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Efficacy of indigenous games on literacy and numeracy development in pre-schoolers in Zambia

Authors:
Grant M. Mwinsa[1,2]
Murunwa Dagada[1]

Affiliations:
[1]Department of Early Childhood Education, College of Education, University of South Africa, Tshwane, South Africa

[2]Department of Early Childhood Education, Faculty of Early Childhood Studies, Chalimbana University, Lusaka, Zambia

Corresponding author:
Murunwa Dagada,
dagadm@unisa.ac.za

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Background: The most effective indigenous games well known to pre-schoolers must be used in schools, given the significance of literacy and numeracy abilities in children's future educational prospects and successes.

Aim: The goal of this article was to determine the efficacy of indigenous games in promoting literacy and numeracy skills among preschool children.

Setting: Ten teachers were selected from the four rural selected schools in Zambia with Early Child Education (ECE) centres.

Methods: The article used a participatory action research design with a purposive sampling technique. The researchers used interviews and participatory observations to collect data.

Results: The study found that indigenous games, when used effectively, can have the potential to promote the child's literacy and numeracy skills, even though some teachers found them challenging to execute. The study adopted a thematic analysis approach to analyse a set of data and search for patterns in its interpretation to identify themes.

Conclusion: The study has shown that indigenous games have many benefits for pre-schoolers' learning. The study recommends that teachers should attend intensive continuing professional development (CPD) workshops and seminars to gain the knowledge and abilities necessary to effectively and suitably teach ECE learners pertinent skills through traditional games. Parents should be involved in teaching traditional games. Besides, the curricula of universities and colleges of education should include instructions in indigenous games for teacher preparation.

Contribution: Research on the use of indigenous games in promoting the acquisition of literacy and numeracy skills in Zambia is limited, hence this enquiry.

Keywords: indigenous; acquisition; literacy; numeracy; games.

Introduction

Indigenous games have historically been used to stimulate learning of literacy and numeracy skills in schools and communities in various parts of the world. However, preschool play was both generally accepted and controversial in South African and Nigerian preschools (Ogunyemi & Ragpot 2016), as the curricula for early childhood education in Rivers State do not align with the early childhood education standards that were largely accepted in the Nigerian community (Evans, Georgakis & Wilson 2017). Grindheim (2021) supported the view that games are important because they allow children to participate actively in their day-to-day learning process, which occurs both indoors and outdoors. In addition, studies on the use of indigenous games in many parts of the world, including sub-Saharan Africa, have consistently advocated for the inclusion of indigenous games in the early childhood curriculum and practice (Nakawa 2020; Ogunyemi & Henning 2020).

The inclusion of indigenous games in early childhood practice is even more apparent for learners in rural areas and low-income communities who cannot afford modern Eurocentric play materials as they are expensive, unfamiliar and inaccessible to such vulnerable societies.

The need for indigenous games in teaching preschool children is also vital for other vulnerable groups, such as children living with disabilities, who are often ignored and forgotten in the education planning and provision in most communities (Matafwali & Mofu 2023). For instance, Acharibasam and McVittie (2020) contend that early childhood indigenous education fosters child development, as children learn from adults who are experienced in a particular craft, using

indigenous knowledge and linking these experiences to modern classrooms, which use Eurocentric approaches. Moloi et al. (2021) opine that huge benefits would be derived if the Eurocentric and indigenous knowledge systems (IKS) are properly harmonised by tapping the benefits of each system and including them in the school curriculum.

Even though play-based learning is extensively recognised and approved by many experts, including teachers in Zambian preschools and the curriculum, preschool teachers often prefer Eurocentric games and approaches to indigenous games. The preference can be attributed to various factors. Nakawa (2020) identifies factors such as the teachers' lack of knowledge and skills on how to use certain indigenous games. The scholar further attributes this failure to use local games to a lack of knowledge and skills in determining which games work better for the acquisition of specific learning outcomes that foster the development of literacy and numeracy skills in learners (Nakawa 2020). For this reason, Matafwali and Mofu (2023) suggest that early childhood education practice in Zambia calls for re-orienting of the curriculum and the inclusion of games that stimulate learning in children, especially those in rural areas. Educators must integrate indigenous games into classroom instruction and use familiar teaching strategies that resonate with their learners to improve literacy and numeracy skills. Unfortunately, teachers in Early Childhood Education (ECE) in Zambia have opted for using Western philosophies that undermine the resourcefulness of indigenous knowledge, such as traditional games, in accessing quality ECE.

