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Ethnomathematical Dimensions of the *Shiva* and *Uyerver* Children Plays of the Tiv People of Akor Village in Guma Local Government Area of Benue State, Nigeria

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Abstract

The study investigate the mathematical dimensions of the *shiva* and *uyerver* children plays of the Tiv people of Akor Village in Guma Local Government Area of Benue State, Nigeria. Six research questions and were formulated to guide the study. The study employed a phenomenological research design to achieve the objectives of the study. The study population consists of the entire population of people living in Akor village of Guma Local Government Area of Benue State. The study used a sample of twelve (12) respondents which comprised male and female indigene of Akor village of Guma Local Government Area of Benue State. The data collected was analyzed using the narrative analysis. The results showed that traditional games influenced language skills development of basic education pupils when they can speak in sentences of five or more words about games, recite poems with increasing construction activity and name favourite games. Traditional game like *shiva* and *uyerver* influenced social skills development and mathematics of

pupils through their ability to tell stories, report experience, sing and dramatize and logically scale through the conditions of the game to emerge as winners. The study recommended that pupils should be encouraged to play with traditional games like *shiva* and *uyerver* in their environment since through their interaction with these games, they achieve all-round development more so academic excellence. Therefore teachers should find the need to conserve resources and not flood the school arena with wanton toys that may not have any cognitive relevance.

Keywords: Ethnomathematics, Traditional Games, *Shiva*, *Uyerver*, Akor Guma, Mathematics Education, Tiv

Introduction

Mathematics is one subject that can prepare the students to face 21st century challenges. Learning and innovation skills to prepare students to face complex life and work environments in today's world consist of creativity and innovation, critical thinking and problem solving, communication, and collaboration (Partnership for 21st century learning, 2007). In addition, mathematics learning process in elementary school is an important phase for children in understanding the concept of mathematics.

Mathematics is a science of magnitude and number as well as the science that sustains the daily practices of man. It is one core science subject that acts as pivot on which national development and wealth of any nation is created. Competency in mathematics learning is vital and indispensable to every individual's meaningful and productive life. Mathematics learning is very important in enhancement and sustainability of human existence because mathematics is all about finding solutions to human problems and physical challenges. All these are indications that mathematics is useful in domestic and business deals, scientific discoveries, technological breakthrough, problem-solving and decision making in different situations in life (Usman & Nwoye, 2010; Unodiaku, 2011; and National Council of Teachers of Mathematics, NCTM, 2013). It may be due to these vital usefulness of mathematics that Nigeria government made the study of mathematics compulsory at all level of basic education in Nigeria by National Policy on Education (2004) provision.

In the elementary education level, children are expected to build the foundations of mathematical concepts. The teacher should be able to design mathematics learning process based on the characteristic of elementary school students. According to Ollerton (2010), teaching is more than just finding ways to transfer the knowledge, teaching is about organizing learning so that students can be confident to try the new ideas, find the relationships and the opportunities to do the creative and analytical action, develop the generality, and take the initiative.

In Nigeria, it is not uncommon to hear many students at all levels of the Basic Education system commenting that they have always found mathematics a difficult subject to understand. Depending on the type of cultural background that one comes from, and how well one attaches to mathematics as a formal school subject, there will surely be a variety of responses to this comment given by different individuals. Some would ignore it, probably regarding it as one of the day to day complaints about the experiences children go through. However, for those who seriously call themselves mathematics educators, such a comment constitutes a challenge to their professional competence (Matang, 2002).

Recent trend in teaching and learning of mathematics worldwide demands conceptual change approach as against the traditional didactic method, which promotes rote learning of mathematics. Educational reforms in mathematics teaching at both pre-secondary and secondary school levels in Nigeria follows from philosophers in science like Robert Sternberg (2013) who advocated for replacement of traditional cumulative view of scientific knowledge with an experiential change view such as the use of ethno-mathematics (Sternberg, 2013).

NCTM (2013) defined ethnomathematics as the study of the relationship between mathematics and culture or the mathematics which is practiced among identifiable cultural groups. It is the investigation of the traditions, practices and mathematical concepts of subordinated social groups. Ethno-mathematics is the study of mathematics which takes into consideration the culture in which mathematics is embedded. Mathematical concepts and ideas found in the Shiva and *Uyerver* children play of the Tiv people of Akor village in Guma Local Government Area of Benue State, Nigeria are more prominent in their occupations and crafts, particularly in their social activities, mode of measurements and counting system. It is the mathematics concepts and ideas embedded in these cultural games of the people that this study intends to investigate along with its mathematical dimension and influence on mathematics teaching and learning at the Basic Education level in Guma Local Government Area of Benue State.

The mathematical dimension of this game will be imperative and this can be used both to increase the social awareness of students and offer alternative methods of approaching conventional teaching and learning of mathematics in schools (Gerdes, 2001); and the best of alternative approaches should come or be given through practical activities using concrete materials (NCTM, 2013), such as ethno-mathematics materials.

The *Shiva* game of the Tiv people of Akor village in Guma Local Government Area of Benue State take the form of the popular chess game with slight differences. Unlike the chess, the game is played on the ground using dried sticks which represents the piece. The pieces are six (6) in numbers and are often arranged in similar pattern on both sides. Unlike the chess game, the *shiva* has two major characters, the rooks and the queen with the queen carrying its distinctive colour code. The rooks are what the regular player usually referred to as "*azinga*" while the queen are considered as the most powerful of them all and is called "*tor-azinga*". *Azinga* always move forward and diagonal while the 'tor-azinga" with a distinctive matching colour can move forward, diagonal and backward. The *'azinga'* cannot jump over other *azinga*, whereas the 'tor-azinga can jump over other piece. It can even move to take the place of an opponent *azinga* which is then captured. The 'tor-*azinga'* occasionally placed in positions where they can capture the opponent's *azinga* (by landing on their square and then replacing them), defend their own piece in case of capture, or control important squares in the game.

The *tor-azinga* can move in any one straight direction; forward, backward, sideways, or diagonally as far as possible as long as she does not move through any of her own team. And, like the *azinga*, if the *tor-azinga* captures an opponent's *azinga* her move is over. Another unique feature of the *azinga* is that they only move forward and diagonal but never backward. The most basic way to evaluate one's position is to count the total value of *'azingas'* on both sides. The point values used in *shiva* are usually in one point for the *azinga* while the *'tor-azinga'* makes two points at each strike. In *shiva* game, the first mover is always determined by a toss of a coin. The game winner is often determine as the player with the highest points. There are several ways to end a game of

shiva: it is either by checkmate, with a draw, by resignation or by forfeit on time. The *shiva* game of the Tiv people of Akor village in Guma Local Government Area of Benue State develops counting and knowledge of multiples of chosen numbers.

