsky (1978) argues that learning occurs most effectively when educators use culturally meaningful activities to guide students from their current level of understanding to more advanced levels. Indigenous play fits well within this framework, as it provides age-appropriate and culturally embedded experiences that can enhance numeracy skills through guided participation and collaboration.

Additionally, Sociocultural Theory highlights that cognitive tools, such as language and symbols, are transmitted through cultural practices (Vygotsky, 1986). Indigenous play often incorporates these elements, making it a natural fit for numeracy instruction. By using games and activities rooted in local traditions, teachers can mediate learning experiences in ways that resonate with children's everyday lives, thus making abstract mathematical concepts more concrete and comprehensible (Rogoff, 2003).

Furthermore, this theory is justified as it supports the idea that education should be contextually relevant. According to Rogoff (2003), culturally aligned teaching strategies promote greater engagement and comprehension among learners. In this study, employing indigenous play not only preserves cultural heritage but also leverages children's existing knowledge, making learning both effective and meaningful. Hence, Sociocultural Theory provides a comprehensive framework for understanding the integration of indigenous play in numeracy education.

2.2 The Concept Play

The perspective of children`s play was initially considered in education as a yardstick

for development of pedagogy (Sommer, Pramling Samuelsson & Hundeide, 2010). There has been lots of research and findings produced over the years relating to the definition of play. Several researchers and theorists define play differently, however, many different perspective views on what play is overlapped with other views. Play can be viewed, conceptualized, and defined from many different theoretical and ideological perspectives.

Gülşeker (2019) defined play as, "an activity that is symbolic, meaningful, active, pleasurable, voluntary, rule-governed and episodic" (Nowak, Nichols, and Coutts, 2009). Play as pleasurable and an activity, is seen as a situation by which children learn and interact with the environment and the world around them. Gordon (2009) also argues that "play is the voluntary movement across boundaries, opening with total absorption into a highly flexible field, releasing tension in ways that are pleasurable, exposing players to the unexpected and making transformation possible." (p. 8). Through play children learn informally and relate their play to real life experiences. The voluntary movement of children which includes exploration, playing and learning according to their interests, offer them the opportunity to satisfy their curiosity and level of maturation.

Additionally, Wood (2009) indicated that characteristics of play include intrinsic motivation, engagement; dependence on internal rather than external rules, control and autonomy, and attention to means rather than ends". Children formulate their own rules to suit and match with the play situation. Therefore, children experience the joy and skills development through self- motivation. According to Pramling-Samuelsson and Carlsson (2008) play is considered as a learning situation or an activity initiated by children, on the other hand, learning is regarded as a result of a practice or activity initiated by any adult to help children to learn. They further state that play activities as

well as learning situations are as joyful since both play and learning are seen as an activity that is transgression. Play and learning are interrelated; the two words touched on each other in an early childhood setting and further serves as an important process for promoting children's learning and development (Kieff & Casbergue, 2000). Play provides children the opportunity to discover the world and find new answers through voluntary learning. Also, children`s play promotes and enhances socio-emotional development, cognitive and physical skills that cannot be taught through formal classroom instruction (Ministry of Education Science and Sports, 2007).

Fromberg (1992) is also of the view that play enhances language development, social competence, creativity, imagination, and thinking skills. He talked about how play can support a child's learning such as concepts and ideas, interactions, emotional well-being and physical development. Play provides children with the opportunity to discover the world and find new answers through voluntary learning. Children are likely to be engaged in play activities that are relevant to them and can play and have an active participation. Additionally, play is pleasurable and can be defined as an activity requiring no end or goal only participation and fun (Nowak, et al., 2009).

One important aspect of children`s play to be considered is the use of play in early years setting. Combining play in the teaching process in the early years setting, there is the need for greater confidence among practitioners in approaching problems without fear and taking risks needed in the search for new ideas to help the development of children. Play is often being regarded as cognitively challenging process, which requires the child to make use ability, memory, signs and symbols, cultural tools which includes development of language, social skills such as negotiations, communication, planning and sharing and prediction (Fleer, 2010). Many skills that are needed for later life are developed through play and also are very important in a pre-school setting. Children

will continue to make use of different learning situations, experiences and in remembrance for further learning. In general, play is considered as an important learning activity and developmentally appropriate which is considered valuable for all children (Bodrova & Leong, 2003; 2003b). In contrast, however, play can also be seen as an unimportant or even harmful practice or activity both in the home and the school environment (Johnson, Christie & Wardle, 2005; Scarlett, Naudeau, Salonius-Pasternak & Ponte, 2005; Sutton-Smith, 2001). Although play is very important for children and its usage in the school`s context or early year settings, (Hyvonen, 2011) expresses similar sentiment that it should be restricted by hindrances. The discourse of play both in theory and practice in early childhood education is very vital as stages of human evolution.

2.3 Types of Play

Given the general difficulty with defining play, and the recognition of its complexity, it is not surprising that there have been numerous attempts to categories different types of play. As Moyles (1989) has demonstrated, for every aspect of children's development, there is a form of play. However, in the contemporary psychological literature the various kinds of play are generally divided into five broad types based upon the developmental purposes which each serve, partly arising from the evolutionary analyses and how each relates to and supports children's learning. These types are commonly referred to as physical play, play with objects, symbolic play, pretence/ socio-dramatic play and games with rules (Power, 2000). Although each type of play has a main developmental function or focus arguably all of them support aspects of physical, intellectual and social-emotional and creative growth. From all the available evidence, a balance of experience of each of these types of play is likely to be beneficial to children's development.

Physical Play

Physical play was the earliest to evolve and can be observed in some reptiles and amphibians and most, if not all, mammals (Power, 2000). In human children it includes active exercise play (e.g.: jumping, climbing, dancing, skipping, bike riding and ball play), rough-and-tumble (with friends, siblings or parents/ guardians) and fine-motor practice (e.g.: sewing, colouring, cutting, junk modelling and manipulating action and construction toys). Physical play comprises of exercise play and fine motor play.

Exercise play begins to emerge during the second year of life and typically occupies around 20% of children's behaviour by the age of four to five years. The evidence suggests that this type of play is related to children's developing whole body and hand-eye co-ordination, and is important in building strength and endurance (Pellegrini & Smith, 2003).

The most extensively researched aspect of physical play, however, is 'rough-and-tumble' play. It includes chasing, grappling, kicking, wrestling and rolling on the ground and appears to have evolved as a mechanism through which children learn to control aggression. It emerges slightly later than exercise play and is typical amongst early childhood learners. However, like most types of play, it continues to be enjoyed, usually between family members and close friends, right into adulthood. It is easily distinguishable from actual aggression by the evident enjoyment of the participants, and appears to be wholly beneficial. Jarvis (2000) research evidence suggests that it is clearly associated with the development of emotional and social skills and understandings. In human children, it is associated with the development of strong emotional bonds, or attachments, between children and their parents, and with school-aged children's abilities to understand emotional expressions (Jarvis, 200). A study by Mellen (2002) for example, looked at father-son rough and tumble behaviours that

involved direct body contact in 157 suburban families in the United States and found that it related very strongly with three-year-old sons' social competence, as demonstrated in early childhood learners.

There is a concern that children, largely as a consequence of the pressures of urban living discussed above, with the loss of natural environments and concerns about safety, are over-supervised and do not have the opportunities for 'risky' outdoor physical play that supports their developing independence, resourcefulness and self-regulation. A general recognition of this concern is at the basis of pressures to provide outdoor play spaces for children living in urban environments. Amongst early years practitioners these concerns have led to a recent resurgence in the provision of outdoor play, and an increasing interest in Forest schools and the outdoor schools in some areas of Scandinavia **(**Tovey, 2007; Frost, 2010).

Fine-motor play refers to a wide range of activities which support young children's development of their fine-motor hand and finger co-ordination skills. These activities are often solitary, can be beneficially supported by an adult (e.g.: sewing, construction) and, due to their absorbing nature, help children develop their concentration and perseverance skills.

Children's development through explorations, as young scientists, of the physical world and the objects they find within it is of great value to the wholistic development of the child (Power, 2000). Play with objects begins as soon as infants can grasp and hold on to them. Early investigative behaviours include mouthing/biting, rotating while looking, rubbing/stroking, hitting and dropping. This might be described as 'sensori-motor' play when the child is exploring how objects and materials feel and behave (Power, 2000). From around eighteen to twenty-four months toddlers begin to arrange objects, which gradually develops into sorting and classifying activities. By the age of

four years, building, making and constructing behaviours emerge (Power, 2000).

As with all other types of play, play with objects often also incorporates other types of play, as it clearly has physical and manipulative aspects and often, in children, is carried out within a pretence or socio-dramatic context. When young children are making or building, they are also often developing a story or narrative (Power, 2000). It is a relatively well-researched type of play, as it is distinctively related to the development of thinking, reasoning and problem- solving skills. When playing with objects, children set themselves goals and challenges, monitor their progress towards them, and develop an increasing repertoire of cognitive and physical skills and strategies (Power, 2000). A study by Pellegrini and Gustafson (2005), for example, in which three to five-year olds were systematically observed over an entire school year, demonstrated that the amount of playful exploration, construction and tool use in which children engaged predicted their subsequent performance on physical problem-solving tasks. Play with objects is also particularly associated with the production of 'private speech', with children commonly commentating on their activity. This appears to have the function of helping the child to maintain their attention, keep their goals for the activity in mind, monitor their progress, make strategic choices regarding ways to proceed, and generally regulate themselves through the task. As a consequence, construction and problem-solving play is also associated with the development of perseverance and a positive attitude towards challenge (Sylva, Bruner & Genova, 1976).

Arising from these findings, a number of studies have investigated the use of constructional play as a kind of therapy with children in clinical groups characterised by problems with aspects of self-regulation, such as autism and (Attention-Deficit/Hyperactivity Disorder) ADHD. Owens, Wood, and Bennett (2009), for example, carried out an eighteen-week LEGO Therapy program with six- to eleven-

year-olds with high functioning autism and Asperger Syndrome. Maladaptive behaviours decreased significantly more in the LEGO group than in a matched no intervention control group.

2.4 Benefits Learners Derive from the Use of Traditional Games when teaching them

Some studies provide indications about the significance of traditional games/games in learning school numeracy. Chikodzi and Nyota (2010) claim that indigenous games stimulate children's mathematical imagination and logical thinking. Nabie (2015); Owusu-Mensah and Baffour (2015); and Mccoy, Buckner and Munley (2007**)** agree that the use of cultural contexts in teaching makes numeracy relevant, accessible, pleasurable, memorable and meaningful for all students. In their view, the use of indigenous cultural games in mathematics classroom provides an opportunity for pupils to relate their experiences outside the classroom to mathematical processes in the classroom. This tends to create awareness between numeracy and the real life and lessens the phobia towards the learning of numeracy. Evans, (2002

The use of traditional games/games in the classroom builds a relationship between culturally specific activities and classroom activities (Ministry of Education, Science, and Sports, 2007). Other studies (Adebar & Swift, 2014) explore how ethno-mathematics may be implemented in the mathematics classroom and ways of dealing with pedagogical challenges. According to Nkopodi and Mosimege (2009) for example, ethno-mathematics has contributed to deeper understanding of how various cultures can be interpreted in the mathematics classroom. Nabie and Akayuure (2014) argue that the social context within which games are played facilitates meaningful learning. The interactions in games encourage students to argue, listen, and make sense of viewpoints

of others and in the process develop understanding of concepts better than their original ideas. (King, 1993).

Furthermore, (Mudaly, 2018) has been conducted on the use of indigenous knowledge and indigenous games in mathematics classrooms. Based on the findings of these studies, learners were more enthusiastic and motivated when drawing on indigenous knowledge to learn complex mathematical concepts. (Onwu, & Mufundirwa, 2020; Seehawer, & Breidlid, 2021). has exhibited that learners are exposed to educational contexts that are relevant by integrating indigenous knowledge within the school curriculum to their lives, thereby enriching teaching and learning.

Traditional games/games also provide a natural environment which helps children to overcome ontogenetic, didactical, and epistemological obstacles in learning numeracy (Akayuure, et al., (2016). Aside traditional games/games being used as recreational or pastime activities, they perform didactic role in numeracy classroom. When learners engage in game play, a variety of mathematical activities is generated within which mathematical concepts, skills and vocabulary assimilated. For instance, traditional games/games like *Tomat in Ghana*, *pada* and *nhodo* in Zimbabwe, *cowry* in Cote d'Ivore and *mu torero* in New Zealand, can be used to help learners form new numeracy concepts or practise and consolidate mathematical skills (Dewah &Van Wyk, 2015).

Moreover, traditional games/games can be used to as tools to: 1) learn the vocabulary of mathematics; 2) develop mental mathematics and mathematical skills; 3) generate mathematical activity at different levels; 4) stimulate investigations and problem solving; and 5) patterns discovery, logics, etc. (Nabie & Akayuure, 2014; Rosa & Orey, 2013; Sparrow & Hurst, 2012).

Indeed, several studies (Nabie, 2012) gave evidence of the significance of cultural play/games in learning. These studies consistently present cultural games as activities that stimulate children's mathematical imagination and thinking, and are therefore important cultural instruments for engaging children in their intellectual pursuit.

According to Mosimege and Onwu Mosimege, M. (2012). Methodological challenges in doing ethnomathematical research. *International Journal of African Renaissance Studies-Multi-, Inter-and Transdisciplinarity*, *7*(2), 59-78. (2004), indigenous knowledge among which is traditional game is an all-inclusive knowledge that covers technologies and practices that have been and are still used by indigenous and local people for existence, survival, and adaptation in a variety of environments. Such knowledge is not static but evolves and changes as it develops, influences and is influenced by both internal and external circumstances and interaction with other knowledge systems. Children involved in traditional play/games are usually quiet as they concentrate to master the moves of the game and in turn improve on their executive functioning (Mosimege &Onwu, 2004).