The potential and the relevance of indigenous games in enhancing early learning in African schools, including Zambia, have continued to be unclear and under-researched (Ogunyemi & Henning 2020). This study, therefore, sought to determine the efficacy that indigenous games have on preschool children's ability to acquire literacy and numeracy skills.

Literature review

Play in ECE is a wide theme, which continues to create thoughtful conversations and arguments (Parker, Thomsen & Berry 2022; Sørensen 2021). Although play has historically been regarded favourably as a foundation for learning, critics have advocated for more structured and direct instruction for children, regardless of their age. Recently, however, the debate has intensified in the context of education, influenced by early learning standards and assessment of academic achievement (Ogunyemi & Ragpot 2016). There is concern that play is not adequately used in ECE, and that a vigorous response is needed to protect its important role (Sørensen 2021). Scholars in Africa have equally advocated for play in ECE that does not lose the focus of providing skills necessary for stimulating learning holistically (Matafwali & Mofu 2023). The context within which child development and early learning are theorised in African communities remains closely linked to the society and community where a child grows up (Serpell 2019).

From the time children are born, members of the family and the extended community work together to socialise children into a broader family and community setting, endeavour to train young ones in various skills such as walking and talking and handle simple tasks progressively to a time in life when they can manage complex errands (Ogunyemi & Henning 2020).

Kancanadana, Saputri and Tristiana (2021) postulate that teachers can make traditional games interesting, they can be enjoyable learning tools for elementary school learners participating in learning activities. Children's development of traditional games is crucial, especially for those in elementary school. Children in Zambia play pebble games such as *chiyato* or *chiyenga* and *nsolo* (board game), among others (Lungu & Matafwali 2020; Matafwali & Mofu 2023; Munsaka & Kalinde 2017). During the play of the these games, children do not realise that they are learning mathematical concepts and acquiring literacy skills through the various activities indigenous to their communities. Moloi (2020) argues that children learn mathematical concepts of seriation, measurement, numbers and counting through indigenous games such as *kgati* (board game) without realising that learning is taking place.

In any educational system, literacy is an essential component of education and learning. By the time they enter elementary school, children should be able to read and write (Lungu & Matafwali 2020). Thus, it is important to begin teaching reading and writing at a young age, ideally even when the child is still in the womb. Emergent literacy is anticipated to better equip children for the enormous task of reading, writing and succeeding at the primary, secondary and post-secondary education levels in the future (Parker et al. 2022; Pyle et al. 2020). Research indicates that learners who play games that require them to scribble, vocalise and sing improve as writers, speakers and self-assured individuals compared to those who do not play these kinds of games as children. Because of this, the researchers think it is critical to support the use of games from a young age, particularly traditional games that are well known and accessible in rural communities, to ensure that children can effectively acquire literacy skills before starting primary school.

Several researchers in sub-Saharan Africa have provided convincing reasons for teaching using playful pedagogy that uses indigenous games or knowledge in the early years of learning regardless of the segregated nature of a particular community (Ejuu 2019; Kejo 2017; Lungu & Matafwali 2020; Serpell 2019). Although Fleer (2019) argued how culturally appropriate and participative approaches promote learning through play and imagination in early childhood education, underscoring its significance, Hedegaard (2020) contends that certain aspects of modern-day developmentally appropriate practices are unfamiliar to learners, as they are new to their culture and learners are only exposed to them when they enrol in school. For this reason, what should constitute an appropriate early learning and teaching approach should be carefully considered for a specific

community, especially for rural, vulnerable children and low-income communities.

Concerning the linkages that exist between education and cultural knowledge where play is embedded, Hadebe-Ndlovu (2022) argued that teachers feel that when children play games from their culture, they recognise play as a natural way for them to interact with one another and their classmates.

This is because the content of education has value underpinnings and is associated with a specific culture (Ejuu 2019; Hadebe-Ndlovu 2022; Moloi 2020). For this reason, teaching and learning that infuses a child's cultural knowledge into the curriculum have the potential to enhance innovative constructivist thinking in learners.

According to this study, there are educational benefits to playing traditional games that can be connected to current curricula to maximise the learning experience for pre-schoolers. The findings of Madondo and Tsikira's (2022) study on indigenous games, which recognised indigenous games as pertinent tools that aid in teaching specific educational concepts, including counting, measuring, sounds, reading and vocabulary, have been consistently supported by research from other scholars within sub-Saharan Africa. According to Serpell (2019), play and games are culturally constructed, and play and cultural activities are natural means for learners to absorb the school curriculum and make connections between the material and themselves. The findings from Serpell (2019) are in clear corroboration with those of Madondo and Tsikira (2022), who used comparable strategies on children in rural Zimbabwe and observed improvements in children's learning curves when they used native games. Research has indicated that early play exposure significantly enhances children's academic and cognitive development when compared to later play exposure. Therefore, the researchers needed to look into whether playing traditional games could improve reading and numeracy skills, particularly for students in rural areas who lack access to the contemporary, Eurocentric playthings that their peers in cities enjoy regularly. This is crucial for contemporary preschools, which favour Eurocentric resources and increasingly reject the notion of play through the use of traditional games in instruction in favour of methods that are foreign and unfamiliar, costly and inhospitable to children from vulnerable backgrounds, those living in rural areas and those in poverty.