In the teaching of mathematics, this problems belongs to the recreational mathematics. The most known problems of this kind are connected to graph theory and combinatorics. The application of this game in the teaching of Mathematics occur when students a given the chance to practice solving basic Mathematics problems like in geometrical calculations as earlier mentioned. This also gives teachers the opportunity to observe the students' performance in mental calculations, helping to determine areas where students may be having difficulties. In mathematics, graph theory is the study of graphs, which are mathematical structures used to model pair-wise relations between objects. A graph in this context is made up of vertices (also called nodes or point) which are connected by edges (also called links or lines). A distinction is made between undirected graphs, where edges link two vertices symmetrically, and directed graphs, where edges link two vertices asymmetrically. The game of *shiva* has many other mathematical applications such as the concepts of problem solving and logic. It is a game of strategy that develops memory and concentration. It involves a lot of problem solving skills because your mind must constantly be scanning the board and piecing together possible solutions.

On the other hand, the *uyerver* game of the Tiv people of Akor village in Guma Local Government Area of Benue State looks like the popular hide-and-seek game of children, game in which one player closes his or her eyes for a brief period (often counting to 100) while the other players hide. The term *'uyerver'* literally mean run and hide. The game is best played by ten to 20 number of children. The seeker then opens his eyes and tries to find the hiders; the first person found is the next seeker, and the last is the winner of the round. In one of many forms of the game, the hiders try to run back to "home base" while the seeker is away looking for them; if all of the hiders return safely, the seeker repeats as seeker in the next round. The seeker is usually required to count to either 50 or 100 while the others go and hide. The play instrument is the children themselves of the age of four years upwards. The *uyerver* game can be played indoor or outdoor

The *uyerver* game is played differently in various regions; sometimes the seeker may be helped by those he finds. Alternatively, only one child hides and is sought by all the rest, as in sardines, where the hider is joined by seekers surreptitiously as they find him (the name of the game coming from the crowded condition of the hiding place). Hide-and-seek appears to be equivalent to the game *apodidraskinda*, described by the 2nd-century Greek writer Julius *Pollux*. In modern Greece hide-and-seek is called *kryfto* (Encyclopaedia Britannica, 2014).

The game is played throughout the world. In Spain the game is called *el*escondite, in France *jeudecache-cache*, in Israel *machboim*, in South Korea *sumbaggoggil*, and, in Romania *de-av-atiascunselea*. Hide-and-seek is known throughout South and Central America under such names as *tuja* (Bolivia), escondidas (Ecuador and Chile), and cucumbè (Honduras and El Salvador).

Similarly, there are many variants on the *uyerver* game. For instance, the Igbo children in Nigeria play *oro*, a combination of hide-and-seek and tag in which the seeker stands in the centre of a large circle that has been drawn in the sand and tells other players to hide. The seeker then steps out of the circle, finds, and then chases the other children, who must run into the circle to

be safe. The child touched before reaching the circle must be the next seeker. The *uyerver* game create anticipation and creative thinking and using these to help solve mathematical problems. It helps develops ability to identify numbers and follow instructions carefully. The concept of this game helps to develop ability to trace numbers and direction of line either diagonal, horizontal or vertical.

Considering the mathematical significance of these children plays, this study seek to explore their mathematical dimensions along with their potential to improve the teaching and learning of mathematics in Basic Education. The study also inquires into the cultural experience of the Tiv People of Akor village of Guma Local Government Area of Benue State, Nigeria with the *shiva* and *uyerver* indigenous games.

Statement of the problem

Students, parents, educators, government and all stakeholders are worried by persistent poor achievement of students in mathematics. Evidence shows that this condition is deplorably high, to the point that Nigeria students start competing for the last position instead of first in mathematics in Senior School Certificate Examination among the eleven English-speaking West African Countries. Also there is evidence to lend support to the fact that this poor achievement and retention is as a result of non-utilization of appropriate teaching approaches in the subject. One wonders why all the methods used so far are not capable of reversing this ugly trend. It is however noted in previous researches that the use of games and cultural approach mostly referred to as ethno-mathematics has not been adequately tried out in Nigeria, particularly with the view to see if it could reverse this poor achievement.

In addition to the view of change in mathematics students' academic performance, the incorporation of the mathematical dimension of cultural practices, games and activities of different tribes may henceforth be implemented in the school curriculum by curriculum planners for teaching and learning. There are also conflicting believes whether Basic school mathematics teachers have the necessary competencies in designing and using mathematical dimensions of indigenous games in the teaching of mathematics at the Basic Education. Therefore, the problem of this study is to provide empirical evidence of the mathematical dimension of the *shiva* and *uyerver* of the Tiv people of Akor village in Guma Local Government Area of Benue State, Nigeria as well as investigate the potential of the game to improve the academic performance of mathematics students in Basic schools in the study area.

Literature Review

Vygostsky's Socio-Cultural Cognitive Theory (Vygotstsky 1986)

Lev Vygotsky, a Russian psychologist, developed a theory of cognitive development known as the Socio-cultural theory of cognitive development in the early twentieth century. The main assertion of the Vygotsky theory is that the cognitive development of children is advanced through social interaction with other people, particularly those who are more skilled. In other words, Vygotsky believed that social learning comes before cognitive development, and that children construct knowledge actively.

Vygotsky is most recognized for his concept of Zone of Proximal Development (ZPD) pertaining to the learning process of children. According to the Vygotsky theory, children who are

in the zone of proximal development for a particular task can almost perform the task independently, but not quite there yet. They need some help in order to perform the task successfully.

For example, a five-year-old child knows how to ride a tricycle. However, she can't ride a bicycle (with two wheels) without his grandfather holding onto the back of her bike. With his grandfather's help, this little girl learns to balance her bike. With some more practice, she can ride the bike on her own. As children are given instructions or shown how to perform certain tasks, they organize the new information received in their existing mental schemas. They use this information as guides on how to perform these tasks and eventually learn to perform them independently According to Vygotsky's theory of cognitive development, children learn through social interaction that include collaborative and cooperative dialogue with someone who is more skilled in tasks they're trying to learn. Vygotsky called these people with higher skill level the More Knowledgeable Other (MKO). They could be teachers, parents, tutors and even peers.

Vygotsky's theory is a social-cultural cognitive theory that emphasizes how culture and social interaction guide cognitive development as inseparable from social and cultural activities. He views knowledge in this theory as being constructed through interaction with other people and objects in the culture such as play objects and books. Vygostsky's theory is significant to ethnomathematical intervention because it focuses on the process in which a person's attitude and behaviors change to conform with those regarding his environment. In this respect, the indigenous games of the Tiv people of Akor village emanates directly from their social and cultural environments. Through this approach, researchers are able to examine how the different systems (e.g., microsystem, mesosystem, exosystem, and macrosystem) affect development (Berenbaum, *et al.*, 2008). The microsystem refers to the relationship between the individual and the settings in which the individual interacts (e.g., home, school, work, place of worship, game, toys etc.). The mesosystem is the intermingling of the settings in which individuals participate.