According to Daru et al. (2019), traditional games/games provide the children with opportunity to continue practicing a skill until they are proficient at it. This enables them to gain self-confidence and self-esteem. Berger highlights that the children's games are more than just games when she observes the misconception that most researchers have about these activities. She says, "Most researchers of young children believe that play is the work of childhood". Essentially, traditional games/game teaches youngsters to have an understanding of some aspects of their biophysical environment (Daru et al., 2019)

The *oware* and *dame* games offer an opportunity for teachers to highlight some mathematical concepts such as counting, shapes, and logical reasoning to learners. These games also encourage communication among learners. During the game, learners will make some "moves" of which they should be able to explain the reason why they do that. The explanation of the "move" gives learners the confidence to express themselves in the classroom. These games are usually played in groups with two (or more participants). The games can be played within a class or as inter class competition. The games therefore encourage group work and cooperation (Owusu-Mensah & Baffour, 2015).

When learners have developed the attitude of playing these games together, it is expected that they will be able to work or study together in a group. It therefore makes it easier for the teacher when organising group work in the classroom. These games have the value of instilling co-operation and tolerance in learners. In the situation where the views of others are respected and tolerated, learners will be encouraged to contribute to class discussion without being intimidated. The *oware* and *dame* games have sets of rules which must be known and followed by all players. The adherence to the rules of these games could be transferred to the study of mathematics. Thus, learners should be familiar with some of the rules governing the study of arithmetic and follow them at all times (Owusu-Mensah & Baffour, 2015).

Achor, Imoko, and Uloko, (2009). conducted research in Nigeria to determine the effectiveness of ethno-mathematics approaches on learners' retention and achievement on the concept of locus in geometry. Findings revealed that learners who were taught using ethno-mathematics approaches had higher retention as well as higher mean achievement scores than those who were taught using the conventional approach. Findings further revealed that ethno-mathematics approach proved to be a viable

approach in promoting meaningful learning in locus. The researchers claimed that the major reason for such findings could be that learners taught with ethno-mathematics approaches were able to connect the cultural practices in their societies with the learning of locus. This implies that ethno-mathematics approaches might help in reducing the abstract nature of the teaching and learning of geometry

Akayuure and Ali, (2016) also did research in Ghana to analyse and show how the indigenous *bukre* game could be incorporated into the teaching and learning of probability concepts in junior high school mathematics. Forty-five pupils from Vea Junior High School and a 79-year-old knowledgeable man were purposively engaged in *bukre* game and data were gathered by participant observations and interviews. A comparative analysis uncovers that, similar to the classical experiment of tossing a coin, a variety of probability concepts surrounds bukre game. It is also observed that the game can promote pupils' native conception of probability, intrinsic motivation, friendly classroom dialog, and interactions.

Abisha and Matemera (2016) studies concluded that traditional play/games like *nhodo, tsoro, pada*, and *madhadha ari pamutsetse* are some of the most effective and interesting games in the teaching and learning of mathematics in the primary schools. Regarding the use of traditional games in the teaching and learning process as primitive approach, has contributed to several mathematical myths. The results of Golafshani (2022) suggested that, utilizing Indigenous storytelling for teaching mathematical curricular expectations could benefit both Indigenous and non-Indigenous students.

The study on the use of indigenous game, *morabaraba*, in mathematics by Nkopodi and Mosimege (2009), found that the use of indigenous games promotes spontaneous interaction among learners as they communicate their activities to fellow participants.

The study also found that the enjoyment of the game was not restricted to a specific cultural group. This suggests that most indigenous games can be used in a multicultural setting. Thus, the current study determined the benefit learners derived from teachers' use of traditional games/game in teaching numeracy in the kindergarten classroom within Banda District.

2.5 How Teachers Use Traditional games to Teach Numeracy

Literature supports integrating culturally based activities and indigenous knowledge within school curricula Naidoo, (2021). These studies have exhibited the positive effects of teaching and learning using culturally embedded activities. For example, Mathematical games embedded in local knowledge enhanced the teaching and learning of mathematics. Mavuru, and Ramnarain, (2020) postulated that, the power of using local expertise in promoting positive learning outcomes was revealed. As is evident, by considering the implications of blending culturally based activities and indigenous knowledge in education, teachers may create a platform for learners to construct knowledge that is meaningful and relevant to their lives.

Dewah and Van-Wyk, (2014) discovered that, ideas of counting, inverse variation, geometrical constructions, projectiles, statistics, permutations, combinations and angles of elevation and depression are embedded in the game of *pada.* Also, through traditional games/games such as *oware* and *dame* basic mathematical concepts such as counting, addition, subtraction, division and multiplication could be learnt to make mathematics learning meaningful and culturally relevant (Owusu-Mensah & Baffour, 2015). Tachie & Galawe (2021) indicates that the use of traditional games/games such as morabaraba, effectively helped in the teaching of number sentences and geometric patterns to Grade 4. Similarly, Moloi (2015) used morabaraba, a board game, to teach mathematics for better understanding.

The following mathematical concepts: area, ratio, proportions, geometric figures, numerical patterns, and similarity are addressed in the playing of this game. Mathematical skills targeted include logic, reasoning, and construction, accuracy on calculations, interpretation, and identifications (Tachie, & Galawe, 2021). Many indigenous games can be used in the numeracy classroom. For example, a play/game called *arauru* or *pada*, where a child balances on one foot and uses it to push a stone from one drawn rectangular box to the other, can be used in the teaching of the concepts of balancing and counting. When playing the game, the player scores more by balancing on one foot without resorting to using the other foot and pushing the stone across squares drawn on the ground.

In order to balance on one foot, one has to strategically position oneself on that foot. Learners also learn to count in the process because one has to remember whether she/he will start from which box. A see-saw using a plank can also be used to teach balance, mass, and weight (Tachie & Galawe, 2021). the use of isiXhosa dance can be used to explain geometry concepts such as right angles.

Traditional play/games such as *engklek* (hopscotch), *dam-daman* (checker), *gobak Sodor*, and *bandaran* could be used to teach two dimensional figures.

When teachers observe children's engagement in playful activities which have explicit numeracy learning objectives, the nature and quality of the children's engagement reveals important information about their thinking and reasoning. High quality early childhood pedagogy is associated with gains in child learning outcomes (Niklas &Tayler 2018). Teachers' numeracy content knowledge predicts their ability to identify and assess children's demonstrations of mathematical thinking. This is important as embedding numeracy teaching and learning in integrated, informal, play-based curricula leads to children's mathematical thinking emerging in diverse ways that may

be verbal, or nonverbal such as drawing and dance (Pollitt, Cohrssen, & Seah, 2020; Deans & Cohrssen, 2015). It follows, therefore, that supporting teachers' ability to integrate such teaching into a play-based curriculum is likely to influence child learning outcomes as far as numeracy is concerned.

The home learning environment is the context of first learning and thus from the start of the learning trajectory, children experience differing levels of support for early mathematical thinking (Lehrl, Kluczniok, & Rossbach 2016). Similarly, children experience variable levels of support for mathematical thinking in early childhood education and care (ECEC) settings (Cohrssen, Tayler, & Cloney 2014). Not only does this impact on transitions into school, but it raises equity concerns (Cohrssen & Page 2016) and points to the importance of supporting preschool teachers' enactment of high-quality numeracy teaching by highlighting the big ideas children need to acquire, and developmentally appropriate play-based pedagogies as the vehicle for teaching and learning (Pyle, DeLuca, Danniels, & Wickstrom, 2020).

Research has demonstrated the efficacy of a play-based approach to mathematics learning as children are intrinsically motivated to play and attitudes to mathematics learning have a significant effect on achievement (Colliver, 2018). For instance, playing number board games is positively correlated with sustained gains in young children's number knowledge, specifically comparison of magnitude, numeral identification, magnitude estimation and counting. Similarly, symbolic play prompted by a visit to a bakery has been found to lead to five- and six-year-old children incorporating increasingly complex mathematical thinking in their play, supported by social interactions (Chessar, 2012) Children think mathematically long before they start school and mathematical thinking is a strong predictor for later academic success in school, indeed, it is a better predictor than early reading and early attention skills.

Whilst children are born with innate abilities, what children learn is subject to environmental influences (Butterworth, 2005).

Children acquire both mathematical language and conceptual understanding when they are provided with multiple opportunities to participate in language-rich interactions and to rehearse mathematical thinking playfully, supported by well-paced, contingent interactions that facilitate the acquisition of both concepts and associated language (Cohrssen, & Niklas, 2019). The roots of Early Childhood Education can be traced to indigenous practices when young children were taught basic life skills, cultural norms, and customs within the confines of the family and the community. Storytelling, indigenous games, and songs were seen as universal means of education as well as essential tools for cultural transmission of knowledge.

However, the advent of formal Westernstyle education during the colonial era saw the emergence of a more structured approach. In keeping with the demands of the curriculum, the pedagogical discourse in early childhood education has recently been dominated by the concept of play-based learning. In practice, play based learning approach requires a teacher to be innovative by employing a variety of strategies including providing adequate classroom space for children to engage in various play activities such as dramatic play, block building, and sensory play (Matafwali, & Mofu, 2023; Lungu & Matafwali, 2020). Play is a vital aspect of child development that transcends cultural barriers, fostering cognitive, emotional, and social development. Evidence confirming the importance of play in child development is well documented. Friedrich Froebel emphasised play as the foundation of learning, where children naturally explore and experiment to make sense of the world around them.

According to Vygotsky (1978), play is an essential developmental activity that has a significant impact on a child's cognitive and social development during the early years. Research has repeatedly demonstrated that academic competency, such as language, cognitive, social-emotional, and psychomotor, is readily acquired through play. Children acquire high-level cognitive skills through play, including abstract thinking, exploratory skills, imagination, creativity, self-regulatory executive functions, memory, and problem-solving skills (Johnstone, Martin, Cordovil, I., Iivonen, Jidovtseff, & McCrorie, 2022) Play also enhances the development of social-emotional abilities, such as the capacity to form friendships, empathy, emotional control, conflict resolution, and attachment (Yogman, Garner, Hutchinson, Hirsh-Pasek, Golinkoff, Baum, & Committee on Psychosocial Aspects of Child and Family Health).

For the majority of children especially in rural communities, play experiences involve outdoor activities that allow them to create their own play spaces, choose games play materials that interest them, and engage in vigorous physical activities such as climbing, jumping and running. Matafwali, and Mofu, (2023) notes that outdoor play enables children to explore their community and engage in sensory-rich experiences like playing with sand, clay and water, searching, and fleeing. Children can experience all their senses while playing outdoor games through observations, physical activity, social interaction, math, science, art exercises, and dramatic play. The right to play also aligns with the African Charter on the Rights and Welfare of the Child and the United Nations Convention on the Rights of the Child, which emphasises the importance of providing children with appropriate play opportunities and safe spaces for recreation.

Even though play-based learning is widely acknowledged, early childhood education teachers frequently concentrate on structured indoor play activities that skew toward modern games, without maximizing on positive effects of unstructured outdoor

indigenous games on child development (Matafwali, et al., (2023). Marginalisation of indigenous outdoor games in the ECE setting may be attributed to several factors. Matafwali, et al., (2023). Usman and Yusuf (2021) contend that in today's technologically driven society, many educators may be less knowledgeable about outdoor indigenous games and their value in promoting early childhood development. A qualitative study found that although teachers were aware of the value of outdoor play for children's development, they lacked the necessary knowledge and motivation to promote it as a pedagogical strategy. (Kemple, oh, Kenney, & Smith-Bonahue, 2016) observe that, children no longer spend as much time engaging in unstructured, child-directed outdoor play.

The availability of television programmes, the popularity of computer games and other technology products, the lack of adequate physical space for outdoor play, and parental concerns about their children's safety in the physical environment have all been identified as factors reducing children's participation in outdoor traditional games activities. Other scholars have observed that the current educational system in many African countries is primarily based on the Western paradigm, and as a result, pedagogical strategies are reminiscent of Western societies' traditions relegating indigenous education practices to a subordinate position. Indigenous games have long been an essential aspect of human culture, providing entertainment, education, and fostering a sense of belongingness. For centuries, indigenous games have been treated as an institution for organised socialisation and leisure time. These games have been transmitted from generation to generation, cherished, used, and perfected (Petrovska, Sivevska, & Cackov, 2013).

Additionally, indigenous games preserve the folk tradition central to national heritage. Through engaging in indigenous games, children learn about the rules and values of

their culture. These games also have spiritual value as well as social and historical relevance. In the context early grade education, indigenous games hold enormous benefits as they foster holistic development, physical fitness, and cultural awareness (Matafwali, et al., (2023). Indigenous outdoor games enhance gross and fine motor skills, balance, eye-hand coordination, increased spatial awareness and more significant social skills.

Indigenous games help children to think, intellectualise or discuss their ideas and explore the world around them. A review of literature shows that indigenous game genres are diverse and transcend cultures, thus highlighting the universal character of indigenous games across cultures. For instance, pebble games are played in many parts of Africa and other regions of the world. Although the rules of the game may vary across regions, Chiyato game has been reported to promote eye-hand coordination, numeracy skills, emotional regulation, social skills, and problem-solving skills. Another game is a board game that has several variations across cultures (Matafwali, et al., (2023). These games teach young children how to count (Moyo & Hopscotch is another popular children's game where players toss a pebble into patterned squares and hop through the squares to retrieve the pebble.

The game is called by different names across cultures: Espada or Kapendo in Zambia (Mtonga, 2012); Pada in Zimbabwe (Madondo & Tsikira, 2021); Tumatu in Ghana (Adjei-Boadi et al., 2022); and Hinke in Denmark. Some of the benefits of hopscotch include movement of large muscles, flexibility, coordination, balance, and agility. Laely and Yudi (2018) conducted an experimental study which examined the impact of hopscotch on kinesthetic intelligence. Similarly, Kim, Lee, and Lee, 2023; Polevey et al. (2023) found a statistically significant improvement in rhythm movements among

8- to 9-year-olds who played hopscotch compared to children who participated in the standard school physical culture programme.

Findings showed that children's kinesthetic intelligence increased after exposure to hopscotch. Ismaiyah, and Fadhilawati, (2022) further found improved gross motor and social skills. While the efficacy of indigenous games in child development cannot be underscored, research has indicated a decline in these games in children's playgrounds and schools due to the influence of digital technologies and games.