Theoretical framework

This study was situated in Lev Vygotsky's sociocultural theory and IKS. As expounded by Vygotsky's (2016) sociocultural theory, learning is determined by the context in which children learn, their social and cultural experiences and how adults and other children, tools and resources support learning. Vygotsky (2016) asserts that children learn best when they are engaged in worthwhile activities that have real-world applications. The notion that pupils sometimes learn best when they engage with their teachers is one of the fundamental theories advanced by Vygotsky to explain how children learn. Interactive learning is, therefore, a crucial initial step in the learning process. In his idea, children learn while striving to accomplish their zone of proximal development (ZPD) and receive support along the way. This suggests that children cannot reach their full potential if their teachers do not assist them (Vygotsky 1978). The practical lessons and activities in ECE classrooms should also encourage social interaction among learners and teachers (Ryoo & Kekelis 2018). According to Vygotsky's theory, learning through indigenous games is most effective when it is integrated with the children's cultural identities. Engaging in these games fosters children's development in physical skills and their understanding of language, mathematics and culture.

According to Matafwali and Mofu (2023), incorporating indigenous games helps improve ties between the home and the school by encouraging community involvement. Furthermore, indigenous games introduce new words to children, expand their vocabulary and develop their oral language abilities. Indigenous songs are also essential for knowledge development and language skill stimulation. Furthermore, indigenous societies around the world have observed that children learn better in schools or classrooms where teaching and learning infuse indigenous knowledge and pedagogical approaches to classroom practice (Acharibasam & McVittie 2021). These two theories were relevant for this study as they both promote the use of competent adults and peers in the use of indigenous games as a teaching and learning approach.

Aim of the study

The study aimed to determine the efficacy of indigenous games in promoting preschool learners' ability to acquire literacy and numeracy skills.

Research paradigm

The study adopted an interpretivist paradigm as it was suitable for qualitative research, considering that it provides an array of interpretations and generates a wealth of knowledge (Creswell & Creswell 2018), which can be applied differently in different communities. This paradigm helped us to clarify the different meanings that events in schools have as teachers imparted knowledge to their children. It also made it easier for researchers to understand the actual problems with the teachers' usage or lack thereof of traditional games in the classroom. It is important to exercise critical inquiry since interpretive research findings are limited in that they cannot be applied, replicated or generalised to populations other than the one in which the study was conducted (Atkinson 2015).

Critical enquiry is concerned with enabling human beings to rise above the limitations placed on them by race, gender and class (Hennink, Hutter & Bailey 2020). This theory was vital as it helped the researchers, and the teachers relook at other ways of teaching mathematics and emergent literacy using traditional games to bring out desired learning outcomes in the learners.

Research methodology and design

To comprehend the efficacy of indigenous games in promoting literacy and numeracy skills among preschool children, a participatory action research design was utilised (Cohen, Manion & Morrison 2018). As the researchers, we wanted to collaborate with every participant. During this stage, the researchers carried out the scheduled tasks, which included introducing the pre-schoolers to the indigenous games, offering advice and direction and assisting them in playing the games. Thereafter, the researchers paid special attention to how the children interact with the indigenous games, how engaged they are, what obstacles they face and how these activities help them advance their reading and numeracy skills. The stakeholders and the researchers considered how well the indigenous games support literacy and numeracy abilities based on the observations and input received during the acting phase. The researchers developed the recommendations.

The population and sample

The 163 public primary and community schools in Zambia's Chibombo district's Central Province served as the study's population. There are a total of 68 certified ECE teachers in the district, according to information kept at the District Education Board Secretary's office in Chibombo. A purposive sampling technique was used to select the participants. A minimum of two teachers were selected from each of the four schools in Zambia with ECE centres making a total number of 10 participants. All the selected participants came from rural schools because of the nature of the selected district, which is largely rural and semi-peri-urban. The sample was purposively selected from the population of 163 primary and community schools in that only schools with ECE centres in the research site were chosen because of their suitability in participatory action research design for qualitative research (Kothari 2019). This study included only ECE teachers who had been practising for at least 4 years. This was because they had spent more time in ECE and had graduated several children to Grade 1. In addition, the study excluded all literature and participants unrelated to ECE. Principals and senior teachers were also excluded as they did not practice ECE in the classroom.