Intrinsic and Extrinsic Motivation Theory (Wlodkowski, 2011)

Beck (2008) maintains that with regard to influence of game on motivation to learn, one can distinguish between intrinsic and extrinsic motivation. Intrinsic motivation theory is an internal energy called forth by circumstances that connect with that which is culturally significant to the person. It relates to those things that are near and dear to people because of values, beliefs or circumstances. Wlodkowski (2011) postulates that some students is dominated by extrinsic factors or external rewards which tend to keep learners more dependent on the instructor and in need of further help. He further states that game based motivation is important for education for the following reasons:

i. A motivated learner will surpass an unmotivated learner in performance and outcomes.
ii. Basically, when there is no motivation to learn, there is no learning.
iii. Instruction with motivated learners can be joyful and exciting.
iv. Learners who leave an educational environment feeling motivated are more likely to have a future interest in what they learned and are more likely to use what they have learned.
v. One of the most commonly measured indicators of the impact of games is persistence, and when this exists, people work longer and with more intensity.

In this games of *shiva* and *uyerver*, the nature and pattern of the play promote and motivate players to stay tuned and persistent in ensuring he or she win the game at the end. *Shiva* game and *uyerver* game has one similar motivation strategies as seen when players calculate logically the approach that best promote him/her winning the game. This scenario promote motivation among the entire participants of the game.

Ethnomathematics

Ethnomathematics was originally developed as a means to express mathematics that were practiced outside the perimeter of scholarly settings: the mathematics found in primitive culture. As studies in the area expanded as it relates to education, culture, and politics, evolving ideas produced a broader view of ethnomathematics. Hence, there is no simple definition of the term, but collective perspectives from many writers on the subject provide an adequate understanding of its scope and purpose (Weldeana, 2016).

Generally speaking, ethnomathematics expresses the relationship between mathematics and culture (D'Ambrosio, 2001). Culture transcends boundaries and includes "arts, history, languages, literature, medicine, music, philosophy, religion, and science" (D'Ambrosio & D'Ambrosio, 2013). Ethnomathematics, therefore acknowledge mathematical practices within these expressions of culture, which collectively and uniquely form cultural groups such as "urban or rural communities, working groups, professional grade, students in groups, indigenous peoples, and other specific groups" (Haryanto *et al*., 2017).

Although we live in a society that is dominated by math-based technology, most people typically only think about 'school math' when they think about mathematics. Quite early in their schooling, most students learn to hate math or believe that they cannot "do" math, as it is defined by the traditional academic approach (Mukhopadhay, Greer & Roth, 2012). In fact, Wolfram (2010) suggests that the future technology-based math should probably not even be called "math" due to its negative connotations and the potential changes to the curricula and pedagogy. Instead of instilling fear and loathing, mathematics education should foster a greater understanding of how mathematics is applied in our increasingly technologically driven world. School math needs to expand its parameters and become more inclusive of the mathematics found in the world that the students inhabit. One way to do this is to include aspects of ethnomathematics, culturally-based mathematics, in order to help students develop a greater interest in mathematics. As their interest in mathematics grows, students will be in a better position to see that mathematics extends beyond the classroom, that it has real importance in the 'real' world.

As Presmeg (2000) points out, there are a number of critical questions that arise from the initial question of what exactly is ethnomathematics? Is it solely the mathematical ideas from traditional societies? In essence, ethnomathematics shifts mathematics from strictly the domain of schools and universities, and places it within the world of people, their cultures, and everyday activities (Pais, 2010).

The Akor People in Guma Local Government Area of Benue State, Nigeria

The history of the Tiv people of Akor village cannot be traced back as they were in existence for decades before Benue State was created. The market, Akor, as the name implies is named, managed and controlled by Mbakyabe clan of Nzorov Council Ward in Guma Local Government Area of Benue State, Nigeria. Mbakyose Tiv people of Akor village are bordered in the north by Nasarawa

State from where they settled in the river bank of the River Benue; to the west by Makurdi Local Government Area of Benue State to the East by Gboko Local Government Area of Benue State and to the south by Buruku Local Government Area of Benue State.

Part of the river Katsina-Ala also passes through the village giving them the enablement to be involved in fishing, hunting and farming of soybeans, rice, yam and cassava as their major occupation.

The Akor (Mbakyase) Tiv People observed traditional festivals such as the new yam festival. The people of Akor village live a simple lifestyle and are mostly found in small round hut made of blocks with thatch roofs. Their children are often found in community schools and government schools during the early hours of the day while they often go the farm in the afternoon and will often return in the late evening. In Akor village, children often stay around their homes playing games whenever they are neither in school nor in the farm.

The *Uyerver* game

It is believed that the game of *uyerver* (hide and seek) first originated from a Greek game called "apodidraskinda." It was described for the first time by the second century Greek writer Julius Pollux. While it is impossible to determine its exact origin, the game of apodidraskinda is the earliest known example of hide-and-seek. The game was first played in Yoruba land in Nigeria where it is popularly called "Boju Boju". The game was later introduced to other parts of the country during trade transactions between the western and eastern Nigeria. It was later introduced to North Central Nigeria where Benue State is located due to similar agricultural activities and trade. Unlike the name given to 'boju boju' it is called *'uyerver'* game literally meaning "have you hiden". It is played exactly as it is today in our society, with one player closing his or her eyes and counting while the other players hide. Then the first player tries to find the other players before they can make it back to home base.

There are few rules other than the basic point of the game, which singles out a seeker, while the other players find hiding spots. The seeker counts aloud to a number previously agreed upon by all players so they know how much time they have to hide. This in turn allows them to venture to an appropriate distance and situate themselves before the seeker finishes counting. For example, if playing in a house the seeker may count to 40 or 50 while in a smaller space the seeker may count to 20. The usual speech goes like this: "One, two, three, …, twenty. Ready or not, here I come!" It is very important to tradition that the seeker say "Here I come" to let the other players know their time is up.

Uyerver game is a long favoured game as it requires nothing but the players. It takes shorter time in setting up the game, and it makes use of several skills such as ability to count, ability to keep silence, and the ability to observe and finding a target. It allows the seeker to tune into their senses to aid them in finding the concealed players, while the concealed players are able to practice remaining calm and silent in what could arguably be described as high-stress situations.

The player found last wins the game and becomes the seeker for the next round. This game is also favoured as it gives everyone an equal chance at winning and playing different roles in the game. Sometimes there is a home base, where the seeker will have counted. If the seeker has not found the players in a certain amount of time, then the hiding players may run to home base before

the seeker catches them, and this renders them safe. If a player is tagged while running to home base, they become the next seeker.

Society traces this game all the way back to 200 years Before Common Era (200 B.C.). One can feasibly argue the game of *uyerver* is as old as survival itself.

Figure 1: The *Uyerver* game

The *Shiva* game

The origin of the *shiva* dates back almost 1500 years in the form of chess game. The game originated in northern India in the 6th century AD and spread to Persia. When the Arabs conquered Persia, *shiva* game was taken up by the Muslim world and subsequently, through the Moorish conquest of Spain, spread to Southern Europe and to West African through the time of Dan fodio (Encyclopedia Britannica, 2002).