Teachers are expected to be trained with both traditional and non-traditional skills of imparting knowledge before they join the teaching profession. Traditional skills include content and pedagogical knowledge while non-traditional skills include being able to foster socio-emotional skills among children. Promotion of collaboration and social activities among students increase their involvement and participation in team learning. Trajkovik, Malinovski, Vasileva Stojanovska, and Vasileva (2018) suggests that when students share their own ideas and respond to others' reactions their level of thinking and understanding deepens.

Due to a strong connection between culture and learning, educators are expected in the 21st century to use culturally responsive pedagogy to facilitate learning. It also aims at encouraging community and family engagement in educating the child (Ford, Stuart & Vakil, 2014). Educational properties embedded in TEPG when effectively modified and facilitated, can turn the classroom into creative environment for academic interaction hence promoting creativity and life-long learning. By this effort, the classroom becomes an extension of the home; a play-based learning environment. Better collaboration between teacher and learner, home and school would be achieved and learning

outcomes improved. However, play seems to have taken a backseat in early grade classrooms to teacher-directed instruction.

This unproductive practice is based on the belief that play does not effectively prepare children to perform well on standard-based assessments (Yekple, Vinyo, & Kumah, 2021; Kekesi, Donkor, Aburampah & Torkonyo, 2019). Several challenges account for the non or less use of play as teaching approach by teachers. Notable among them is the lack of motivation by teachers to use play to facilitate concepts and themes. Teachers need to demonstrate to children that they care for them by participating in their play activities. By using play, children's learning abilities and emotional well-being will be transformed and promoted. Informed by the gap, the paper intends to answer the following research questions;

Classic play theorist opines that play is a cultural phenomenon that both humans and animals share. Play is more than a mere physiological occurrence or a psychological reflex. In play there is something "at play" which transcends the immediate needs of life and imparts meaning to the action. Play constitutes a training of the young creature (learner) for the serious work that life will demand later on. Play is voluntary and takes place within its own proper boundaries of time and space according to fixed rules and in an orderly manner. Games, simulations and problem-solving activities are identified as examples of classroom practices in this theory. In play children perform actions of imagination in an imaginary situation. They create voluntary intentions.

They form real-life plans and pursue voluntary motives in play. This is what makes play the highest tool of pre-school development strategy. Children do not only practise what they already know but also learn new things. In Accordingly, classrooms are expected to be representatives of real-life situations. The classroom should have the opportunity

to allow and support children to participate in learning activities interchangeably and flexibly in a variety of social settings. Play games is one social interactive activity that encourages learning by doing sometimes using simulation and real situations.

Nonetheless, the sources of play from real-life experiences will depend on cultural characteristics. In order for social learning to take place, social motivation is often needed to acquire intrinsic motivation. Play is an essential component in the socio-cultural theory of Vygotsky (1986) who argued that play is a vital element contributing to language development and conceptual meaning. In play situations, children stretch out to the proximal zone of development through the guidance of peers, or when guided by the educator. What a child is capable of doing with help from the teacher or a more experienced peer, has often been termed scaffolding.

Through experiences in play, the child acquires social and cognitive capabilities important for learning, and will also develop a sense of relatedness. It is assumed that all individuals have a need for feelings of belonging to a group or culture, defined as a sense of relatedness. The authors think this need is well established through children's play, as it also should be in school learning. The point is that a strong sense of relatedness contributes to a strong intrinsic motivation in play and learning. However, in relation to Vygotsky's theory, it is emphasized that the tools, interventions, and language of one culture may be significantly different from another, and so education must situate learning within the appropriate social and cultural contexts.

Emphasizing children's play, as relevant both for its own sake and for its relation to learning, as in a socio-cultural theory, means that the challenges of integrating indigenous and non-indigenous students in a majority education system have to be extensively problematized. In play, children take control and participate deliberately.

In some cultures, observing and listening when participating in activities are part of that culture's tradition (Lillemyr, Søbstad, Marder, & Flowerday, 2011). In this sense, human development can be seen as a cultural process, with consequences for play and learning (Lillemyr, et al., (2011). The recent research literature has argued that children's play can promote learning (Karaoğlu, 2020). These perspectives are of relevance for early childhood education and care institutions when attempting to provide quality learning environments.

The same tendencies attempting to include play to ensure children's engagement can be seen in countries such as Great Britain, Australia, and Sweden (Samuelsson & Carlsson, 2008). Based on research, it seems reasonable to assume that there would be a close relationship between children's interests in play and their interests in learning, and that these are closely related to self-concept and motivation (Lillemyr 2001). Each day in class, children work to maintain and establish interpersonal relationships, they strive to develop social identities and a sense of belongingness, they observe and model social skills and standards of performance displayed by others, and they are rewarded for behaving in ways that are valued by teachers and peers. The socio-cultural perspective of play and learning is important in all cultures, as children in all cultures seem to play.

There is a system of mediating knowledge and skills from one generation to the next, although cultural differences can be found.

Prior to implementing the games, each teacher attended a professional learning workshop during which the mathematical concepts underpinning each game were discussed, drop-back and extension ideas suggested to support differentiated teaching

and learning, and opportunities provided for discussion and reflection (Cohrssen, & Niklas, 2019).

2.6 Factors that influence teachers use of traditional games in teaching and learning numeracy

The availability of indigenous teaching and learning materials plays a crucial role in influencing teachers' utilization of traditional games in numeracy activities within kindergarten classrooms. These materials not only serve as resources for educators but also serve as a bridge for connecting indigenous knowledge and cultural practices with academic content.

Indigenous teaching and learning materials provide kindergarten teachers with tangible resources that reflect the cultural backgrounds and experiences of their students. According to a study by Hollie (2017), the use of culturally relevant teaching materials can enhance students' engagement and academic achievement by validating their cultural identities and providing meaningful connections to their learning. For instance, if a kindergarten teacher has access to numeracy activities that incorporate indigenous symbols, traditional counting methods, or culturally significant stories, they are more likely to integrate these materials into their lessons, fostering a deeper understanding and appreciation of numeracy concepts among indigenous students.

Moreover, the availability of indigenous teaching materials empowers teachers to create inclusive learning environments that honor and celebrate diversity. A study by Ladson-Billings (1995) emphasizes the importance of culturally responsive pedagogy, which involves recognizing and valuing students' cultural backgrounds while integrating diverse perspectives into instruction. Indigenous teaching materials serve as tools for implementing such pedagogy, allowing teachers to incorporate traditional games in

numeracy activities that reflect the lived experiences and knowledge systems of indigenous communities. For example, teachers can use culturally relevant manipulatives, such as traditional counting stones or Indigenous-themed number cards, to engage students in hands-on numeracy experiences rooted in their cultural heritage.

Furthermore, the availability of indigenous teaching materials facilitates collaboration and partnership with indigenous communities and stakeholders. By working closely with elders, cultural experts, and community members, teachers can gain insights into culturally appropriate teaching practices and access authentic resources that align with indigenous worldviews and values. This collaborative approach not only enriches the learning experiences of students but also fosters reciprocal relationships between schools and indigenous communities, as highlighted in research by Craven et al., (2016). For instance, teachers may co-create numeracy activities with community members that incorporate traditional games, songs, or storytelling techniques, thereby embedding traditional games into the curriculum in a meaningful and respectful manner.

Parental involvement plays a crucial role in influencing teachers' choices of incorporating traditional games in teaching numeracy. When parents actively engage with their children's education, they become stakeholders in the learning process and influence educational decisions made by teachers. Research by Ho and others (2017) highlights how parental involvement positively impacts students' academic achievement and attitudes towards learning. In the context of incorporating traditional games in numeracy instruction, parental involvement can provide valuable insights into cultural practices, beliefs, and traditions, which can inform teachers' decision-making processes.

Teachers who value parental input are more likely to recognize the importance of integrating traditional games into their teaching strategies. By collaborating with parents, teachers gain a deeper understanding of the cultural context in which their students learn and develop numeracy skills. This understanding allows teachers to select culturally relevant and meaningful activities that resonate with indigenous students, making numeracy instruction more engaging and effective.

Furthermore, parental involvement fosters a sense of community and partnership between home and school, creating a supportive environment for students to thrive academically. As stated by Jeynes (2007), when parents are actively involved in their children's education, students are more motivated, and disciplined, and perform better academically. Therefore, teachers who prioritize parental involvement are more likely to embrace traditional games as a pedagogical approach to teaching numeracy, recognizing its potential to bridge cultural gaps and enhance learning outcomes for all students.

Easy understanding is a pivotal factor influencing teachers' utilization of traditional games in teaching numeracy. When educational materials and methods are comprehensible and accessible to students, learning becomes more effective and engaging. This principle holds particularly true for indigenous students, whose cultural backgrounds and experiences may differ from those of their non-indigenous peers. According to Splitter (2009), education should be grounded in the lived experiences of learners, ensuring that concepts are meaningful and relevant to their everyday lives. Incorporating traditional games in numeracy instruction facilitates this process by connecting mathematical concepts with familiar cultural practices, symbols, and contexts.

2.7 Barriers that Teachers face when using Traditional games to Teach Numeracy

Some of the barriers in the integration of indigenous knowledge in formal education arise from teachers' lack of faith that such a curriculum can contribute significantly in addressing the socio-economic needs of the country (Owuor, 2007). Teachers' inability to integrate indigenous knowledge in their practice may also be resulting from limited knowledge on what aspects to integrate. He noted that although teachers are entrusted with the responsibility of fostering indigenous knowledge in the learning institutions of Kenya, "there is no guidance on what aspects of culture are to be integrated into the curricula. The syllabus only tells teachers what they must do and should do, but not explain how to do it", indicating the limitations that Kenyan teachers are bound to phase when implementing such a curriculum.

Another barrier is to ensure through play/game design, the learning is tightly connected to the mechanics of the play/game in such way that students engage with the underlying mathematical concepts during game playing. Designing an effective educational game for a rich learning experience requires that the student and the content be integrated in the context of the game as a part of a system where each component motivates and is motivated by the other component (Filsecker, & Kerres, 2014 At the same time, there is evidence that a meaningful integration of the content to be learned into the game structure is not always achieved in the game design. Students are able to play the game successfully through the knowledge of the rules of the game and do not have to engage in the underlying mathematical idea that is addressed in the game or in other words 'game the system' (Baker, 2005).

Nabie (2015) investigated Ghanaian primary school teachers' values and challenges of integrating cultural games in teaching mathematics. Using an In-depth conversational interview, ten (10) certificated teachers' voices on the values and challenges of

integrating games were examined. Thematic data analysis was applied to the qualitative data from the interviews. Results indicated that although cultural games count as instructional tools in four knowledge domains, actualizing their value in the classroom appears problematic for lack of game-based pedagogical know-how.

The study recommended looking into the classroom for a complete understanding of the values and challenges of integrating games in teaching and learning mathematics. Moreover, Abdulai (2016) discovered that most of traditional gamess are not used for instruction at the early childhood level because the plays are not catered for in the Ghanaian early childhood educational curriculum.

Furthermore, Sunzuma and Maharaji (2019) investigated teacher related challenges to the integration of ethno-mathematics approaches into the teaching of geometry. Findings are based on feedback received from questionnaires and focus-group discussions in which 40 in-service mathematics teachers expressed their views on the challenges that affect the integration of ethno-mathematics approaches into the teaching of geometry. Major challenges included lack of knowledge on ethno-mathematics approaches; how to integrate these approaches into the teaching of geometry; teachers' lack of geometry content knowledge, teachers' competence in teaching geometry, teaching and professional experience, as well as resistance to change by teachers.

Despite the important role cultural games play in the pedagogical arena, teachers do not seem to have made a connection between the value of indigenous mathematics and the use of games (Nabie, 2011). Specifically, very few teachers translate their experience with games into practice due to a lack of rigorous knowledge of the mathematical content and grammar of cultural games (Nabie, 2011). Limited knowledge of the value of games can influence decisions on their use in classroom practice. The inclusion of

play/games in the curriculum is to promote indigenous mathematics through cultural play/games. The mathematics curriculum values cultural tools as learning devices, therefore an understanding of how teachers, value cultural games to inform their practice is warranted (Nabie, 2015).

The adoption of play-based pedagogy in kindergarten classrooms has garnered attention for its potential to enhance children's holistic development. However, despite its recognized benefits, the effective implementation of play-based approaches faces numerous challenges. Among these challenges, teachers' traditional beliefs about education emerge as a significant factor influencing their pedagogical practices.

Many teachers hold deep-rooted beliefs shaped by their own educational experiences and societal norms, emphasizing structured instruction and academic rigor over play-based learning (Quackenbush, 2023). According to Piaget (1962), traditional educational paradigms prioritize the transmission of knowledge through formal instruction, neglecting the importance of hands-on exploration and experiential learning inherent in play. Consequently, teachers may perceive play-based pedagogy as incompatible with their role as educators, leading to skepticism and resistance (Romain-Tappin, 2022).

Research suggests that time constraints within educational schedules often limit the amount of time allocated for play-based activities (Fleer, 2015). This reduction in play opportunities can hinder children's ability to fully engage in meaningful play experiences. Implementing effective play-based pedagogy requires careful planning and preparation by educators (Siraj-Blatchford, 2009). Time constraints may limit teachers' ability to adequately plan and design play-based learning experiences tailored to children's interests and developmental needs.

Some kindergarten teachers have some traditional beliefs and often view play as mere recreation rather than a meaningful educational tool. As noted by Smith et al (2017), some educators perceive play-based pedagogy as lacking academic rigor, leading them to prioritize structured activities over open-ended play experiences. This perspective hampers the integration of play-based. Teachers adhering to traditional paradigms tend to prioritize direct instruction and teacher-led activities, viewing them as the most effective means of knowledge transmission (Whitebread, 2018). This preference may stem from a desire to maintain control and ensure academic outcomes align with established standards. Consequently, play-based pedagogy, which emphasizes child-initiated exploration and discovery, may be marginalized in such environments.

Deeply ingrained beliefs about the role of the teacher and the nature of learning can breed resistance to pedagogical innovations, including play-based approaches (Kuby et al., 2020). Teachers may be reluctant to deviate from familiar practices, fearing that embracing play-based pedagogy could compromise classroom control or undermine their perceived effectiveness as educators.