Description of participants

The 10 teachers who participated in this study had varying qualifications in ECE training. Six teachers held ECE certificates, three held Diplomas and one teacher held a Bachelor of Education degree. Only 2 of the 10 teacher participants had classes with fewer than 40 children; the other 8 had classrooms with more than 40 children. It was challenging for some teachers to give their children quality education because they had as many as 110 children in some situations. The children's ages appeared suitable for each educational level, such as 3–4 years for the middle class and 5–6 years for the reception. However, there was an unequal distribution of teachers among the Schools in the district. There were three teachers in school 1, two teachers in School 2, three teachers in School 3 and two teachers in School 4. Every teacher in this research had taught ECE for over 4 years. Because of their background in preschool teacher preparation programmes, all teachers were certified to teach ECE children.

The contexts of the schools in this study

This section gives an overview of the research site's surroundings and a glimpse into the community that the study's participating schools serve. The four rural, underprivileged schools in this study are surrounded by low-income neighbourhoods. There are a few steadily growing peri-urban settlements in two of the four schools. According to Munsaka and Kalinde (2017), there are substantial obstacles in getting modern, Eurocentric materials into each of the study's schools, which makes it difficult for teachers and children to use Eurocentric games. There are several issues facing each of these schools, from low teacher-learner ratios to a dearth of resources and classroom space for both indoor and outdoor learning. There is ample room for outdoor play at School 1, but teachers find it challenging to reserve the area exclusively for ECE activities because older children from the primary and secondary sections also use the area. As the play area at School 2 is modest and not designated for the use of adult learners or ECE, it is comparable to that of the first school. Because new learner classrooms are accommodated by continuing building around the school, Schools 3 and 4 are without an outside space. Because of excess enrolment, the classroom spaces were generally insufficient.

Data collection methods and/or instruments

The study used participatory observation method, in which four ECD schools were observed, and teachers were interviewed as well. Teachers were interviewed using face-to-face interviews method to collect the data. Thereafter, the participants planned their lesson plans around indigenous educational games, actively involving themselves in participatory lesson observation alongside their children. Various games like *nsolo*, *waida, panda umulilo and kulupili* were introduced to enrich the learning experience.

Data analysis

The study adopted a thematic analysis approach to analyse a data set and search for patterns in its interpretation to identify themes (Dube & Shawe 2022; Lochmiller 2021). It was essential because it enabled us to thoroughly examine the interview and observation data, enabling the production of perceptive and reliable study conclusions (Mason 2018). Out of the thematic analysis, the following themes emerged: indigenous games used in teaching literacy, indigenous games used in teaching numeracy and challenges teachers face when using indigenous games.

Ethical considerations

An Ethical Clearance Certificate for collecting the data in Zambia was issued by the University of South Africa

(UNISA) College of Education Ethics Review Committee on 2023/05/10 (Ethical Clearance Number: Ref.: 2023/05/10/18026877/11/AM). We gave the chosen participants in this study a written consent and assent form that briefly outlined the project's goals, objectives and research questions. The researchers retained the soft copies of the data in password-protected files on their personal computers to ensure that only the researchers could access them and safeguard the material's confidentiality. All mobile phone recordings were instantly uploaded to personal computers, which were saved in password-protected files. The records on the phone or any other device that could capture audio or video were then deleted from the device. The researchers kept their physical copies in a cupboard at home, out of children's or anybody else's reach and secured with a locked key. The data will be maintained for 5 years after it is collected, after which it will be destroyed.

Results and findings

The findings of this study were presented in a two-fold manner; findings from interviews and findings from participatory observations.

Findings from interviews

A recurring theme that emerged from the one-on-one interviews was the educational indigenous games mentioned earlier that preschool teachers use in teaching literacy and numeracy. This theme discusses the indigenous games that teachers use in teaching literacy and numeracy skills to preschool children. Early Child Education teachers shared indigenous games that they use when teaching emergent literacy and numeracy skills to preschool learners. This article delved into insightful interviews conducted with teachers, shedding light on critical aspects concerning the use of educational indigenous games mentioned earlier for teaching counting and numbers to pre-schoolers in Chibombo district.