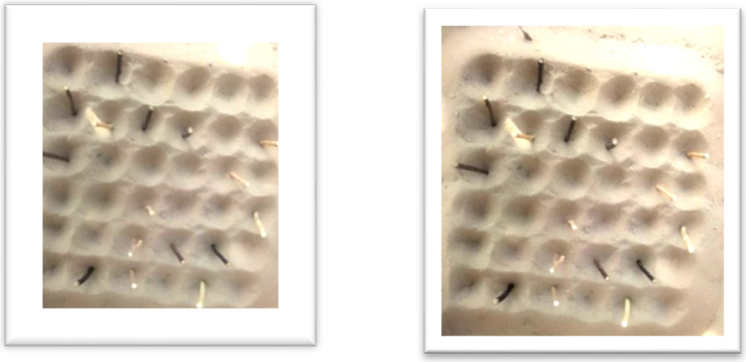


Figure 2 *Shiva* game

The game was taken up by the Muslim world after the Islamic conquest of Persia, with the pieces largely retaining their Persian names; in Arabic "māt" or "māta" means "died", "is dead". In Arabic, the game became Shatranj. In all other languages, the name of the game is derived either from *shatranj* or from *shah*. Changes later occurred in the names of the pieces. Table 1 below provides a glimpse of the changes in the names and character of *shiva* pieces, as they passed from one culture to another, from India through Persia to Europe. Changes later occurred in the names of pieces happened over several centuries after the game arrived in Europe and Nigeria. The Igbo people of Nigeria calls it 'oro' while the Tiv calls it the *shiva* (Gareth, 2000). After embracing the game, its pattern of play was changed by the early ancestors of the Tiv people. Some aspect of this changes were in the platform in which this game was played, that is instead of playing the game of *shiva* using the board, it is played by the Tiv people using the ground with dried sticks with some having special colour codes usually representing the *tor-azinga*.

Table 1: Names of *shiva* related games in different languages

Sanskrit	Persian	Arabic	English	Spanish	French	Italian	Tiv
Raja (King)	Shah	Shah	King	Rey	Roi	Re	Tor
Mantri (Minister)	Vazir/Vizir	Wazir/Firzān	Queen	Reina	Reine	Regina	Torkwase
Hasty/Gajah (elephant)	Pil	Al-Fil	Bishop	Alfil	Fou	Alfiere	Orhemen
Ashva (horse)	Asp	Fars/Hisan	Knight	Caballo	Cavalier	Cavallo	Jaki
Ratha (chariot)	Rukh	Rukh	Rook	Torre	Tour	Torre	Anyoon
Padati (footsoldier)	Piadeh	Baidaq	Pawn	Peón	Pion	Pedone	An-ye

Mathematical dimension of *shiva* game

Many studies have analyzed the relationship between general intelligence and abilities of the *shiva* game and other chess-like game. In particular, some of them have investigated the correlation between these two variables suggesting that the players' population (both adults and children) is more intelligent than the general one (Frydman & Lynn, 1992). This evidence, however, does not necessarily lead to the conclusion that the game improves intelligence because the direction of the causality is uncertain (Gobet & Campitelli, 2002). In fact, there are several possible alternative explanations for that: A high IQ could be the cause of a high (*shiva*) ability (and not vice versa); in other words, an intelligent individual achieves a high ability just because the game requires a high degree of intelligence, but it does not increase it; or, alternatively, high-IQ people could be "selected by the game" much more easily than others: Subjects playing *shiva* can find out that they are good at the game, so they are encouraged to continue to play it (Gobet & Campitelli, 2006). Beyond the question of direction of causality, the more general problem of the transfer of skills must be held in consideration.

The work of Thorndike and Woodworth (1901) states that the transfer of cognitive abilities, from a domain to another one, occurs only when the domains share common elements. This implies that the transfer of skills is quite rare and limited to the extent that there is an overlap between the domains. Some studies have shown that this applies to the game of chess too. More recently, Unterrainer, Kaller, Leonhart, and Rahm (2003) have found that chess players' planning abilities did not transfer to the Tower of London, a test assessing executive function and planning skills (Unterrainer *et al*., 2011); in Waters, Gobet, and Leyden (2002), Chess players' perceptual skills did not transfer to visual memory of shapes; and finally, chess abilities did not correlate with performance in a beauty contest experiment (Bühren, Frank & Nage 2012). All these studies have suggested that transfer is, at best, improbable, and that chess players' special abilities are context-dependent. Given that the more specific a skill is, the less that skill is transferable to another domain; nevertheless, it is reasonable to suppose that a game requiring attention, logical thinking, planning, and calculation abilities would be able to improve at least some of the aforementioned abilities, which are linked to the problem-solving competence and, overall, to general intelligence, at the beginning of their development.

Related studies of (Barrett & Fish, 2011; Hong & Bart, 2007; Kazemi, Yektayar, & Moham, 2012; Scholz and Leferre, 2008; Trinchero, 2012) have found that children attending *shiva* games or *shiva* related games show significant improvements in mathematical abilities. This is even true for low-IQ subjects Scholz *et al.* (2008) found that children with an IQ ranging from 70 and 85, attending 1 hr per week of chess instead of 1 hr of mathematics, performed significantly better in addition and counting than children who did not participate in chess; Hong and Bart (2007) found a correlation between chess ability and non-verbal intelligence in students at risk of academic failure, suggesting that chess ability can be a predictor of improvement in cognitive abilities; Barrett and Fish (2011) tested 31 students, receiving special education services, divided in 2 groups: One had *shiva* lesson once a week instead of a lesson of mathematics, whereas the other one had two lessons per week of mathematics, but no *shiva*.

This study showed that then *shiva* group improvements in "number, operations and quantitative reasoning" and in "probability and statistics" were significantly higher than those obtained by the other group who did not attend any *shiva* activity. Similar results have also been

found in pupils with normal IQ and without specific disabilities (Kazemi *et al.*, 2012; Liptrap, 1998; Trinchero, 2012a, 2012b). In all these studies, positive effects of *shiva* appeared after at least 25/30-hr courses. Studies of Trinchero (2012b) and Kazemi *et al.* (2012), which investigated the effects of a chess course on children's (third graders in Trinchero, 2012b, fifth, eighth, ninth graders in Kazemi *et al.* 2012) mathematical problem-solving ability, deserve a particular attention. Both of these studies have found a significant improvement in problem-solving scores in *shiva*-trained children compared with children who have not performed any *shiva*-related activity.

These results suggest that *shiva* could increase not only basic mathematical abilities (as calculation or addition) but also competences, such as mathematical problem-solving abilities. Starting from these data, the aim of the present study was to verify whether a blended strategy (Trinchero, 2013) consisting in a 10- to 15-hr*shiva*course supported by a computer-assisted training (CAT) is able to improve mathematical problem solving ability in children in a shorter time compared with other previous studies. Assuming that at least some *shiva* abilities can be transferred from *shiva* to the mathematical problem-solving domain, our hypothesis is that the *shiva* trained children group will show a significantly higher improvement in mathematical problem-solving skills compared with children who did not receive any *shiva* training, and among the subjects who received *shiva* training, those who used the CAT more will show a higher improvement.