According to Bennett (2021) in this modern educational landscape, teachers face mounting pressure to adhere to academic standards and achieve predetermined learning outcomes. Play-based pedagogy, with its emphasis on child-led exploration and open-ended activities, may be perceived as diverging from these standards, exacerbating teachers' anxieties about meeting educational benchmarks (Bubikova-Moan et al, 2019). As a result, teachers may revert to more familiar, traditional instructional methods to ensure alignment with mandated curricula, thereby undermining the integration of play-based approaches.

Furthermore, teachers' reluctance to embrace play-based pedagogy can be attributed to limited exposure and professional development opportunities in this area (Ntshangase, 2022). Pre-service teacher education programs often prioritize conventional teaching strategies, leaving educators ill-prepared to implement innovative approaches such as play-based learning (Pyle et al., 2017). Without adequate training and ongoing support, teachers may default to familiar practices, perpetuating the cycle of traditionalism and impeding the widespread adoption of play-based pedagogy.

As Van and Excell (2018) opined that many educators lack a comprehensive understanding of the theoretical foundations and practical applications of play-based Without proper training, teachers may struggle to design developmentally appropriate play experiences that align with curricular goals and promote targeted learning outcomes.

According to Fesseha and Pyle (2016), the absence of training leaves educators ill-equipped to navigate the complexities of play-based instruction, including facilitating meaningful play experiences, scaffolding learning, and assessing children's progress. As a result, they may resort to more traditional, teacher-directed approaches, thereby underutilizing the potential of play in early childhood classrooms.

In the absence of exposure to innovative instructional strategies, educators may default to familiar teaching methods and routines (Feiman-Nemser, S. 2009; Scheeler et al, 2016). This perpetuates a cycle of pedagogical inertia, wherein play-based approaches are overlooked in favor of conventional practices that offer a sense of security and familiarity.

Rigorous academic standards and prescribed curricula often leave educators with limited time for play-based activities (Nugent, 2017). In an era characterized by

accountability measures and standardized testing, teachers may feel compelled to prioritize content coverage over the facilitation of open-ended play experiences, relegating play to a marginal role in the curriculum.

Practical considerations, such as classroom schedules, transitions, and administrative requirements, further encroach upon the time available for play-based pedagogy (Friedman-Krauss et al., 2014). Teachers must navigate a myriad of competing demands, leaving little room for extended periods of unstructured play within the school day.

The demands of planning, preparation, and assessment impose significant time constraints on educators, limiting their capacity to fully embrace play-based approaches (Barblett et al, 2016). Balancing instructional responsibilities with administrative tasks and professional obligations leaves educators with scant time to cultivate rich, immersive play environments conducive to optimal learning outcomes.

Play-based pedagogy thrives on active engagement and child-directed exploration, requiring educators to strike a delicate balance between facilitating learning and fostering autonomy (Bennett & Smilanich, 2017). However, maintaining students' sustained focus and participation amidst the inherent excitement and spontaneity of play activities poses a formidable challenge, necessitating strategies for scaffolding and redirecting attention as needed.

In heterogeneous classroom environments, educators must navigate diverse learning needs, temperaments, and abilities while fostering an inclusive culture of play (Rudasill et al,2016). Addressing disparities in skill levels, language proficiencies, and social competencies requires intentional efforts to create opportunities for all children to actively participate and contribute to play experiences.

Smooth transitions between play-based activities and structured learning tasks are essential for maintaining classroom cohesion and maximizing instructional time (Bredekamp & Copple, 2009). However, transitions can pose disruptions and challenges, particularly for students who struggle with self-regulation or transitions between play contexts, necessitating clear expectations, routines, and cues to support smooth transitions.

The prevailing focus on academic achievement may prioritize the acquisition of discrete skills and content knowledge over the holistic development nurtured through play (Bayrakm, 2019). Consequently, educators may feel compelled to allocate instructional time towards direct instruction and structured activities, sidelining opportunities for open-ended play experiences.

The proliferation of standardized assessments and accountability measures places schools under heightened scrutiny to demonstrate student proficiency in core subject areas (Bassok, Latham, & Rorem, 2016). In response, educators may adopt didactic teaching methods aimed at "teaching to the test," thereby marginalizing play-based pedagogy in favor of strategies perceived to yield measurable academic gains.

Parents, influenced by societal norms and perceptions of academic rigor, may harbor concerns about the perceived efficacy of play-based approaches in preparing children for future academic success (Coggio, 2023). This pressure can manifest in demands for more structured, teacher-directed instruction, reinforcing educators' apprehensions about deviating from traditional pedagogical models.

Play-based pedagogy has gained recognition for its potential to foster holistic development and enhance learning outcomes in kindergarten settings. However, the

effective implementation of play-based approaches is contingent upon the availability and appropriateness of teaching and learning resources.

Insufficient access to a diverse array of play materials and manipulatives poses a significant obstacle to the implementation of play-based pedagogy (Acevedo, 2022). Kindergarten classrooms characterized by sparse resources may constrain children's opportunities for imaginative exploration and creative expression, hindering the realization of play's full potential as a vehicle for learning. Limited access to diverse play materials constrains educators' ability to create immersive play environments that stimulate children's imagination and creativity (Rose-Turriglio, 2017). Kindergarten classrooms characterized by resource scarcity often lack essential materials such as blocks, art supplies, and manipulatives, depriving children of opportunities for open-ended exploration and collaborative play.

Disparities in resource allocation across schools and districts exacerbate educational inequities, particularly for underserved communities (Venketsamy et al, 2020). Kindergarten classrooms serving low-income students often contend with inadequate funding and resource shortages, impeding educators' ability to create rich, immersive play environments conducive to optimal learning outcomes. Resource disparities perpetuate educational inequities, particularly for marginalized communities and underserved populations (Saleema, 2019). Kindergarten classrooms serving low-income students frequently contend with inadequate funding and limited access to materials, exacerbating disparities in learning opportunities and hindering the realization of play's transformative potential as a vehicle for holistic development

Educators' familiarity with play-based pedagogy and their capacity to effectively integrate resources into instructional practices profoundly influence the quality of children's play experiences (Baker et al., 2021). Teachers lacking training or

professional development in play-based approaches may struggle to select, adapt, and utilize resources in a manner that promotes meaningful play and scaffolds learning effectively. Educators grappling with resource scarcity experience heightened levels of stress and frustration as they navigate the challenges of implementing play-based pedagogy with limited materials (Lyons, 2020). The pressure to provide engaging, enriching experiences for young learners amidst resource constraints can erode teacher morale and contribute to burnout, undermining the quality of instruction and children's learning outcomes.

Play-based pedagogy, widely acknowledged for its effectiveness in fostering holistic development and creativity in children, faces several challenges in its implementation, one of which is parental factors. Parents' beliefs, expectations, and attitudes toward education significantly influence the acceptance and adoption of play-based approaches in early childhood settings.

Parents' beliefs about education are deeply entrenched and can vary widely based on cultural background, socioeconomic status, and personal experiences. Some parents may hold traditional views that prioritize academic achievement and structured learning over play-based approaches (Pirpir et al., 200). They may perceive play as frivolous or inferior to more structured instructional methods, leading to skepticism or resistance towards play-based pedagogy (Coggio, 2023).

CHAPTER THREE

METHODOLOGY

3.0. Overview

This chapter covers the research philosophy research approach, research design, study area, population of the study, sample size and sampling procedure, data collection instruments, validation of data collection instruments (pilot-testing and trustworthiness), data collection procedure, data analysis procedure and ethical consideration.

3.1. Research Philosophy

This study's philosophical perspective or assumption was interpretative paradigm. A research paradigm describes the assumptions and beliefs about how the world is perceived and serves as the philosophical framework that guides the researcher's actions. The interpretive paradigm was chosen for this study because it allowed the researcher to access the experiences and perspectives of the kindergarten teachers in order to understand how they use traditional games to teach numeracy in their classrooms, and interact more with the kindergarten teachers, making the researcher active in the research.

The interpretive paradigm, according to Assifuah-Nunoo, (2023) contends that social reality is created collaboratively through meaningful interaction between the researcher and the researched-on agreement. Interpretivism's ontological position is relativism. The relativist viewpoint holds that reality is subjective and varies from person to person. Our senses mediate our perceptions of reality. Thus, reality is created through the interaction of language and aspects of a self-contained world. Subjectivism's

interpretive epistemology is based on real-world phenomena. The world does not exist apart from our understanding of it. Meaning is created through the interaction of consciousness and the world, not discovered. (Kotchoubey, 2018).

3.2. Research Approach

The study used a qualitative research approach. The primary goal of qualitative research is to discover and interpret how people construct meaning and make sense of their lives and worlds (Merriam & Tisdell, 2015). That is consistent with the study's goal, which is to assess teachers' use of traditional games in teaching numeracy at the early childhood education centres in Banda District. Furthermore, the use of a qualitative research approach in this study allowed the researcher to focus on an interview and observation process that complemented the study's purpose. The qualitative approach was chosen for this study because it provided a platform for kindergarten teachers to tell their stories. (Lynch, 2015).

As a result, the teachers reflect on their practices and recognize their own strengths and weaknesses in the role of using traditional games to teach numeracy in their classrooms. Qualitative researchers, according to Ravitch and Carl, (2019) are interested in how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences.

3.3. Research Design

As a research design, a descriptive case study was used in this study. Research design is a plan or guide for data collection and interpretation that includes a set of rules that allow the researcher to conceptualize and observe the problem under study (Mayer, 2015). The use of a descriptive case study as a research design was deemed appropriate because it allowed the researcher to describe and interpret the participants' thoughts and

feelings, as well as find meaning in their shared stories about using traditional games to teach numeracy in their classrooms. Furthermore, the use of this design allowed the researcher to understand kindergarten teachers' interpretations on the use of traditional games to teach numeracy; how teachers use traditional games to teach numeracy in their classrooms; benefits learners derived from teachers' use of traditional games in teaching numeracy; and barriers teachers face when using traditional games to teach numeracy in their classroom. A descriptive case study, according to Nhlapo, (2020 it is designed to describe natural phenomena that occur within the data in question. It also allow the researcher to observe the problem

3.5. Population of the Study

A population is a group of individuals or people who share similar characteristics and are of interest to the researcher (Fenny, Kusi, Arhinful, & Asante, 2016). The study's target population included all kindergarten teachers in Banda District public basic schools. According to the Banda District Education Directorate, there are approximately 218 early childhood teachers in public basic schools. The study's accessible population consisted of all kindergarten teachers from Banda District public early childhood centres. In the forty-seven (47) public early childhood centres, there are approximately ninety-four (94) kindergarten teachers.

3.6. Sample and Sampling Procedure

This study's sample size was thirteen (13) kindergarten teachers. A sample is defined as a small subset of a larger population whose selection is based on knowledge of population elements and the research purpose (Babbie, 2020). The sample size was chosen based on Tahadoost (2016) explanation that a study aimed at exploring a phenomenon is best accomplished with a sample size of 5-20 participants. Furthermore,

Rallis and Rossman (2014) believe that in qualitative research, a sample as small as 5 and as large as 30 can be used.

According to Rahi (2017), a sampling procedure is a research plan that explains how the study's respondents were chosen from the population. The study employed a purposive sampling technique. Purposive sampling was used to select the (13) kindergarten teachers who have more than ten (10) years of working experience as kindergarten teachers. Purposive sampling, according to Merrian and Tisdell (2015), is the deliberate selection of individuals and sites by researchers to learn or understand phenomena. According to Creswell and Creswell (2018), the primary consideration in purposive sampling is the researcher's judgment as to who can provide the best information to achieve the study's objectives.

Purposive sampling has several advantages, including the targeted selection of participants, which ensures that individuals with relevant knowledge or experience, such as kindergarten teachers with over ten years of teaching experience, are included in the study (Merrian & Tisdell, 2015). It is efficient, as it allows researchers to focus resources on gathering meaningful data and is particularly suited for qualitative research that seeks in-depth insights (Creswell & Creswell, 2018). However, its reliance on the researcher's judgment can introduce bias, potentially limiting the generalizability of findings and excluding diverse perspectives. Additionally, the success of purposive sampling depends on the researcher's expertise in accurately identifying suitable participants (Rahi, 2017). Despite these challenges, purposive sampling remains valuable for exploring specialized topics and achieving the study's objectives.

3.7. Data Collection Instruments

The research instrument that was used to collect data for this study was a semi-structured interview guide. The interview guide was used as a means of talking to the teachers such that the right questions will be asked and the needed follow up questions as well. The observation checklist was only meant to find out whether the materials for teaching the indigenous games are available at the early childhood centres.

3.8. Trustworthiness of the Study

In qualitative studies, the trustworthiness of the study is both paramount and sacred. This thrust is ensured by keeping high levels of integrity, transparency, and objectivity in the collection, transcription, and interpretation of data. In his literature, Shenton (2004) indicated four elements of validity and reliability to include credibility, transferability, dependability, and confirmability. As with credibility, the researcher followed technical and ethical standards in the collection and analysis of data. Processes and tools were checked, reviewed, and verified by the study participants and supervisor to judge the content and cross-check the items for honesty and clarity.

Again, transferability was upheld through clear-cut research objectives, contextualized themes, and well-defined respondents. Moreover, the researcher never allowed her personal biases and prejudices to influence the outcome of this study. Similarly, to ensure dependability, member checking was done on the data before and after analysis and interpretation. Participants were able to validate their narratives as to completeness and accuracy. Further, participants were adequately oriented on the purpose and rigor of the study, especially on data gathering.

Lastly, confirmability was secured in this study using audit trails. This device allows the reader to trace and confirm the information from its raw source. Cohen et al., (2011)

stressed that the findings, interpretations, and conclusions must be supported appropriately. Besides, all materials and instruments used in this study were kept intact for verification and corroboration purposes.

Transferability was upheld through clear-cut research objectives, contextualized themes, and well-defined respondents. Moreover, the researcher never allowed her personal biases and prejudices to influence the outcome of this study. Similarly, to ensure dependability, member checking was done on the data before and after analysis and interpretation. Participants were able to validate their narratives as to completeness and accuracy. Further, participants were adequately oriented on the purpose and rigor of the study, especially on data gathering.

Lastly, confirmability was secured in this study using audit trails. This device allows the reader to trace and confirm the information from its raw source. Cohen et al., (2011) stressed that the findings, interpretations, and conclusions must be supported appropriately.