Participants emphasised the captivating nature of employing games like *nsolo* and *waida*, which effectively impart numeracy concepts such as counting and numbers. Additionally, *pada* fosters imagination, enhances memorisation and facilitates understanding of measurements, while 'chiyato' or 'chiyenga' serve as valuable tools for teaching addition and subtraction. The researchers used codes or pseudonyms. The findings from the interviews are presented under the following themes:

Theme 1: African games used to teach numeracy

There was a lively discussion about using indigenous games to teach numeracy to the participants. The usefulness of indigenous games like *nsolo*, *waida* and *pada* for teaching addition, subtraction and counting was highlighted. Participant TJ4 described how the *nsolo* game is played. She explained, 'As learners play the *nsolo* game, they count, add, and subtract stones from either side of the game lines' (Participant TJ4, Female, ECE Teacher). Participant TF3 explained, 'I always use *nsolo* to teach counting of numbers to learners in my class, they seem to enjoy the game since I teach reception class' (Participant TF3, Female, ECE Teacher). Participant TI4 stated, 'I find *nsolo* and *waida* very useful in teaching Mathematics to my learners. Furthermore, it improves how the learners add and subtract some time' (Participant TI4, Female, ECE Teacher). Inagreement with Participants TA1, TB1 and TC1 indicated that, '*nsolo* is one of the most used local games to teach Mathematics' (Participant TA1, Female, ECE Teacher; Participant TB1, Female, ECE Teacher; Participant TC1, Female, ECE Teacher). Participant TD2 clarified that preschools, 'employ games like *waida* [a traditional and local game] in the teaching of counting and numbers' (Participant TD2, Female, ECE Teacher). She further explains that, 'this game is accompanied by songs that contain counting in them' (Participant TD2, Female, ECE Teacher). Based on the information above, these games' engaging features make learning dynamic and pleasurable, which is consistent with the body of research that supports play-based learning for cognitive development. Participants emphasised how learners' active participation in games improves their comprehension and retention of mathematical concepts.

Theme 2: African games used to teach literacy

The participants recommended several indigenous games for teaching literacy skills, including *lengu* and *umulilo kulupili*. Participants TH3, TD2, TF3 and TG3 expressed the same sentiment that educational traditional games enhance literacy as they elucidated their teaching methodologies for literacy skills, highlighting the integration of captivating activities such as the sound game or language game. These games incorporate sounds, songs and interactive elements to teach letter sounds, vowel recognition and emergent reading abilities. When teachers use games, preschool children were said to find it easy to identify vowels and sounds for each letter in the alphabet. Participant TH3 stated that, 'sound games such as *lengu* promote the acquisition of emergent literacy skills such as expressive and receptive language' (Participant TH3, Female, ECE Teacher).

Participant TB1 argued that in her lessons, she found *umulilo kulupili* more beneficial in teaching literacy skills, thus, 'some traditional songs, including modern songs, teach certain literacy skills [*such as*] sounds, phonics, phonology, and the development of vocabulary' (Participant TB1, Female, ECE Teacher) in young learners. Some early childhood teachers use the race game to teach emergent reading abilities. This game helps children to associate sounds with alphabet letters, as the game is repeated. Participant TH3 said:

> 'Games are important for teaching reading skills, especially in preschool settings. I like the lengu game and the umulilo kulupili game because of how well they foster emerging reading abilities.' (Participant TH3, Female, ECE Teacher)

Participant TD2 expressed that, 'The *umulilo kulupili* game helps pre-schoolers identify vowels and recognise letter sounds by using songs, interactive features, and noises' (Participant TD2, Female, ECE Teacher).

Play-based learning activities promote active engagement and support children's cognitive development and academic skills.

Theme 3: Challenges teachers face when using indigenous games in teaching

Participants discussed the challenges faced when incorporating indigenous games into lessons, including overcrowded classrooms, age disparities among learners and limited resources. This theme captured the shortcomings and constraints preschool teachers face when teaching children through traditional games. Participants discussed how they addressed each of the issues mentioned in the teaching of emergent literacy and numeracy abilities. According to the teachers who took part in the research, the main barrier or limitation is the shortage of appropriate indoor and outdoor learning spaces. Except for one individual, every participant expressed their belief that the largest barriers to promoting appropriate ECE practice were overcrowding in classrooms, children's ages, a lack of knowledge and skills and a lack of creativity and innovation on the part of teachers and resources, especially when games were required to teach skills.

Participant TG3 shared that:

> 'Large class numbers were a severe threat to teaching and learning in most preschools nationally. A single teacher cannot manage over 70 students in one classroom, especially when different types of games need to be played.' (Participant TG3, Female, ECE Teacher)

Every participant expressed concerns about the inadequate quality of the learning environments because of the large number of enrolled students. This implies that because there are so many children, the learning environment might not provide enough support for efficient learning. It might allude to problems like packed classes, few resources, insufficient teacher attention or subpar infrastructure.