Chess affects both sides of the brain and improves mathematical abilities. Logic games like *shiva* are a challenge to the brain and stimulate dendrite growth by sending signals from the neuronal brain cells. Dendrites are an integral part of the neuron, and with more dendrites the nervous system improves and thus influences brain development "Knowing *shiva* rules, basic principles, and to have knowledge of some *shiva* opening is within easy-to reach educational goals, accessible to almost all students.

To point out the benefits that *shiva* can yield during the educational process, it is necessary to take into account experiences collected at several levels. Psychological research has provided a deeper insight into the thought processes that take place in the mind of an individual during *shiva* games. At the empirical level, psychological researches were carried out where *shiva* players were used as means to examine the cognitive process in creative task solving. Exploring the ability of chess players to play without looking at the table, he concluded that they were using imagination, experience and memory.

The benefits of *shiva* for children are enormous, it is a fact. Shiva makes kids smarter. Through learning *shiva*, children develop or sharpen the following skills:

i. **Focusing**: Children are taught the benefits of observing carefully and concentrating. If they do not pay attention to what is happening, they can't respond to it, no matter how smart they are.
ii. **Visualizing**: Children are prompted to imagine a sequence of action before it happens. We actually strengthen the ability to visualize by training them to shift the pieces in their mind, first one, then several moves ahead.
iii. **Thinking Ahead**: Children are taught to think first, then act. Teachers should teach them to ask themselves "If I do this, what might happen then, and how can I respond?" Over time, chess helps develop patience and thoughtfulness.

iv. **Weighing Options**: Children are taught that they do not have to do the first thing that pops into their mind. They learn to identify alternatives and consider the pros and cons of various actions.
v. **Analyzing Concretely**: Children learn to evaluate the results of specific actions and sequences. Does this sequence help me or hurt me? Decisions are better when guided by logic, rather than impulse.
vi. **Thinking Abstractly**: Children are taught to step back periodically from details and consider the bigger picture. They also learn to take patterns used in one context and apply them to different, but related situations.
vii. **Planning:** Children are taught to develop longer range goals and take steps toward bringing them about. They are also taught of the need to reevaluate their plans as new developments change the situation.
viii. **Juggling Multiple Considerations Simultaneously**: Children are encouraged not to become overly absorbed in any one consideration, but to try to weigh various factors all at once.

There are other benefits as well are:

i. Mathematics Development
ii. Adding and Subtracting
iii. Division
iv. Multiplication
v. Introducing numbers
vi. Counting
vii. Categorizing Algebraic Concepts and Pre-Concepts
viii. Spatial Orientation/Directions
ix. Graph Reading & Coordinates Pre-Reading & Writing Skills
x. Shape recognition
xi. Fine motor skills/hand-eye coordination
xii. Word and sound recognition (Listening exercises)
xiii. Visual memory Life Skills Development
xiv. Creativity
xv. Colour and Pattern recognition
xvi. Steriognostic development
xvii. Planning & Strategic thinking
xviii. Reasoning & Problem solving
xix. Comprehension

Empirical Studies

In a study Giovanni, Alessandra and Gabriella (2015) explored Mathematical Problem-Solving Abilities associated with chess game played by young pupils. Five hundred sixty students were divided into two groups, experimental (which had chess course and on-line training) and control (which had normal school activities), and tested on their mathematical and chess abilities. The study was conducted on a total of 31 classes (third, fourth, and fifth grades) from 8 different schools of Northern Italy. The classes were randomly assigned to two groups, including 17 classes

in the experimental group and 14 in the control group. The experimental group included 5 fifth-grade classes, 10fourth-grade classes, and 2 third-grade classes for a total of309 students (169 males and 140 females). One hundred ninety-three children included in this group declared to be able to play chess before the beginning of the study. The control group included 6 fifth-grade classes, 3 fourth-grade classes, and 5 third-grade classes for a total of 251 participants(116 males and 135 females).Results show a strong correlation between chess and math scores, and a higher improvement in math in the experimental group compared with the control group. These results foster the hypothesis that even a short-time practice of chess in children can be a useful tool to enhance their mathematical abilities. The present study is similar to this study because it seek to explore the mathematical dimensions of the *shiva* game of the Tiv people of Akor village in Guma Local Government Area of Benue State. The *shiva* game is a local form of the chess game investigated by Giovanni *et al.* (2015). However, the resent work is only an ethonomathematical exploration using qualitative methods only.

Unodiaku (2013) conducted a study to the effect of Ethno-mathematics Teaching Materials on Students' Achievement in Mathematics in Enugu State. The study was conducted to ascertain the effect of ethno-mathematics teaching materials on students' achievement in mathematics. The sample for the study was 156 Senior Secondary Schools two (SSS 2) students, which were randomly selected from 16 Senior Secondary Schools in Igbo-Etiti Local Government Area of Enugu State through multi-stage sampling technique. The instrument used for the study was ethno-mathematics achievement test (ETHNOMAT). The data obtained with the instrument were analysed using mean and Analysis of covariance (ANCOVA). Mean was used to answer the research questions posed, while ANCOVA statistic was employed in testing the null hypothesis at 0.05 significant level. Findings of the study showed that the ethno-mathematic achievement test was effective in enhancing students' achievement in measurement on with particular reference to volumes of cylinder and hemisphere. It was recommended among others that ethno-mathematics teaching materials should be incorporated in the Senior Secondary School mathematics curriculum as technique to be used by teachers in teaching the concepts of volumes of cylinders and hemispheres. More so, workshops/Seminars should be organized by professional bodies such as Science Teachers Association of Nigeria (STAN), Mathematical Association of Nigeria (MAN), among other bodies, to popularize and sensitize mathematics teachers on the use of ethno-mathematics teaching materials as approach in teaching students the concepts of volumes of cylinders and hemispheres. This study differs from the present study because on like this study that considered the general impact of ethno-mathematics on the academic achievement of secondary school students, the current study seek to investigate mathematical dimension of *shiva* game and the *uyerver* game of the Tiv people of Akor village in Guma Local Government Area of Benue State. Also, instead of deploying the quasi-experimental design deployed by Unodiaku (203), the present work employs qualitative techniques and design.

Kurumeh, Onah, and Mohammed (2012) carried out a study on the effect of the ethnomathematics teaching approach on Junior Secondary three (JS3) students' retention in statistics. It is also aimed at determining whether any of the sexes (male and female) would retain statistics concepts more than the other from the teaching. The study was carried out in Obi and Oju education areas of zone C in Benue state of Nigeria using a sample size of 248 junior secondary three (JS3) students. The study employed Quasi- experimental design of non-equivalent but culturally homogenous group. Intact classes were used for both the experimental and control

groups. The experimental group was taught using the ethnomathematics approach while control group was taught using conventional approach. Two research questions and two research hypotheses were formulated to guide this study. Statistics Retention Test (SRT) instrument with the reliability coefficient of 0.80 was used as pre, post and retention tests though reshuffled each time for data collection. Mean and Standard deviation were used to answer the research questions while an ANCOVA was used to test the null hypotheses at a 0.05 level of significance. The results revealed among others that the ethnomathematics teaching approach was more effective in facilitating and improving students' retention in statistics than the conventional approach. The ethnomathematics teaching approach did not significantly differentiate between the sexes (male and female) retention scores in statistics. These findings have implications for all Mathematics teachers and stakeholders in mathematics education. Based on the findings, it was recommended among others that the ethnomathematics teaching approach be adopted in schools particularly in our junior secondary school education, while teaching statistics since it has proved to be a viable option in promoting meaningful learning and affected students' retention rate positively. Again, the ministry of education and professional bodies such as Mathematical Association of Nigeria (MAN) and Science Teachers Association of Nigeria (STAN) should be involved in promoting this method through conferences, seminars and workshops so as to expose to teachers an ethno method in teaching mathematics. The work of Kuumeh *et al.* (2012) differs from the current study because it does not explore a particular game unlike the current study that seek to explore the mathematical dimension of *uyever* and *shiva* game of the Akor people. It also differs from the current study because its approach is quasi-experimental unlike the present study that was deeply qualitative.