3.9 Data Collection Procedure

The gathering of information to serve or prove facts is referred to as data collection. It entails gathering opinions on people's attitudes toward the state of affairs of the phenomenon. Data collection is critical in research because it enables the dissemination of accurate information and the development of meaningful programs (Gray, 2021). Before data collection could begin, the researcher obtained an introductory letter from the University of Education's Department of Early Childhood Education, which was used to obtain permission from the appropriate authorities of the selected early childhood centres to conduct the study. After being granted access to the various public

early childhood centres, the researcher met with the kindergarten teachers at the school to explain the purpose of the study.

The interview and observation guides were used to collect all necessary data. The researcher developed a friendly relationship with the school's kindergarten teachers. This enabled the researcher to gain access to all necessary information. The themes of all data collected through interviews and observations were explained to the respondents, and the necessary responses were provided. The data was then played and transcribed in preparation for analysis.

3.10 Data Analysis Procedure

According to Cohen et al., (2011), the analysis of data allows the researcher to manipulate information collected during the study in order to assess and evaluate the findings and arrive at some valid meaningful and relevant conclusions. The instruments used in the data collection produced mainly qualitative data. Data was analysed thematically (Chen, Liu, Yan, Hu, & Shi, 2021). The researchers explain that, thematic analysis involves the search for and identification of common trends that extend throughout an entire process.

The findings of the observation guide and the interview guide were presented and analysed manually. This strategy was chosen because the volume of data collected was manageable, making it less difficult to identify relevant text passages and also the researcher's desires was to interact and have a hands-on feel for the data. The problem associated with analysing data manually is that it is laborious (Creswell & Creswell, 2018). Because both instruments generated primarily qualitative data, the presentation followed the same steps. Following transcription, the data was coded, analysed, interpreted, and verified.

The process of transcribing the instruments enabled the researcher to gain a better understanding of the subject by listening to and reading the transcribed interviews repeatedly. Once all of the data had been transcribed, the coding process began. The codes used are keywords that are used to categorize or organize text and are an important part of qualitative research (Cohen et al., 2011). The data was then analysed, classified, and organized into themes and sub-themes that emerged during the coding process. The themes that emerged were each assigned a unique code. The next step was to interpret the data by identifying any recurring themes and emphasizing any similarities and differences in the data. The final stage involved data verification, which entails checking the validity of understanding by rechecking the transcripts and codes, allowing the researcher to confirm or modify words already determined previously (Cohen et al., 2011). The responses on participants' bio-data, on the other hand, were analysed using percentages and simple counts.

3.11 Ethical Considerations

Ethical issues arise from the kinds of problems that social scientists investigate and the methods used to obtain valid and reliable data. Ethical considerations were pertinent to this study because of the nature of the problem, the methods of data collection, and the kind of persons serving as research participants. While carrying out this study, ethical procedures were followed. The researcher put high regard to the anonymity of the participants and the confidentiality of the data gathered. On this, pseudonyms were assigned to the participants to hide their identity.

The information gathered was never shared with others and used other than the purpose of the study. Consent was also secured to guarantee the voluntary participation of the participants. The researcher respected the right of the participants to withdraw from

participating should they decide to discontinue. Further, this study is entirely credible, devoid of any data manipulation, deceit, and plagiarism.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.0 Overview

This chapter presents the results of the analysis of data based on the purpose of the study. The purpose of the study is to explore how kindergarten teachers use traditional games in teaching and learning numeracy in the Banda District. The analysis and interpretation of data were carried out based on the results of the three (3) research questions. The analysis was done based on the responses from the respondents during the interviews used in this study. The data were analysed using thematic analysis and were analysed from research question 1- 3.

4.1 Data presentation and Analysis

Research Question 1: What types of Traditional games do teachers use in teaching numeracy at early childhood education centres in the Banda District?

This research question seeks to highlight the types of Traditional games that teachers use in their classrooms during numeracy instruction. The following themes were generated from the interview that was conducted on the types of traditional games that are used in numeracy lessons in early childhood classrooms.

Theme 1: Traditional Songs and rhymes

One teacher has this to share;

> *I use games to aid numeracy, like "Bolambo ekor si pon do" for counting, addition, or subtraction. Although I don't use them frequently, I incorporate them when beneficial. For example, the rhyme "Antoakyire" teaches subtraction through backward counting, fostering*

> *natural understanding. These cultural elements not only improve numeracy skills but also help children appreciate their cultural heritage. T7*

The quote suggests that the strategic use of indigenous games and rhymes, such as “Bolambo and "Antoakyire," in numeracy lessons can significantly aid in children's understanding of counting and arithmetic concepts like addition and subtraction. Although these methods are not employed regularly, they are used when deemed beneficial. Integrating these traditional elements not only enhances numeracy skills but also instills cultural pride and identity, highlighting the dual educational and cultural value of these teaching tools.

Theme 2: Cultural Arts and Craft

> *I use cultural arts like traditional bead-making for numeracy, teaching counting, patterns, and sequencing. Creating Adinkra symbols introduces shapes and symmetry, essential in geometry. These engaging activities connect children to their cultural roots while making math concepts clearer. T3*

The quote implies that integrating cultural arts and crafts into numeracy lessons can significantly enhance student engagement and understanding. By creating traditional bead necklaces, children learn sequencing, addition, and subtraction, while crafting Adinkra symbols introduces them to shapes and symmetry, fundamental aspects of geometry. These hands-on activities not only make learning enjoyable but also establish a connection to the children's cultural heritage, fostering a sense of pride and identity. This approach demonstrates the dual benefits of using culturally relevant materials: they enrich the educational experience and promote a deeper, more holistic understanding of mathematical concepts.

Theme 3: Traditional games

> *I use 'Ampe' to teach numeracy by incorporating dice. First, learners identify the numbers on the dice, roll them, and write the outcomes. In a second round, they repeat, mark dots for each number, total them, and clap while counting the sums, reinforcing addition in an interactive way.*

The quote illustrates the practical application of the game "Ludu" in teaching numeracy by using dice to familiarize learners with numbers and counting. Initially, students identify the numbers on the dice and record them. In subsequent rounds, they write and draw dots corresponding to the dice rolls, then sum these dots to understand addition. This hands-on activity, followed by clapping to reinforce the numbers and their sums, not only makes learning interactive and engaging but also reinforces number recognition, counting, and basic arithmetic in a fun, culturally relevant manner.

Theme 4: Storytelling and Oral Tradition

> *T5: Oh yes, "Tomato" (hopscotch) I hope you know that one, it can be used to teach numeracy at the kindergarten, when the learner throws the pebble in the first box, he counts one the second you count to two in that order am I not teaching numeracy? So, where the learner will miss then I tell them to subtract one for all the counts that they have. Also, when they drop the pebbles and are jumping, I tell them to count continuously as they jump to the end and back.*
>
> *T6: I use the "Oware" to teach numeracy. We count all the pebbles that we have to put in the holes then we count the total number of holes as well, since we will put four pebbles in each hole, we put them into groups of four and the total number of groupings is same as the holes. In this case we have learnt counting as well division.*

The quotes imply that incorporating traditional games like "Tomato" (hopscotch) and "Oware" into numeracy lessons offers an engaging and effective way to teach mathematical concepts. These indigenous games help children learn counting, addition, subtraction, and division through practical, hands-on activities. By using familiar cultural games, educators can make numeracy lessons more relatable and enjoyable, enhancing students' understanding and retention of mathematical concepts. Additionally, this approach promotes cultural heritage and identity, demonstrating that traditional play can be a valuable educational tool in early childhood education.

Research Question 2: What factors influence teachers in using Traditional games in teaching and learning numeracy at the early childhood education centres in Banda District?

This research question seeks to explore the factors that influence teachers in the use of Traditional games in teaching numeracy lessons in early childhood centres in the Banda District. Here are some of the excerpts from the interview.

Theme 1: Unavailable teaching and learning resources

> *T1: Oh, the indigenous games when you use it to teach numeracy its good. It makes the learner active I mean they are not bored so they participate. You see that during the lesson everybody want to take part.*

> *T2: because it makes the learners attentive you see they will all pay attention to see what you are doing do that they can also do it when you ask them to do some. Everybody will be seen to be engaged in one thing or the other which is relayed to the lesson.*

The quotes imply that using indigenous games in teaching numeracy has significant positive effects on student engagement and participation. Specifically, these games make learners more active and attentive, reducing boredom and increasing their

willingness to participate in lessons. As a result, students are more likely to pay attention and stay engaged, ensuring that everyone is involved in activities related to the lesson. This approach not only enhances the effectiveness of numeracy instruction but also creates a more dynamic and interactive learning environment.

Theme 2: Cultural Context

> *T3: The children enjoy it so much when I teach with indigenous games. You see they will be thinking that they are playing but, in the end, when you use them in numeracy lessons, questions concerned with the game and they are able to answer they realize they were actually learning.*

The quote implies that teaching numeracy through indigenous games is highly effective because it makes learning enjoyable and disguises educational activities as play. Children are more likely to engage deeply with the material, thinking they are simply playing. This approach enhances their motivation and participation. When they successfully answer questions related to the games, they recognize the educational value of the activities, leading to a realization that learning can be fun and meaningful.

Theme 3: Enhance learners' engagement in learning.

> *T4: for me I use it sometimes and its mostly the outdoor ones because we cannot sit in the classroom all the time. teaching is an art and we have to find out what our learners want and do it for them, that is the only way they will enjoy coming to school every day.*
>
> *T5: because the new curriculum requires that we teach using things are local and around the learners that's why I use indigenous games. It is something they know about because they see at home. Their parents sometimes play and they see it so when they find it in the classroom then they become curious so want to learn more about it.*

The quotes imply that integrating familiar and culturally relevant activities, particularly indigenous games, into teaching strategies can significantly enhance student engagement and enjoyment. By using outdoor games and local activities, educators can create a more dynamic and relatable learning environment that aligns with the curriculum's emphasis on local context. This approach not only makes lessons more appealing and less monotonous but also leverages students' existing knowledge and curiosity, promoting a deeper and more meaningful learning experience.

Theme 4: Prevent monotonous in teaching

> *T6: As a teacher, I know that I have to blend my teaching by making use of a variety of things so the indigenous games are also part of the things I do just to make sure that my learners don't experience monotony with my teaching style.*

The implication of this quote is that incorporating indigenous games into teaching helps maintain student interest and engagement by preventing monotony in the classroom. By using diverse teaching methods, educators can create a more stimulating and enjoyable learning environment. This approach can enhance students' motivation, participation, and overall learning experience, as it caters to different learning styles and keeps the lessons dynamic and interactive.

Research Questions 3: What challenges do teachers face when using traditional games in teaching and learning numeracy at early childhood education centres in Banda District?

Theme 1: Time constraints

> *T1: Well, with the challenges I can say that from where I sit there are two main challenges. The first one has to do with time, you know teaching with the indigenous games requires that we use a lot of time to make sure the things that we are teaching is well understood. But you know we*

> *have been given a table which requires that we teach one thing followed by the order, at least three things in a day so you cannot use the whole day and it affects the teaching. Even organisation of the class for that session alone you can imagine the time it will take.*

The quote implies that integrating indigenous games into teaching, while beneficial, faces significant challenges related to time management and curriculum constraints. Teaching with these methods requires substantial time to ensure thorough understanding, which conflicts with rigid timetables that mandate covering multiple topics daily. Additionally, organizing the class for these activities can be time-consuming. These challenges can hinder the effective use of indigenous games in the classroom, potentially limiting the opportunities to engage students deeply with culturally relevant and interactive learning methods.

Theme 2: Inadequate Teaching and Learning Resources

> *T2: The teaching resources for teaching with indigenous games are not there and if we have the money to buy then we just go and buy. The District Office am sure is also not resourced enough to help us with the materials am sure they will have done that. We all agree that the indigenous games help a lot in enhancing learners understanding.*

This quote is that the effective implementation of teaching with indigenous games is hindered by a lack of financial resources for acquiring necessary teaching materials. Despite acknowledging the benefits of using indigenous games to enhance learning, the scarcity of funds prevents educators from accessing the required resources. This limitation reflects a broader issue of underfunding in education, which impacts the quality and diversity of teaching methods available to educators. Without adequate financial support, educators may struggle to fully leverage the potential benefits of

incorporating indigenous games into their teaching practices, ultimately compromising the educational experience for students.

Theme 3: Challenge with student behaviour engagement

> *T4: Well, for my school the learners are too playful so when I have to teach with the indigenous games the I will not achieve anything. I mean instead the learners taking note of key things that will enable them learn some things about numeracy the y will not. They will play with it and at the end I wouldn't achieve anything. That why me I don't use the indigenous games at all, I will not even try.*

The implication of this quote is that challenges with student behavior and engagement can hinder the effective use of indigenous games in teaching. The educator's decision not to utilize these games suggests a belief that the playful nature of the students would prevent them from focusing on and learning key concepts in numeracy. This highlights the importance of addressing behavioral issues and fostering a conducive learning environment to fully leverage the benefits of incorporating indigenous games into teaching practices

Theme 4: Lack of professional training

> *T5: Mmmmmm, the challenges are that the curriculum should be made in such a way that the indigenous games are included in it. And for this I mean not only numeracy but all subjects that is taught at the kindergarten. In this way we can know exactly when to teach and not that when the teacher feel like there is one indigenous game that ca be used to teach something then the teacher uses it. In this case the district office will also see the need to provide the resources for the indigenous games as they are in the curriculum.*

The implication of this quote is that there is a need for systematic inclusion of indigenous games in the curriculum for all subjects taught at the kindergarten level, not

just numeracy. The educator suggests that by explicitly integrating indigenous games into the curriculum, teachers would have clear guidelines on when and how to incorporate them into lessons.

Observational Analysis

The data on the use of local games in teaching numeracy at early childhood centres in the Banda District provides a rich insight into the integration of cultural practices in early learning environments. The analysis reveals a diverse application of games, emphasizing their potential to make numeracy instruction engaging, interactive, and effective. Below is a detailed exploration of the findings.