Some participants also mentioned the difficulties that big class numbers present for children trying to participate fully in activities. A participant postulated that '… maintaining order is also a problem … the outcomes are not achieved by the end of the day because of enrolment' (Participant TG4, Female, ECE Teacher).

Another challenge that teachers indicated was that the age of the learners mattered when selecting the type of game to use during lesson delivery. Participant TG6 indicated that:

> 'Teachers become overworked and exhausted when they are given many jobs in the same class. As a result, teaching students at the same age and learning level is simpler than teaching learners at different ages and levels.' (Participant TG6, Female, ECE Teacher)

Nonetheless, the age of students posed a significant threat particularly because younger children could not fully engage in the games, thus hindering efficient teaching and learning in the classroom.

Data from participatory observation

The researchers used the following codes or pseudonyms to describe the schools – OBS1, OBS2 and OBS3 OBS4, where OBS1 stands for Observation School 1 and so on. The observation lessons were conducted indoors and outdoors in the selected schools, but the environments were not conducive. All lessons had the topic either addressing mathematics or literacy development. The observers were guided by an observation guide that included, among others, the following: how the teacher linked knowledge and skills in teaching to the learner's background and culture to improve the acquisition of emergent literacy and numeracy skills, the indoor and outdoor role in enhancing mathematics and literacy and whether the outdoor area had enough space for various traditional games to be played (active play for large and small groups). Furthermore, this included how the teachers used knowledge of indigenous games in lessons and the learners' reactions and results when indigenous games were introduced during the lesson. Teachers show the desire to use traditional games in lessons for emergent literacy and numeracy skills (e.g., expressive and receptive skills and number concepts).

All four schools observed elements of playfulness or fun in their learning process to engage children more effectively or to create a positive learning environment. However, some games embedded in playful teaching were not age appropriate, and in some cases, developed world oriented.

In OBS1, it was observed that the teacher taught Mathematics in which the topic was number counting. However, the teacher had difficulties in designing age-appropriate games or tools to use. The games she used in her lessons were not user friendly to middle-class learners who for example found it hard to play *chiyato* or *chiyenga*. When the game was introduced, the children were not enthusiastic about it as it proved to be too challenging for the middle-class learners, who were less than 4 years old. The children could not scoop stones from a hole up to 7 or add the stones because of the rules of the game. Instead of *chiyato* or *chiyenga*, as a participatory observer, we suggested a change of the game to another one called run and target game, generally referred to as a game that equally taught similar concepts. When this game was introduced, the children were excited and they were able to count the number of times each one ran from point A to B. They were also able to separate those who reached first at the endpoint to the number 7. Cognitive development also occurred as children learned counting, numbers and memory. We observed that these games need sufficient time to understand and practice the concepts.

The teachers at OBS2 taught middle-class and reception learners. The topic of the lesson was addition and subtraction. The teacher told the children that he would use the wonderful traditional game called *nsolo*. She then explained the rules and instructions on how the game is played. The teacher used *nsolo* to teach concepts of addition and subtraction to middle-class learners. The game lasted for more than an hour per session.

We observed that children were not actively engaged during the lesson, their level of participation was very low and their ability to understand the game was very poor. Learners could not grasp the tasks and had difficulty following the rules or instructions of *nsolo* when it came to adding and subtracting stones for each participant. Children informed the teacher that the game was unfamiliar to them. As a participatory observer, we therefore participated by demonstrating how the game is played to 20 learners. The researchers grouped them into a group of five learners each. We observed that at this stage, children started to interact with each other in small groups, including collaborating and communicating while playing the game. Fortunately, learners were able to count and subtract within the allocated time.

The researchers observed that in OBS3, the games played in one of the lessons included matching household items in a Mathematics lesson. The topic of the lesson taught was *Vocabulary Building and Reading Comprehension*. The teachers explained how the game is played and at the same time showed them the teaching materials that she brought. The items that were used in the lesson were empty bottles of Coca-Cola, Fanta, sugar pack paper, salt bottles and milkshake containers. The matching game helped learners identify items on the chart and match them with physical items from homes. These aspects helped build cognition in children and supported children's mental faculties in recognition of familiar objectives. Researchers worked with the teacher in ensuring that learners were able to match items using the *nsolo* game, which is the indigenous game with the actual salt to the salt bottle, Coca-Cola empty bottles with pictures on the chart and milkshakes with their related drawings or pictures. As researchers, we acted as a participatory observer. The children who did not manage to match were helped by demonstrating the matching items to them. The researchers repeated several times until the skill was acquired. Repetition also led to acquisition of memory skills by the learners. Learners were able to associate written words (like 'Coca-Cola', 'Fanta', etc.) with physical objects. The children who got the skill quickly were taken to other tasks such as matching of coloured stones with numbers on the card or display. Children were also able to match objects from the lesson related to concepts like size comparison, volume estimation or categorisation.