Research Questions

The following research questions guided the study:

i. What are the rules of *Shiva* game of the Tiv people of Akor village in Guma Local Government Area of Benue State, Nigeria?
ii. What are the rules of *Uyerver* game of the Tiv people in Akor village in Guma Local Government Area of Benue State, Nigeria?
iii. What are the mathematical dimensions of *shiva* game of the Tiv people in Akor village in Guma Local Government Area of Benue State, Nigeria?
iv. What are the mathematical dimensions of *uyerver* of the Tiv people in Akor village in Guma Local Government Area of Benue State?
v. What is the original experience of the Tiv people of Guma Local Government Area of Benue State, Nigeria with the *shiva* children play?
vi. What is the original experience of the Tiv people of Guma Local Government Area of Benue State, Nigeria, with the *uyerver* game?

Methodology

The present study is an exploratory, descriptive and contextual qualitative study. The researcher employed a phenomenological research design and methodology to achieve the objectives of this study. Qualitative research refers to inductive, holistic, subjective and process-oriented methods used to understand, interpret, describe and develop theory on a phenomenon or a setting and is a

systematic, subjective approach used to describe life experiences and give them meaning (Morse & Field 1996).

The Study Area is Guma Local Government Area of Benue State. Gum Local Government is one of the twenty three (23) Local Government Areas in Benue State. Guma LGA is bordered in the north by Nasarawa State in the north, Makurdi LGA in the west, Logo LGA in the east and Gboko and Buruku LGAs in the south. Part of the River Katsina-Ala also passes through the LGA. These major rivers make the LGA a marshy one, suitable for the cultivation of rice, cassava, sesame and soy beans (Dada, 2006). The headquarters of Guma LGA are built in the town of Gbajimba, on the northern bank of River Benue (Dada, 2006). The population of the LGA at the 2006 Census was 194,164(Federal Government of Nigeria, 2009).

Traditionally, the major clans who are indigenes to Guma LGA are the Isherev, Utyondo and Nongov. Politically, Guma LGA is divided into ten council wards namely Abinsi, Kaambe, Mbabai, Mbagwen, Mbagwen, Mbawa, Mbayev/Yandev, Nyiev, Nzorov, Saghev, and Uvir.

Guma LGA is blessed with a lot of mineral deposits including barites, common salt, kaolin and clay. Unfortunately, all these remain untapped. Along with Makurdi, Guma LGA forms the Guma/Makurdi Federal Constituency in the House of Representatives. It also has the Guma State Constituency seat in the Benue State House of Assembly.

The population of the study consists of the entire population of people living in Akor village of Guma Local Government Area of Benue State.

The study used a sample of twelve (12) respondents which comprises of both the male and female indigene of Akor village of Guma Local Government Area of Benue State. The category of participants involve both the young and the old who will volunteer to participate in the study. The respondents were selected based on their wealth of experience and knowledge about the games of *uyerver* and *shiva* respectively. The volunteers were also grouped into players, observers and referees for the both games. Each game is usually played by two participants per time with the observation of referees while others including the researcher speculate.

The researchers used different instruments to collect data namely a semi-structured rubric and a photographic/video recorder were used in obtaining data for the study. The semi-structured interview consist a number of planned questions. However, the researcher ensured that the wording and order of the questions in the course of the interview captures the interest of the respondents. The use of this method (in-depth interview) was to ensure that the entire procedures are made casual in order to make the respondents scared and reluctant during the interview session. The researcher was able to collect complete information with a higher proportion of opinion based information with the help of the interview. The questions were more focused on the lived experience of the Akor people in playing the games of *uyerver* and *shiva*. Photographic/video recorder was used to ensure that pictures and video coverage of the games and interview process were taken throughout the process.

The instrument for this study was designed by the researcher and subjected to face and content validation. A face and content validation was done by a mathematics education expert after which it was approved to be used for the study. Face and content validation is to ensure that the instrument measures exactly what it purported to measure.

The researcher visited the homes of the respondents and at some point met some participants in open places to administer the interview. Semi-structured rubric interview and photographic/video recorder were the two instruments used in obtaining data. The photograph/video recorders were used for taking pictures and coverage of the game sessions and interview session respectively. An in-depth observations and note taking of the interview and games sessions were carried out to ensure accuracy in the entire procedure. A research assistant was used to assist the researcher cover the study area due to limited time.

The researcher used the narrative analysis method for analyzing the data. The analysis method was adopted and used to interpret the shared experience of the Tiv people of Akor village of Guma Local Government Area of Benue State, Nigeria in their everyday lives in relation to the *uyerver* and *shiva* games played in the study area.

Results

The presentation of the data for this study is done according to the research questions.

Research Questions One

What are the rules of *Shiva* game of the Tiv people of Akor village in Guma Local Government Area of Benue State, Nigeria?

Condition that apply throughout the *shiva* game:

Interaction with elder 1 reviewed that the following rules for the *shiva* game:

Condition 1: a toss of the coin could be used to decide who makes the first more.

Condition 2: A player is not allowed to make repeated move after making the initial move.

Condition 3: a player must make a paired move in order to be considered a win.

Condition 4: the game is ends only when the opponent's sticks are all inherited by the other player.

Research Question Two

What are the rules of *uyerver* game of the Tiv people in Akor village in Guma Local Government Area of Benue State?

In the game of *uyerver*, all you need is people to play with. Some hide and seek games require the players to just hide while the other person finds the other players that have gone hiding.

Figure 3: At the start of *uyerver* game

In making rules before playing the game of *uyerver*, the following conditions apply:

i. Players must hide in places where everyone else can go is permitted. That is players are not allowed to hide in an off-limit areas.
ii. The hider must always try to run back to home base while the seeker is away looking for them.
iii. When the any hider is found by the seeker, the persons automatically becomes the next finder.
iv. When a finder fails to find any hinder, it result in a repeated game.

In the *uyerver* game, the game is started when one of the players (the finder) closes his or her eyes for a brief period (often counting to 100) while the other players hide. The seeker notify the hiders by a shout of the word "ready or not, here I come or I'm coming" The seeker then opens his eyes and tries to find the hiders; the first one found is the next seeker, and the last is the winner of the round.