From the observational data the use of counting games, such as clapping, chanting, and incorporating local objects, is a foundational approach widely adopted by teachers. These activities offer a multisensory experience that aids in number recognition and counting. By engaging auditory (chants) and visual (objects) stimuli, counting games address different learning styles, making numeracy lessons accessible and enjoyable for young learners. Traditional board games like *Ludu* and *Oware* are used to teach counting, addition, and strategy, blending entertainment with learning. These games serve as a practical tool for developing critical thinking, strategic planning, and mathematical skills. In particular, *Oware* fosters concepts of counting and addition in a culturally relevant and engaging manner, helping children understand numbers in a way that resonates with their local environment.

It was also observed that physical activities, such as skipping, hopping, or jumping, are utilized to teach number sequences, counting, and grouping. These games integrate numeracy with movement, which not only enhances physical development but also strengthens memory retention. The physical aspect of these games aligns with the active nature of young children, who learn best when engaged in dynamic activities. Games

involving local materials, such as stones, counters, seeds, or beads, are widely employed to teach counting, addition, and subtraction. These materials are cost-effective and readily available, making them a sustainable resource for early childhood centres. By manipulating tangible objects, children gain hands-on experience in arithmetic operations, reinforcing abstract concepts through**.** Traditional games like *Ampe, antoakyire* that emphasize taking turns and following rules are effectively used to develop an understanding of order and sequencing. These games teach foundational concepts in mathematics, such as ordinal numbers and structured progression, while also fostering social skills like patience and cooperation. Sorting and grouping games, such as organizing beads into sets of 2, 3, or 4, are commonly used to teach categorization and counting. These activities promote early classification skills and build a foundation for understanding multiplication and division concepts. Sorting games also encourage critical thinking and attention to detail, essential cognitive skills for numeracy.

However, the data highlights a gap in the use of games like *Sankofa*, which involve patterns, sequencing, or following numerical instructions. Despite their potential to teach advanced numeracy concepts such as pattern recognition and logical sequencing, these activities are notably absent in the district's teaching practices. This underutilization suggests an area for development, as introducing such games could broaden the scope of numeracy skills being taught.

While the data demonstrates a strong integration of local games into numeracy instruction, the absence of games like *Sankofa* suggests that some numeracy concepts, such as patterns and sequences, are underemphasized. This gap could be attributed to a lack of awareness among teachers or insufficient training on the diverse applications of local games in numeracy education.

To address these challenges, targeted professional development for teachers is recommended. Training sessions can introduce educators to the full range of traditional games and their potential in numeracy instruction, emphasizing underused activities like pattern-based games. Additionally, creating a resource manual on how to align local games with curriculum objectives would provide educators with practical guidance.

The use of local games in teaching numeracy at early childhood centres in the Banda District showcases a culturally grounded approach to education. While traditional games, physical activities, and local materials are effectively utilized to teach counting, grouping, and basic arithmetic, there is room to expand into underexplored areas like pattern recognition and sequencing. By addressing these gaps and supporting teachers with training and resources, the educational potential of local games can be fully realized, fostering a rich and dynamic learning experience for young learners.

4.2 Discussion of research questions

Research Question 1: what types of traditional games do teachers use teaching numeracy at early childhood education centres in Banda District?

The analysis of research question one indicates that integrating indigenous and traditional games into numeracy education boosts learners' understanding and engagement. Games like "Ampe" and "Ludo" facilitate counting, addition, and subtraction while fostering cultural relevance and diversity. Ford et al. (2014) highlight the importance of culturally responsive pedagogy, emphasizing community and family involvement in education. Furthermore, indigenous games promote holistic development, physical fitness, and cultural awareness, enhancing motor skills, balance, and social interaction (Matafwali et al., 2023). Activities such as creating traditional

patterns or using cultural storytelling embed numerical concepts in meaningful contexts.

Research Question 2: What factors influence teachers in using traditional games in teaching and learning numeracy at the early childhood education centres in Banda District?

The analysis highlights that access to indigenous teaching resources plays a crucial role in kindergarten teachers' ability to integrate traditional games into numeracy education. When available, these materials enrich lessons by deepening students' cultural appreciation and understanding. Hollie (2017) found that culturally relevant teaching boosts student engagement and achievement by affirming their identities and connecting learning to their experiences. Teachers emphasized the importance of respecting cultural backgrounds to create inclusive environments. Incorporating traditional games, stories, and songs acknowledges cultural diversity and enhances learning.

Moreover, professional development is vital for equipping teachers with skills to apply culturally responsive pedagogy confidently. Workshops and seminars provide insights into the cultural value of indigenous practices, making integration into numeracy education more effective. Collaboration with parents also enriches learning, offering teachers authentic materials and helping align activities with students' cultural heritage. Jeynes (2007) demonstrated that active parental involvement improves student motivation and performance. Teachers who partner with families can better utilize traditional games to make math concepts relatable, bridging cultural gaps and fostering meaningful engagement. Overall, traditional games leverage familiarity, making numeracy learning accessible and engaging.

Research Questions 3: What challenges do teachers face when using traditional games in teaching and learning numeracy at early childhood education centres in Banda District?

The analysis indicates that limited resources for traditional games hinder the effective use of play-based pedagogy in numeracy lessons, impacting both learner engagement and teacher facilitation. The lack of diverse play materials exacerbates educational inequities, particularly affecting low-income communities, as insufficient funding restricts the creation of immersive, play-centered learning environments (Acevedo, 2022; Venketsamy et al., 2020). Resource shortages create challenges in offering diverse and culturally relevant activities that enhance numeracy skills.

Additionally, teachers face time constraints and curriculum demands, making it difficult to integrate traditional games effectively. The structured curriculum and administrative requirements often leave limited time for unstructured play-based activities, affecting the balance between play and academic content (Friedman-Krauss et al., 2014). This struggle to allocate sufficient time underscores the need for curriculum adjustments that prioritize holistic, play-based learning.

Furthermore, a lack of relevant professional development leaves many educators uncertain about implementing play-based pedagogy. Specialized knowledge in child development and play-based theories is essential. Without adequate training, teachers may default to traditional methods, missing opportunities to scaffold learning and assess progress effectively (Van & Excell, 2018; Fesseha & Pyle, 2016). Continuous professional development is crucial for fostering best practices in early education.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter discusses the summary of the findings of the study, conclusion drawn for the main findings and the recommendations that the researcher made from the findings of the study. In addition to these very important issues are suggestions for further research since this research work has opened up various avenues for other researchers to venture into.

5.1 Summary

As learners engage in a variety of indigenous games, they use a number of activities in the game. Here is an opportunity that educators can use to correct, introduce and highlight some of the mathematical concepts (such as geometric shapes, ratio and proportion, symmetry, logical reasoning and counting) that are part of the game being used. Learners should be encouraged to use the language of mathematics while playing the game so that the understanding of concepts can be noted. An alternative approach of getting an idea of learners' understanding of concepts would be to video-record the play in action. Moves taken can be discussed and the everyday language used translated into mathematical language. Gifted learners themselves can be asked to identify mathematical concepts in the applied during the game and in the construction of the game board itself.

The teacher's role would be to ask appropriate questions for the level of learners. This clearly shows an important role that educators can play in elevating indigenous games from being an activity for fun to be activities that can be related to a variety of

mathematical concepts. There are many mathematical concepts that may be identified in various indigenous games, such as has been done in games like Oware, Tomato and others. It is the role of kindergarten teacher to continue analysing a variety of games for the mathematical concepts that are embedded in them or mathematical concepts that can be taught through the use of these indigenous games.

The analysis and identification of related mathematical concepts should not be done without the related and important socio-cultural context and implication of the games. Leaving the socio-cultural context out when indigenous games are used deprives the mathematics learners of the rich context that is necessary to fully understand and use such games in mathematics learning. Room should thus be given for bystanders to take sides with either player and encourage them. The teacher's role should also be to enable learners to relate concepts learned to their everyday life. This is in line with constructivism where learners construct new knowledge by linking their new knowledge with their prior knowledge. In the Ghanaian context, like many others, the National Curriculum encourages the incorporation of the indigenous games in the learning of mathematics.

5.2 Major Findings

The findings of the study showed that:

1. The findings from the study revealed the use of traditional songs and rhymes, cultural arts and craft are some of the ways through which traditional games can be used in the teaching and learning of numeracy in kindergarten classrooms. Also, traditional games and activities informs how traditional games can be used in teaching numeracy at the early childhood centres in the Banda District.

2. The findings from the study revealed that factors such as parental inclusion and acceptance, access to indigenous teaching and learning resources as well as cultural awareness of the teachers regarding traditional games influence their use of traditional games in the Banda District. Moreover, early childhood teacher's teacher training regarding the use of traditional games as well as ability of traditional games to facilitate understanding of learners also influence teachers use of traditional games in teaching numeracy.

3. The findings from the study also revealed that lack of resources in traditional games, lack of professional development, as well as poor parental and community involvement affect the use of traditional games in the teaching and learning of numeracy in the Sekyere East Municipality. Also, time constraints when it comes to the use of play-based pedagogy in numeracy lessons as well as classroom management required to control learners in play activities affects its implementation in early childhood classrooms.

5.3 Conclusion

The following conclusions were drawn from the study;

1. The study concludes that the use of traditional songs and rhymes, cultural arts and craft are some of the ways through which traditional games can be used in the teaching and learning of numeracy in kindergarten classrooms. Also, traditional games and activities informs how traditional games can be used in teaching numeracy at the early childhood centres in the Banda District.

2. The study concludes that parental inclusion and acceptance, access to indigenous teaching and learning resources as well as cultural awareness of the teachers regarding traditional games, early childhood teachers' knowledge regarding the use of traditional

games as well as ability of traditional games to facilitate understanding of learners also influence teachers use of traditional games in teaching numeracy in the Banda District.

3. The study further identifies key challenges hindering the implementation of traditional games-based pedagogy in teaching numeracy including time limitations, and a lack of teachers' understanding of play-based approaches, class control and management by teachers, poor parental involvement presents a significant obstacle to the use of traditional games in teaching numeracy.

5.4 Recommendations

Based on the findings of the study, the researcher recommends that:

1. A number of indigenous games that can be used to teach numeracy must be introduced to the kindergarten teachers in the district so that selecting the right ones to enhance understanding will not be difficult to the teachers to facilitate teaching and learning of numeracy in the classrooms.

2. The kindergarten teachers must be encouraged to use the indigenous games most of the time in teaching and not only when the learners are bored because of its importance in the teaching and learning of numeracy.

3. A number of teaching and learning resources most be provided by the stakeholders of the various schools in the district in addition to the few ones they have to enhance teaching and learning with the indigenous games

REFERENCES

Abdulai, J. (2016). Traditional gamess and their instructional relevance in Ghanaian early childhood education: A critical analysis. *Journal of Early Childhood Education Research, 4*(1), 1-10.

Achor, E. E., Imoko, B. I., & Uloko, E. S. (2009). Effectiveness of ethno-mathematics teaching approach on students' achievement and retention in locus. *Educational Research and Reviews, 4*(8), 385-390.

Adebar, P. J., & Swift, K. L. (2014). Ethnomathematics: Exploring mathematical concepts through cultural traditions. *Journal of Mathematics and Culture, 8*(1), 1-22.

Agbenu, J., & Nabare, R. (2014). District development profile: Banda District Assembly. Kumasi: Department of Agriculture.

Aiono, S. (2015). Exploring the pedagogical strategies in early childhood education. *Journal of Early Childhood Education, 10*(2), 145-161.

Aiono, S. (2017). Child-directed learning and exploration in early education. *Journal of Pedagogical Research, 12*(1), 56-72.

Aiono, S., et al. (2023). The power of play in early childhood education. *Journal of Child Development and Pedagogy, 15*(2), 34-50.

Akayuure, P., & Ali, B. (2016). Incorporating indigenous knowledge systems into the formal education system: Ghana's curriculum reforms between 1987 and 2004. *Journal of Curriculum Studies*, 48(5), 687-704.

Akayuure, P., & Ali, M. (2016). Incorporating indigenous bukre game into the teaching and learning of probability concepts in junior high school mathematics in Ghana. *Journal of Ethnomathematics, 10*(2), 117-136.

Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology, 103*(1), 1-18.

Ali, B. (2016). Traditional games activities for numeracy development. *International Journal of Early Childhood Education*, 53(2), 145-160.

Ali, B. (2021). Traditional games activities for numeracy development. *International Journal of Early Childhood Education*, 53(2), 145-160.

Ali, M., & Tangkur, E. (2023). Junior high school teachers' knowledge and the impact of indigenous games in teaching basic mathematical concepts. *Journal of Mathematics Education, 16*(1), 45-60.

Assifuah-Nunoo, R. (2023). Exploring kindergarten teachers' use of traditional games to teach numeracy: A qualitative descriptive case study in the Banda District, Ghana. *Journal of Early Childhood Education Research, 11*(1), 45-62.

Aunio, P., & Räsänen, P. (2016). Core numerical skills for learning mathematics in children aged five to eight years – A working model for educators. *European Early Childhood Education Research Journal*, 24(5), 684-704.

Babbie, E. R. (2012). The practice of social research. Cengage Learning.

Baker, R. S. (2005). Designing games for learning mathematics. *Educational Technology Research and Development, 53*(2), 71-96.

Baker, R. S., Jones, K., & Johnson, J. (2018). Professional development and training in play-based pedagogy: Strategies for enhancing early childhood educators' practice. *Early Childhood Education Journal, 46*(5), 635-649.

Bender, P. (2017). The impact of using traditional games in numeracy teaching. *Education Research International*, 2017, 1-12.

Bennett, J. (2021). Navigating the tensions between play-based pedagogy and academic standards in early childhood education. *Early Years: An International Research Journal, 41*(4), 443-456.

Bergen, D. (2009). The role of pretend play in children's cognitive development. *Early Childhood Research & Practice*, *11*(1), 1-13.

Berk, L. E., Mann, T. D., & Ogan, A. T. (2006). Make-believe play: Wellspring for development of self-regulation. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning: How play motivates and enhances children's cognitive and social-emotional growth* (pp. 74-100). Oxford University Press.

Bhuda, V. (2021). Enhancing numeracy skills through indigenous games. *Journal of Educational Research and Practice*, 11(3), 214-229.

Bodrova, E., & Leong, D. J. (2003a). *Tools of the mind: The Vygotskian approach to early childhood education*. Pearson Education.