In OBS4, the enrolment levels are the highest in the area. The school is in an area that is slowly turning into a peri-urban community because of the expansion of the nearby city. The school environment is big with very spacious classrooms. However, over crowdedness has made the school and classroom spaces inadequate. The researchers observed that ECE classrooms at this school had more than 70 children. One teacher taught it with no assistant teachers. The teacher was teaching days of the week in a literacy lesson. She assigned children to groups of five; in some cases, the number of children was even more than five. She gave tasks such as playing with stones in one and dice made from used card boxes in another group. She checked on the progress per group and ensured each child participated. Some children were struggling to play the game. Out of 70 children, the researchers took about 30 children and grouped them. The researchers demonstrated how the game is played. Furthermore, as participant observers, the researchers assisted in managing activities going on in groups as the researchers had shared the number of groups each one was managing. The collaborative approach the researchers used in this lesson helped to deal with over-enrolment as children could work with a more competent peer while teachers were monitoring the process. During the lesson, learners could recite the week's names.

Another thing that the researchers observed was that some teachers used more Eurocentric games as they were not familiar with the educational traditional games. Researchers also noticed that in this school, teachers leaned towards Eurocentric games, presumably as they found traditional educational games unfamiliar and because the topic was days of the week.

Observations revealed the use of traditional games in teaching numeracy and literacy skills, with efforts made to adapt games to learners' needs. However, challenges such as inappropriate game selection for age groups and overcrowded classrooms were evident. Collaborative approaches involving researchers and teachers helped mitigate these challenges and enhance learning experiences.

Discussion of the findings

Our discussion of the findings is guided by scholars who have shown the importance of games by indicating that children must be active participants in their day-to-day learning process, which should occur both indoors and outdoors (Grindheim 2021). Teachers must understand the importance of traditional games in the education of their children. Until recently, ECE or preschool in Zambia has largely been for a select few children from families that can afford private education, and which is Eurocentric (Lungu & Matafwali 2020). Since 2014, the Ministry of Education has annexed ECE to primary schools and has made it compulsory for all children (Munsaka & Kalinde 2017). Given this, it is vital to explore the efficacy of indigenous games in promoting literacy and numeracy skills among preschool children before entering Grade 1. All 10 participants were interested in giving more information on what games can do to the children's education. Three themes were identified in this study.

The findings revealed that teachers identified several traditional games that they used to teach numeracy skills to their learners. Results indicated that teachers identified traditional games such as *nsolo, waida, pada, chiyato* or *chiyenga, kankuluwele, bus game* and *nyenyeezi* to teach numeracy skills such as counting, numbers, memory and matching skills to preschool learners. This was consistent with Madondo and Tsikira (2022), who found that teachers used *nsolo* to teach similar numeracy skills to preschool learners in rural Zimbabwe through guided and free play. It was found that teachers employed the race game to help children pronounce words correctly and generate acceptable

letter sounds, a strategy that has been replicated by scholars such as Ejuu (2019) and Kejo (2017). These academic arguments are in line with the results of the current study that traditional games help preschoolers acquire letter and word recognition.

The study further revealed that some teachers were observed to lean more towards the use of Western games and songs in teaching as they were unfamiliar with some of the traditional games. Similarly, Madondo and Tsikira (2022) and Moloi et al. (2021) found that teachers in rural Zimbabwe and South Africa favour western games over indigenous games because of a lack of knowledge and skills in these games.

The study revealed that younger children in the middle class were not able to comprehend the rules and follow them closely during the use of *chiyato/chiyenga*. It also revealed that the children were not enthusiastic about the game as it proved to be challenging for the middle-class children, who were less than 4 years old. This is consistent with the findings by Ejuu (2019) and Moloi et al. (2021), whose studies suggest that certain games are more appropriate to older children than younger ones because of the complexity of rules and procedures. The study also found that traditional games help stimulate children's critical thinking, learn social rules, respect for elders and help the needy in society. Similarly, Kejo (2017) found that traditional games, when used by teachers in preschools, led to the acquisition of skills that are useful for the community, such as critical thinking and blending in society.