While trying to finder the hiders, the hiders in turn run back to home base while the seeker is away looking for them. If all the hiders returns safely, the seeker repeats as seeker in the next round.

The *uyerver* game is often known to have relevance such as in the reinforcement of object permanence and minimize separation anxiety. It improves physical development and coordination of the player hence, prepares individual in guided learning especially when learning mathematics.

The *uyerver* game of the Akor people also promotes cognitive development in a child as it helps in controlling the impulse and emotion of an individual.

Figure 4: Participants hiding during *uyerver* game

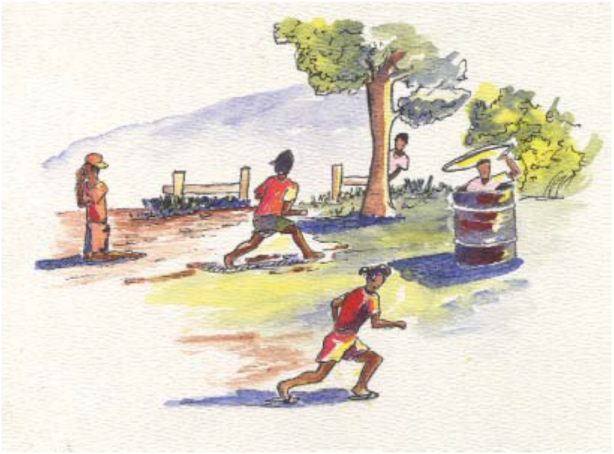


Figure 5: Similar game of *uyerver* played around the home.

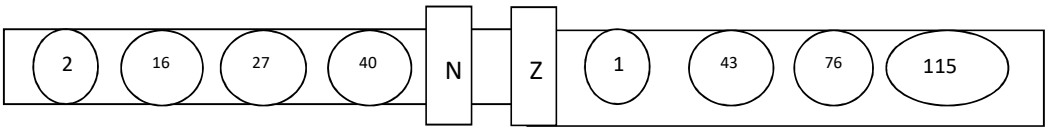
Research Question Three

What are the mathematical dimensions of *shiva* game of the Tiv people in Akor village in Guma Local Government Area of Benue State?

The *shiva* game provides concepts that aid in mathematical problems in quantitative reasoning. One good thing about quantitative reasoning is that it helps you to think deeply in order

to generate the right answer and the game of *shiva* provide similar ability as shown in the problem below

Example 1



The technique used in the above example follow this pattern;

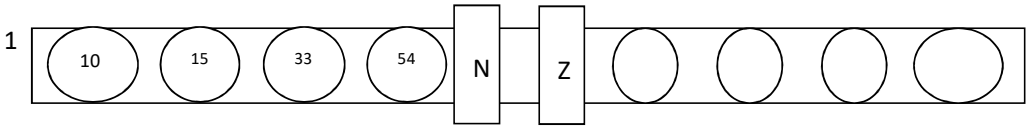
(2*3) – 5 = 1

(16*3) – 5 = 43

(27*3) – 5 = 76

(40*3) – 5 = 115

A problem may be given to now complete one given below using the above example.



Solution

(10*3) – 5 = 25

(15*3) – 5 = 40

(33*3) – 5 = 94

(54*3) – 5 = 157

The problem was logically presented. In order to solve it, the pupil need to first understand the concept and the rules that apply. This is a reflection of one special skills needed in playing the game of *shiva*. In furtherance, number is required to multiply through to give the answers. This gives the pupils the ability to reason and bring out solution that can best defeat the problem. This however purport the game of *shiva* because one aspect of the game is that it enable the player to logically dribble and come out with strategies that can best defeat the opponent.

Research Question Four

What are the mathematical dimensions of *uyerver* of the Tiv people in Akor village in Guma Local Government Area of Benue State?

The *uyerver* game of the Akor people in Guma Local Government Area of Benue State can be used to present counting in mathematics. This is because in the game of *uyerver*, children often count in numbers at the start of the game to enable the participants of the game hide before the seeker start searching for them, more so, the game of *uyerver* requires one's ability to identify and figure out members of the game. This skill also apply in mathematical counting problems as pupils are require to identify and figure out numbers that falls within tens, hundreds, thousands and millions.

Similarly, the concepts of bearing and distance, speed, and geometry are all visible in the play of the *uyerver* game.

Research Question Four

What is the original experience of the Tiv people of Guma Local Government Area of Benue State with the *shiva* children play?

The *shiva* game is a played and enjoyed by the people of Akor in Guma Local Government Area of Benue State because of its believed to improve cognitive as well as boast mood especially among the elderly that may be undergoing difficulties resulting from family, job or other personal reasons. The people of Akor see the game of *shiva* as the only game that can be enjoyed both by the elderly as well as children. It provides similar relaxation and enticing condition ever after when the game is played due to how logical and dribbling the game appears to be. It was also reported that the game of *shiva* is believed to bring about unity and co-existence among dwellers and even neighboring town whenever it is played as match.

Below is pictorial illustration of the *shiva* game:

First, the platform is prepared using sand collected from the soil to form a nested like holes ready to receive the sticks used in playing the game as showed below.

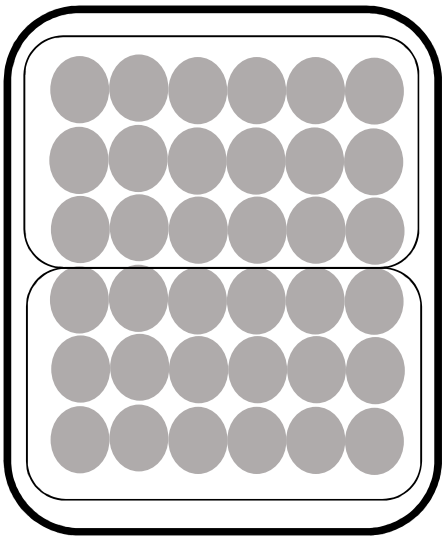


Figure 6: *Shiva* Platform built from sand

The platform is made from collection of sand from the soil while the sticks (*azinga)* are often gotten locally from stems of tress that produce the sizeable stick. The total number of heaps of sand that holds the sticks (*ahungwa*) created are usually thirty six (36) with each opponent maintaining twelve (12) *ahungwa.*

The *shiva* game is played by two players facing each other with the *shiva* prepared platform in-between them. The side with twelve holes in front of each player belongs to him/her.

The rules and strategies for *shiva* game are often stated openly for the players and observers. Significantly, the sticks (*azinga*) are inserted at the beginning of the game in the order as shown in diagram below.