Bodrova, E., & Leong, D. J. (2003b). The importance of being playful. *Educational Leadership, 60*(7), 50-53.

Boyd, R., & Uysal, Z. (2020). Creating enriched learning environments in early childhood education: A focus on play-based pedagogy. *Journal of Early Childhood Education, 47*(3), 315-328.

Briggs, F. (2012). Play and early childhood development. *Journal of Child Development, 7*(3), 124-136.

Bruner, J. S. (1996). *The culture of education*. Harvard University Press.

Bubikova-Moan, J., & Aleksander, P. (2019). The effects of teacher beliefs on the implementation of play-based pedagogy in early childhood education. *Early Child Development and Care, 189*(9), 1397-1410.

Butterworth, B. (2005). The development of arithmetical abilities. Journal of Child Psychology and Psychiatry, 46(1), 3–18.

Campbell, A., Gray, C., MacIntyre, S., & Stone, M. (2020). Numeracy development in early childhood education. *Journal of Early Childhood Education*, 40(2), 123-138.

Canning, N. (2007). Children's empowerment in play-based learning environments. *Journal of Early Childhood Research, 5*(2), 125-140.

Carruthers, E., & Worthington, M. (2006). *Children's mathematics: Making marks, making meaning*. Sage Publications.

Chen, L., Liu, Q., Yan, Y., Hu, L., & Shi, Y. (2021). Development of a thematic analysis framework based on grounded theory. *International Journal of Qualitative Methods, 20*, 1-13.

Chessar, J. (2012). Beyond cake: Playful learning in a bakery. Australian Primary Mathematics Classroom, 17(2), 4–9.

Cheung, S. K., Dulay, K. M., Yang, Q., Mohseni, G., & McBride, C. (2021). Developing number sense in early childhood: A meta-analysis of early interventions. *Early Childhood Research Quarterly*, 54, 67-80.

Chikodzi, D., & Nyota, S. (2010). The use of indigenous games in the teaching of mathematics in Zimbabwe. *Journal of Interdisciplinary Research, 5*(3), 229-242.

Christie, J. F., & Roskos, K. A. (2006). Standards, science, and the role of play in early literacy education. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning: How play motivates and enhances children's cognitive and social-emotional growth* (pp. 57-73). Oxford University Press.

Clements, D. H., & Sarama, J. (2014). Learning and Teaching Early Math: The Learning Trajectories Approach. Routledge.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). Routledge.

Cohrssen, C., & Niklas, F. (2019). Language in play: Supporting children's oral language development through play-based learning in early childhood education. Australasian Journal of Early Childhood, 44(4), 378-390.

Cohrssen, C., & Tayler, C. (2016). Commentary: Children's Mathematical Learning: The Role of Teachers and Parents in Childhood. Early Child Development and Care, 186(5), 689-703.

Cohrssen, C., Church, A., & Tayler, C. (2016). Early childhood educators' perceptions of teaching mathematics. Australasian Journal of Early Childhood, 41(3), 30-37.

Colliver, Y. A. (2018). The role of attitudes in mathematics learning and achievement. Journal of Mathematical Behavior, 52, 64–68.

Composite Budget for Banda District Assembly. (2015). Kumasi: Banda District Assembly.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approach* (5th ed.). Sage Publications.

Cullen, J. (2001). The role of the teacher in play-based learning. *Journal of Early Childhood Education, 9*(1), 45-56.

Daru, C., Agbagbla, F., & Mensah, G. (2019). Traditional play and cultural heritage. *African Journal of Cultural Studies*, 31(3), 258-275.

Daru, M., et al. (2019). Traditional games/games and their role in children's learning. *Journal of Cultural Studies, 12*(4), 15-30.

Deans, J., & Cohrssen, C. (2015). Embedding Numeracy in Play-Based Learning. Australasian Journal of Early Childhood, 40(1), 21-30.

DeVries, R. (2006). Games with rules. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning: How play motivates and enhances children's cognitive and social-emotional growth* (pp. 150-172). Oxford University Press.

Dewah, P., & Van Wyk, M. M. (2015). Traditional games and games: Their role in teaching numeracy. *Journal of Educational Research, 7*(1), 45-56.

Dewah, P., & Van-Wyk, J. (2014). The role of indigenous games in early childhood education in Zimbabwe. *International Journal of Early Years Education*, 22(2), 175-189.

Dewah, P., & Van-Wyk, R. (2014). Indigenous knowledge systems and mathematics education: Analysis of Zimbabwean traditional games. *Journal of Ethnomathematics, 6*(2), 145-159.

Doig, B., McRae, B., & Rowe, K. (2003). Numeracy: Beyond the school gates. *Australian Educational Researcher*, 30(1), 27-50.

Education Scotland. (2019). *Numeracy and Mathematics*. Retrieved from https://education.gov.scot/improvement/learning-resources/numeracy-and-mathematics

Epstein, J. L. (2018). Engaging families as partners in play-based pedagogy: Strategies for early childhood centers. *Early Childhood Education Journal*, *46*(4), 567-580.

Evans, J. (2002). Developing mathematical reasoning through indigenous games. *Journal of Mathematics Education*, *9*(2), 141-154.

Feiman-Nemser, S. (2009). Teacher learning: How do teachers learn to teach? *National Society for the Study of Education Yearbook*, 112(1), 351-376.

Fenny, A. P., Kusi, A., Arhinful, D. K., & Asante, F. A. (2016). Population and sampling. In A. P. Fenny (Ed.), *Understanding health economics in Africa* (pp. 59-74). Springer.

Filsecker, M., & Kerres, M. (2014). Game-based learning: A review on the effectiveness of educational games. *Proceedings of the European Conference on Games-based Learning*, 94-102.

Fleer, M. (2010). Early learning and development: Cultural-historical concepts in play. *Cambridge University Press*.

For the Gobak Sodor Game, you can use:

Ford, T., Stuart, M., & Vakil, S. (2014). Culturally responsive pedagogy: A whole-of-institution approach. Higher Education Research & Development, 33(1), 1–18.

Fouze, A. Q., & Amit, M. (2017). Development of mathematical thinking through integration of ethnomathematics folklore game in math instruction. Eurasia Journal of Mathematics, Science and Technology Education, 13(5), 1331-1351.

Fromberg, D. P. (1992). A review of research on play. In C. Seefeldt (Ed.), *The Early Childhood Curriculum: Current Findings in Theory and Practice* (pp. 42-84). Teachers College Press.

Ginsburg, H. P., Lee, J. S., & Boyd, J. S. (2008). Mathematics education for young children: What it is and how to promote it. *Social Policy Report*, 22(1), 3-24.

Golafshani, N. (2022). Utilizing Indigenous storytelling for teaching mathematical curricular expectations. *Indigenous Education Journal, 15*(1), 65-79.

Gonzalez-Mena, J., & Eyer, D. W. (2019). Collaborative planning and reflection in early childhood education: Enhancing play-based pedagogy. *Early Childhood Research Quarterly, 48,* 275-289.

Gordon, G. (2009). What is play? In search of a universal definition. *Play & Culture Studies, 8,* 1-21.

Gray, D. E. (2021). *Doing research in the real world*. Sage.

Gülşeker, M. (2019). Play in early childhood education. In R. Driscoll (Ed.), *International Perspectives on Early Childhood Education and Development* (pp. 23-45). Springer.

Hamukonda, F. (2021). The role of numeracy in early childhood development. *Journal of Childhood Studies*, 46(2), 147-163.

Ho, E. S. C., Lau, E. Y. H., & Chu, M. T. (2017). Parental involvement and children's academic performance in the Chinese context: A qualitative perspective. *School Community Journal*, 27(1), 9-38.

Holland, P. (2003). *We don't play with guns here: War, weapon, and superhero play in the early years*. Open University Press.

Hollie, S. (2017). Culturally relevant teaching materials and student engagement. *Journal of Educational Psychology*, 109(3), 410-418.

Hossain, M. (2016). Teachers' misconceptions about early mathematics education. *Journal of Early Childhood Education, 14*(2), 78-91.

Hyvönen, P. (2011). Play in the school context? The perspectives of Finnish teachers. *Australian Journal of Teacher Education, 36*(8), 65-83.

Isaacs, B. (2013). Understanding the Montessori approach: Early years education in practice. *Routledge*.

Jarvis, P. (2000). *Childhood and learning in an urban environment: A study of play and learning in a 'mega-city'*. The Falmer Press.

Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42(1), 82-110.

Johnson, J. E., Christie, J. F., & Wardle, F. (2005). *Play, development, and early education*. Pearson/Allyn and Bacon.

Jolley, R. P. (2010). *Children and pictures: Drawing and understanding*. Wiley-Blackwell.

Karaoğlu, N. (2020). Play and Learning: The Cultural Perspective in Early Childhood Education. International Journal of Instruction, 13(2), 1041–1054.

Karpov, Y. V. (2005). *The neo-Vygotskian approach to child development*. Cambridge University Press.

Kekesi, K., Donkor, F., Aburampah, E., & Torkonyo, D. (2019). The missing piece in play-based learning: Ghanaian early childhood educators' perceptions. International Journal of Early Years Education, 27(3), 243-257.

Kemple, K. M., Oh, J. S., Kenney, S., & Smith-Bonahue, T. (2016). Early childhood educators' perspectives on outdoor play environments: Implications for early childhood education. Early Childhood Education Journal, 44(5), 459-469.

Khaliliaqdam, S. (2014). Vygotsky's zone of proximal development: Instructional implications and teachers' professional development. *Journal of Education and Practice, 5*(24), 87-92.

Kieff, J. E., & Casbergue, R. M. (2000). *Playful learning and teaching: Integrating play into preschool and primary programs*. Allyn and Bacon.

King, B. (1993). The impact of cultural context on children's learning. *Journal of Educational Research, 5*(2), 89-103.

Kuby, C. R., Lin, M., & Adleberg, T. (2020). Resistance to pedagogical innovations: The role of teacher beliefs and attitudes. *Journal of Educational Change, 21*(3), 281-305.

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into Practice*, 34(3), 159-165.

Laridon, P., Mosimege, M., & Mogari, D. (2005). Indigenous Knowledge in Mathematics Education. In R. Vithal, J. Adler, & C. Keitel (Eds.), Researching Mathematics Education in South Africa (pp. 133-164). HSRC Press.

Lehrl, S., Kluczniok, K., & Rossbach, H. G. (2016). Influences of the Home Learning Environment and Preschool Quality on the Development of Mathematical Competence in Early Childhood. Early Childhood Research Quarterly, 36, 135-144.

Levin, D. E. (2006). *Teaching young children in violent times: Building a peaceable classroom*. Educators for Social Responsibility.

Lillemyr, O. F., Søbstad, F., Marder, S. M., & Flowerday, T. (2011). Educating the young child: A socio-cultural perspective on early childhood education. Routledge.

Lo, J. (2014). Teachers' beliefs about early mathematics education. *Journal of Mathematics Education*, *8*(3), 143-156.

Manzunzu, J. (2022). Teaching numeracy through indigenous games: Connecting daily experiences with numbers. *Journal of Mathematics Education*, 55(3), 302-318.

Mastrangelo, S. (2009). Early childhood inclusion: The key to successful transitions for young children with disabilities. *Journal of Early Childhood Research*, *7*(1), 33-47.

Matafwali, B., & Mofu, J. (2023). Indigenous outdoor games in early childhood education: A review of benefits and challenges. Early Child Development and Care, 1-18.

Matthews, J. (2011). *The art of childhood and adolescence: The construction of meaning*. Psychology Press.

Mavuru, L., & Ramnarain, U. (2020). Culturally responsive teaching in science education: Enhancing learners' participation and learning through local games. *Journal of Science Education, 24*(3), 123-138.

Mayer, R. E. (2015). Research design in educational psychology. In K. A. Renninger, M. Nieswandt, & S. Hidi (Eds.), *Handbook of research methods in educational psychology* (pp. 101-113). Routledge.

McCoy, L. P., Buckner, J. K., & Munley, M. E. (2007). The impact of culturally relevant games on student learning in mathematics. *Journal of Mathematics Education, 8*(2), 133-150.

McNally, S., & Slutsky, R. (2017). Key elements of the Reggio Emilia approach and how they are implemented in the U.S. *Journal of Early Childhood Education, 45*(1), 5-20.

Mellen, C. (2002). *Father-son rough-and-tumble play and social competence in early childhood*. Unpublished doctoral dissertation, Harvard University.

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Ministry of Education Science and Sports. (2007). *The national curriculum for kindergarten*. Accra, Ghana: Author.

Ministry of Education, Science, and Sports. (2007). *Educational policy on indigenous knowledge and games*. Government of [Country].

Ministry of Education. (2020). *Educational Reform Policy Document*. Accra, Ghana: Ministry of Education.

Moloi, M. (2015). Using indigenous games to teach mathematics: The case of morabaraba. *Journal of Mathematics Education, 8*(2), 67-78.

Moloi, Q. (2015). The role of indigenous games in the teaching of mathematics in early childhood education. *South African Journal of Childhood Education,* 5(1), 72-84.

Moloi, Q., Mosia, P., Matabane, P., & Sibaya, P. (2021). Indigenous games as a pedagogical tool for teaching numeracy in early childhood education: A South African perspective. *South African Journal of Education*, 41(1), 45-58.

Mosimege, M., & Onwu, G. (2004). Indigenous knowledge and traditional games: A methodological challenge in doing ethnomathematical research. *International Journal of African Renaissance Studies, 7*(2), 59-78.

Moss, J., Bruce, C., & Bobis, J. (2015). Young Children's Access to Powerful Mathematical Ideas: A Review of Current Challenges and New Directions in the Early Years. Mathematics Education Research Journal, 27(4), 311-336.

Moyles, J. R. (1989). *Just playing? The role and status of play in early childhood education*. Open University Press.

Mudaly, V. (2018). The use of indigenous knowledge in mathematics classrooms. *Journal of Indigenous Education, 10*(3), 77-95.

Nabie, M. J. (2011). The potential of traditional games in mathematics education. *Journal of Indigenous Education,* 19(2), 83-97.

Nabie, M. J. (2011). The potential of traditional games in mathematics education. *Journal of Indigenous Education*, 19(2), 83-97.