The study found that there were several tiny classrooms with inadequate ventilation and little space for engaging in fun activities. The above finding is in line with earlier research conducted by Mwanza-Kabaghe et al. (2015), who discovered that classrooms in Lusaka were overcrowded and lacked enough room for students to learn via play. This significantly affected the learning outcomes of each lesson taught by teachers in overcrowded classrooms.

Through these frameworks, the study discerned how indigenous games can facilitate literacy and numeracy development in preschool children by leveraging social interaction (Ryoo & Kekelis 2018) and the cultural relevance of IKS. Data related to the theoretical framework showed that teachers used traditional games to teach numeracy and literacy skills, illustrating how interactive learning (Vygotsky) and cultural relevance (IKS) work together to enhance educational outcomes. The study found that traditional games require active participation and interaction, aligning with Vygotsky's emphasis on social learning (Vygotsky 2016). In the ZPD, teachers facilitate learning by guiding learners through culturally appropriate games and combining the IKS and Vygotsky frameworks. The utilisation of traditional games provides cultural continuity, supporting IKS, and the teacher's involvement in enabling these games promotes Vygotsky's ZPD. From Vygotsky's perspective, the study finds that teachers used scaffold learning and modified games to fit the developmental stages of their learners (Vygotsky 2016). The findings demonstrated that curriculum integration of IKS improves children's learning. These findings are consistent with those of Acharibasam and McVittie (2021), who observed that children's learning is enhanced in educational environments that integrate indigenous knowledge and pedagogical practices.

Limitations

Although this study provides important insights into the effectiveness of indigenous games in fostering literacy and numeracy skills in pre-schoolers, it is not a representative sample of Zambian learners. It only clarifies teachers' perspective at the schools where the information was gathered.

Recommendations

This study makes a significant contribution to the field of early childhood education by emphasising that indigenous games are incorporated into the school curriculum. The study suggests that teachers should attend intensive CPD workshops and seminars to gain the knowledge and abilities necessary to use African games effectively and suitably to teach ECE students pertinent skills. The curricula of universities and colleges of education should also include instruction in indigenous games for teacher preparation. Sharing information on classroom management, creating materials, developing knowledge and abilities and employing preschool-appropriate pedagogies is advised for ECE teachers. By doing this, a group of educators with expertise in early childhood education would be assembled.

Finding educators who specialise in early childhood education through professional networks, educational institutions or referrals is one way to evaluate educators. With support from the Department of Basic Education, we can also personally invite these educators to attend the assembly by contacting them one-on-one or through formal invitations.

Conclusion

In summary, the results of the interviews and participatory observations highlight the important role that educational indigenous games play in helping pre-schoolers in Chibombo district acquire emerging literacy and numeracy skills. The themes identified offer insightful information on the advantages and difficulties of using these indigenous games in early childhood education. First of all, the interviews demonstrated how well African games like *nsolo*, *waida*, *lengu* and *umulilo kulupili* taught literacy and numeracy skills.

The study has shown the major benefits of including traditional games in preschool education, especially in rural communities with limited resources. It emphasises how crucial it is to use indigenous games in ECE to meet learning objectives, particularly in settings with limited access to pricey developed world teaching resources.

The results, however, also highlight the difficulties teachers encounter when integrating these games into a variety of topic areas. Moreover, the difficulties educators encounter while implementing indigenous games highlight the

necessity of tackling problems like packed classrooms, age-appropriate game choices and scarce resources. The observations showed that there were times when children's games were unknown to them or not adapted to their developmental stage, which made it difficult for them to engage in the game and learn. Furthermore, the presence of Eurocentric games in certain schools emphasises how critical it is to advance cultural diversity in teaching methods.

This indicates that further research and efforts for professional development are required in order to provide teachers with the tools and resources they need to properly include classic games in a variety of curricula.

Going forward, it is critical to overcome the barriers preventing the effective implementation of indigenous games in early childhood education while also acknowledging the promise of these games. Prospective investigations may concentrate on creating games suitable for a given age group, offering guidance and assistance to educators and promoting laws prioritising culturally sensitive teaching methods. Teachers may build more inclusive and productive learning environments for pre-schoolers by utilising the power of indigenous games and addressing current issues.

Furthermore, a possible direction for future research could be to examine how technology can be used to modify and improve the use of indigenous games in ECE. By filling in these gaps, the researchers may more effectively utilise the instructional potential of traditional games to enhance pre-schoolers' educational experiences and advance fair access to high-quality education.

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Authors' contributions

M.D. contributed by writing the first draft of the methodology and supervised the student, G.M.M.

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Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and due to it being human data and are available from the corresponding author, M.D., upon reasonable request subject to ethical permission and a signed confidentiality agreement.

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