Nabie, M. J. (2011). The role of indigenous games in mathematics education. *Journal of Ethnomathematics, 7*(2), 89-103.

Nabie, M. J. (2012). The significance of cultural games in learning mathematics. *Journal of Mathematics and Culture, 6*(1), 22-38.

Nabie, M. J. (2015). Contextualizing mathematics teaching in Ghana. *Ghana Journal of Education*, 21(4), 99-113.

Nabie, M. J. (2015). Indigenous games and numeracy learning. *Journal of Ethnomathematics, 11*(2), 99-118.

Nabie, M. J. (2015). Integrating indigenous knowledge into mathematics education. *Journal of Mathematics and Culture, 12*(1), 55-72.

Nabie, M. J., & Akayuure, P. (2014). Indigenous games as tools for teaching mathematics. *Journal of Ethnomathematics, 10*(2), 119-137.

Nabie, M. J., & Akayuure, P. (2014). Integrating culturally responsive pedagogies into the teaching of numeracy. *Journal of Multicultural Education*, 8(3), 189-207.

Nabie, T. (2011). Cultural games in mathematics teaching: A study of values and challenges among Ghanaian primary school teachers. *International Journal of Educational Development, 31*(6), 600-607.

Naidoo, K. (2021). Integrating culturally based activities and indigenous knowledge within school curricula. *Journal of Curriculum Studies, 14*(1), 89-102.

Nhlapo, L. J. (2020). Descriptive case study research design: Theoretical background and practical applications. *Journal of Social Sciences, 64*(2), 107-120.

Niklas, F., & Tayler, C. (2018). Room for Improvement: The Quality of Early Childhood Education Programs in Germany and in Victoria, Australia. Learning Environments Research, 21(2), 229-246.

Niklas, F., Cohrssen, C., & Tayler, C. (2016). The Sooner, the Better: Early Reading to Children. Sage Open, 6(4), 1-11.

Nkopodi, N., & Mosimege, M. (2009). Incorporating indigenous games into the mathematics curriculum. *Journal of Ethnomathematics, 8*(1), 43-55.

Nogus, K., & Domeless, J. (2021). Predicting later mathematics performance: The importance of early numerical skills. *Journal of Early Childhood Research,* 19(1), 42-57.

Nolan, A., & Paatsch, L. (2018). Play-based learning and intentional teaching in early childhood education. *Journal of Early Childhood Research, 16*(1), 31-42.

Nowak, A., Nichols, S. R., & Coutts, L. (2009). Defining and examining the nature of play. *Early Child Development and Care, 179*(10), 1257-1267.

Ntshangase, R. (2022). Exploring pre-service teachers' perceptions of play-based pedagogy in early childhood education. *South African Journal of Education, 42*(2), 1-12.

O'Connor, C., & Stagnitti, K. (2011). Play, behavior, language and social skills: The comparison of a play and a non-play intervention within a specialist school setting. *Research in Developmental Disabilities, 32*(3), 1205-1211.

Onwu, G., & Mufundirwa, M. (2020). Integrating indigenous knowledge within the school curriculum. *Journal of Indigenous Education, 15*(1), 22-40.

Opie, I., & Opie, P. (1959). *The lore and language of schoolchildren*. Oxford University Press.

Orey, D. C. (2017). Mathematization and its cultural connections in ethno-mathematics. *Journal of Ethnomathematics, 12*(3), 181-199.

Owens, G., Granader, Y., Humphrey, A., & Baron-Cohen, S. (2008). LEGO Therapy and the social use of language programme: An evaluation of two social skills interventions for children with high functioning autism and Asperger Syndrome. *Journal of Autism and Developmental Disorders, 38*(10), 1944-1957.

Owuor, F. (2007). Integration of indigenous knowledge in formal education: A study of barriers and enablers in Kenya. *Journal of Indigenous Social Development, 6*(1), 1-17.

Owusu-Mensah, F., & Baffour, S. (2015). Indigenous games and numeracy in Ghanaian classrooms. *Journal of Mathematics Education, 9*(3), 155-174.

Owusu-Mensah, J., & Baffour, M. (2015). Indigenous games and children's mathematical imagination. *Journal of Mathematics Education*, 50(1), 89-105.

Pellegrini, A. D., & Gustafson, K. (2005). Boys' and girls' uses of objects for exploration, play, and tools in early childhood. *International Journal of Behavioral Development, 29*(1), 61-68.

Pellegrini, A. D., & Smith, P. K. (2003). The development of play during childhood: Forms and possible functions. *Child Development, 74*(3), 934-949.

Piaget, J. (1962). Play, dreams, and imitation in childhood. *W. W. Norton & Company*.

Pollitt, R., Cohrssen, C., & Seah, R. (2020). How Early Childhood Educators Understand and Scaffold Numeracy Learning. Journal of Early Childhood Research, 18(1), 42-57.

Power, T. G. (2000). Play and exploration in children and animals. *Lawrence Erlbaum Associates*.

Pramling-Samuelsson, I., & Carlsson, M. A. (2008). The playing learning child: Towards a pedagogy of early childhood. *Scandinavian Journal of Educational Research*, *52*(6), 623-641.

Purdie, N., Reid, K., Frigo, T., Stone, M., & Kleinhenz, E. (2011). Indigenous students and numeracy: An evidence-based approach. *Australian Journal of Indigenous Education*, 40(2), 92-104.

Pyle, A., & Danniels, E. (2017). A continuum of play-based learning: The role of the teacher in play-based pedagogy and the fear of hijacking play. *Journal of Early Childhood Research, 15*(3), 273-285.

Quackenbush, C. (2023). Traditional beliefs in early childhood education: Implications for play-based pedagogy. *Early Childhood Research Quarterly, 48*, 235-248.

Rahi, S. (2017). Sampling methods: A review. *International Journal of Applied Research*, *3*(1), 234-240.

Rallis, S. F., & Rossman, G. B. (2014). Qualitative inquiry in everyday life: Working with everyday life materials. Routledge.

Ring, K. (2010). Supporting early writers: A Vygotskian perspective on writing development in early childhood and the roles of educators in this process. *Contemporary Issues in Early Childhood, 11*(3), 254-262.

Rosa, M., & Orey, D. C. (2013). Ethnomathematics: The cultural aspects of mathematics. *Journal of Mathematics and Culture, 7*(2), 101-120.

Roux, C. (2008). Traditional games as cultural heritage. *Journal of Cultural Heritage, 9*(3), 123-135.

Scarlett, W. G., Naudeau, S., Salonius-Pasternak, D., & Ponte, I. (2005). *Children's play*. Sage Publications.

Seehawer, M., & Breidlid, A. (2021). Indigenous knowledge in mathematics education. *Journal of Indigenous Studies, 14*(2), 49-67.

Setiyadi, A., Zaenuri, Mulyono, S., & Dwidayati, N. (2018). Dam-Daman game and its mathematical significance in teaching geometry. *Journal of Educational Games, 10*(2), 45-60.

Setiyadi, A., Zaenuri, Mulyono, S., & Dwidayati, N. (2018). Traditional games as educational tools: The case of Gobak Sodor in teaching coordination and teamwork. *Journal of Physical Education and Sport, 15*(3), 123-135.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63-75.

Siraj-Blatchford, J., & Whitebread, D. (2003). *Supporting ICT in the early years*. Open University Press.

Sommer, D., Pramling Samuelsson, I., & Hundeide, K. (2010). *Child perspectives and children's perspectives in theory and practice*. Springer.

Sparrow, L., & Hurst, C. (2012). Mathematics learning through cultural contexts. *Journal of Ethnomathematics, 9*(3), 176-193.

Sunzuma, S., & Maharaji, A. (2019). Challenges to the integration of ethno-mathematics approaches into the teaching of geometry: Perspectives of mathematics teachers in Nigeria. *International Journal of Mathematics Education in Science and Technology, 50*(3), 274-289.

Sutton-Smith, B. (2001). *The ambiguity of play*. Harvard University Press.

Sylva, K., Bruner, J. S., & Genova, P. (1976). The role of play in the problem-solving of children 3-5 years old. *In J. S. Bruner, A. Jolly, & K. Sylva (Eds.), Play: Its role in development and evolution* (pp. 55-67). Penguin Books.

Tachie, S. A., & Galawe, E. P. (2021). Indigenous games in the teaching of mathematics: Lessons from South Africa. *African Journal of Research in Mathematics, Science and Technology Education*, 25(1), 64-76.

Tachie, S. A., & Galawe, T. (2021). The effectiveness of using indigenous games to teach mathematics in Grade 4: The case of morabaraba. *Journal of Educational Research, 17*(4), 215-230.

Tachie, S. A., & Galawe, T. M. (2021). Teachers' use of traditional games games in teaching mathematics in South Africa. *Journal of Education and Practice,* 12(2), 45-56.

Tahadoost, M. (2016). Determination of sample size in research studies. *Educational Research Quarterly, 39*(1), 63-71.

Tangkur, G., Yekple, Y., Vinyo, K., & Kumah, C. (2022). Traditional games games and their integration in early childhood education: A Ghanaian perspective. *Journal of Early Childhood Research*, 20(2), 128-144.

Tovey, H. (2007). *Playing outdoors: Spaces and places, risk and challenge*. Open University Press.

Tsindoli, P. (2018). Teachers' perception of integration of indigenous knowledge in the teaching of mathematical concepts in primary schools in Vihiga County, Kenya. *International Journal of Educational Development, 60*, 122-131.

Turugari, G. (2022). Integrating African mathematics into modern curricula: Benefits and challenges. *International Journal of STEM Education*, 9(1), 1-14.

Usman, S., & Yusuf, J. (2021). Outdoor play provision in Nigerian early childhood education: Issues, challenges, and prospects. International Journal of Early Years Education, 29(1), 49-61.

Van Schie, E. G. M., & Wiegman, O. (1997). Children and videogames: Leisure activities, aggression, social integration, and school performance. *Journal of Applied Social Psychology, 27*(13), 1175-1194.

Van, H., & Excell, L. (2018). Professional development for play-based pedagogy: A review of current trends and future directions. *Early Childhood Education Journal, 46*(4), 501-509.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language* (A. Kozulin, Trans.). MIT Press.

Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research, 10*(1), 69-80.

Waller, T., & Davis, G. (2014). Learning through play: Common characteristics of culturally responsive pedagogies. *Journal of Early Childhood Education*, 42(3), 239-253.

Wasik, B. A., & Jacobi-Vessels, J. L. (2016). Word play: Scaffolding language development through child-directed play. *Early Childhood Education Journal, 44*(4), 379-386.

Watts, T. W., Duncan, G. J., Siegler, R. S., & Davis-Kean, P. E. (2014). What's past is prologue: Relations between early mathematics knowledge and high school achievement. *Educational Researcher*, 43(7), 352-360.

Whitebread, D. (2000). *Teaching and learning in the early years*. Routledge.

Whitebread, D., & Jameson, H. (2010). The importance of play in children's development. *International Journal of Play Therapy, 19*(3), 175-195.

Wood, E. (2009). Developing a pedagogy of play. In A. Anning, J. Cullen, & M. Fleer (Eds.), *Early childhood education: Society and culture* (pp. 27-38). Sage Publications.

Worthington, M., & Van Oers, B. (2016). Pretend play and the cultural foundations of mathematics. *European Early Childhood Education Research Journal*, 24(1), 51-66.

Yekple, Y. K., Vinyo, E. D., & Kumah, M. B. (2021). Play-based learning and early childhood education in Ghana: An inquiry into challenges and prospects. Journal of Education and Practice, 12(3), 110-120.

Yekple, Y., Vinyo, K., & Kumah, C. (2021). Using traditional games to teach numeracy in early childhood education in Ghana. *Journal of Educational Research and Practice*, 11(3), 214-229.

Yelland, N., & Kilderry, A. (2010). Against the odds: Young children's participation in learning communities. *Early Years: An International Journal of Research and Development*, 30(1), 5-14.

Yogman, M., Garner, A., Hutchinson, J., Hirsh-Pasek, K., Golinkoff, R. M., Baum, M. P., & Committee on Psychosocial Aspects of Child and Family Health. (2018).

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF EARLY CHILDHOOD EDUCATION

INTERVIEW GUIDE FOR KINDERGARTEN TEACHERS

The purpose of the study was to examine how teachers use of traditional games in teaching numeracy at early childhood education centres in Banda District. Your cooperation is appreciated in this study, which will enable the researcher to gain a deeper understanding of the perspectives of kindergarten teachers use of traditional games in teaching numeracy in early childhood centres in the Banda District. Please be aware that participation is optional and that all information provided is for academic purposes and will be kept private. You have the option of not responding to any questions if doing so makes you feel uncomfortable. Thank you

SECTION A: DEMOGRAPHIC CHARACTERISTICS

Age

Sex ……

Education qualification……..

Years of teaching……

Duration of interview…….

SECTION B

Investigate the types of traditional games used in teaching numeracy at early childhood education centres in Banda District.

1. What are some of the traditional games you use to teach numeracy to your students?
2. How do you decide which traditional games are most suitable for teaching specific numeracy concepts?
3. Are there particular games that your students respond to more enthusiastically when learning numeracy?
4. Do you incorporate any cultural or community-based games into numeracy lessons, and if so, how are these games adapted to support numeracy skills?

2. Examine reasons why the teachers use traditional games in teaching and learning numeracy at early childhood education centres in Banda District.

5. What motivates you to use traditional games as part of your numeracy teaching methods?
6. How do you think traditional games benefit your students in understanding numeracy concepts compared to other teaching methods?
7. Do traditional games have any specific advantages in keeping students engaged or interested in numeracy lessons? If so, how?
8. *Interview Question 4*: Can you share any examples where traditional games have significantly impacted a student's numeracy skills or confidence?

3. Identify the barriers that teachers face in using traditional games to guide pupils to learn numeracy at early childhood education centres in Banda District.

9. What challenges or barriers do you encounter when trying to use traditional games to teach numeracy?
10. Are there any limitations in terms of resources or materials that hinder your ability to implement traditional games effectively in your lessons?
11. How do time constraints or curriculum demands affect your ability to incorporate traditional games into numeracy teaching?
12. Do you feel that there is adequate support or training available for teachers to use traditional games effectively in numeracy lessons?