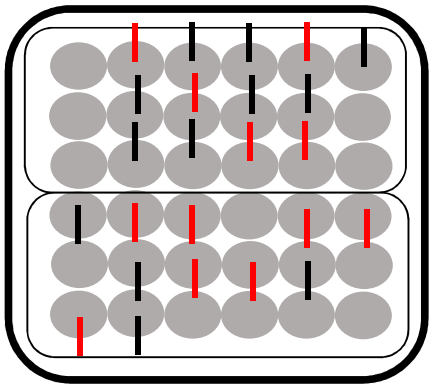


Figure. 7: Sticks position at start of *shiva* game

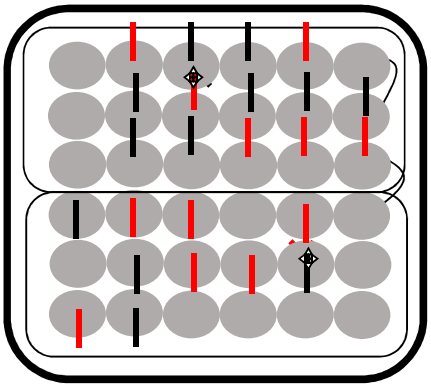


Figure 8: Sticks position after a move targeting three sticks of the opponent

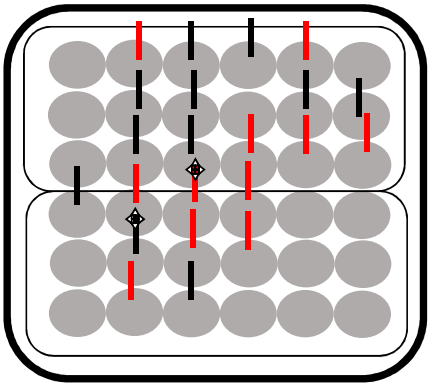


Figure 9: Shows players' movement from the 4th row to the 3rd hole on the same row striking out the highlighted sticks

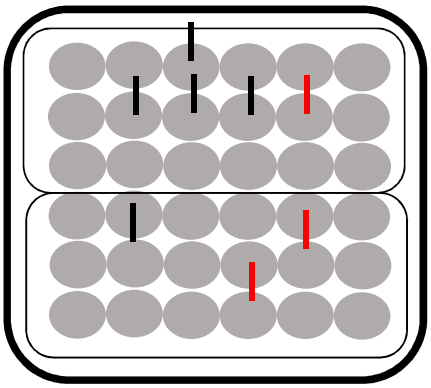


Figure 10: Position of sticks before the ramp of game

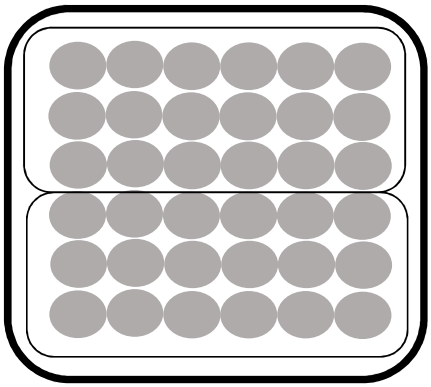


Figure 10: End of game with no sticks present

In the game of *shiva*, the player has a chance of making a move that will make the sticks move from both side to join with three sticks of the opponent. This is usually referred to as *agiir* in the game of *shiva*.

In playing the *shiva* game, the most popular of the pattern of capturing which symbolize a win is called *mya* u *shiva. This* means at any point in time the opponent make a move that attains three *azinga*, the person will literarily remove one stick of his opponent sticks which symbolize a win. In some occasion, when five (5) sticks are very close to each other such that when a move of a stick is made, meeting his two sticks in a side by side manner is called *gbugba.* Also, when 5 similar sticks are in a 2 by 2 with 1st stick leave a how such that when that one stick closing the hole. Making three sticks assigning together from roll and column is called *gbugba.*

Research Question Six

What is the original experience of the Tiv people of Guma Local Government Area of Benue State, Nigeria with the *uyerver* game?

The *uyerver* game is a played and enjoyed by the people of Akor in Guma Local Government Area of Benue State especially among children because it is believed to help improve cognitive as well as boast mood especially among the teenagers. The people of Akor see the game of *uyerver* as the only game that can be enjoyed both during the day and at night. It provides similar relaxation and enticing condition ever after when the game is played due to how logical and dribbling the game appeared to be. It was also reported that the game of *uyerver* is believed to bring about unity and co-existence among children of same village or/and even neighboring village whenever it is played as match. The game of *uyerver* furnishes players with counting skills, logical skills as well as provide a long lasting sense of committeemen during the course of playing the game.

Summary of Major Findings

The following major findings were made:

i. Traditional games influenced language skills development of basic education pupils when they can speak in sentences of five or more words about games, recite poems with increasing construction activity and name favourite games.

ii. Traditional game like *shiva* and *uyerver* influenced social skills development and mathematics of pupils through their ability to tell stories, report experience, sing and dramatize and logically scale through the conditions of the game to emerge as winners.

iii. Manipulative game of *shiva* and *uyerver* influenced problem-solving skills development of pupils when they are able to dismantle and assemble the game with ease, complete a circle of the game, curiously and excitedly alongside, manipulate complex conditions of the game like with the case of *shiva* game.

iv. The games also influenced creative skills development of pupils when they correctly/satisfactorily manipulate and explore the games in a variety of styles, famous characters make-up songs and provide more-than half-believed-in imaginary playmates.

Discussion of Findings

The study showed that the game of *shiva* and *uyerver* improves children's mathematical problem-solving skills in areas such as counting and arithmetic. The results suggest that *shiva* game can enhance problem-solving abilities in children, in fact, *shiva* game of the Akor people in Guma Local Government Area significantly affect participants' mathematical as a result of some *shiva* game related notion such as knowing how to move the pieces.

The *shiva* game has an enormous educational relevance as a cultural artefact when carefully introduced into the pedagogy of mathematics, especially at the primary and secondary education level. The *shiva* is a game which provides player with the opportunity to dribble its opponent by making strategic moves across the platform in a manner that will appear confusing to the other player.

The ability of the player to ultimately develop the ability to think three or more move in the *shiva* game has a mathematical dimension which translate to arithmetic. The *shiva* game also provide enthusiasm due to how the game is played. By maintaining patience, confidence and full control of the sticks in *shiva* game has a mathematical relevance that makes a learner maintain patience, and confidence of solving any given mathematical problem.

The *shiva* game is a strategic game involving maintaining little chance using the best possible logical manifestation. Therefore, it enhances observational skills, critical thinking, planning ahead, spatial perception and number sense. In creating opportunity to make good moves at the expense of sustaining the wining stance of the game of *shiva* seems to also mimic the use of exponentials. This study is in line with the study of Tembo (2012) who opined that the counting, piling up, and adding of stones strategically seems to mimic the use of exponentials. Also, considering the numerous possible moves that depend on many factors around *shiva* game, it can

be asserted that the game of *shiva* also has many attributes that relates that of probability mathematically.

When playing the *shiva* game, the player harvest and compel the opponent player to treat one another politely and with dignity (Powell & Temple, 2001). This according to (Abah, 2016), has not only the mathematical relevance, but also enhances character formation in many ways. As Thomaskutty and George (2007) rightly highlighted, it develop in the individual a proper attitude, as there is no space for prejudiced feelings, biased outlook, discrimination and irrational thinking, and aids him in objective analysis, correct reasoning, valid conclusion and impartial judgment.

Conclusion

Summary

The study investigate the mathematical dimension of the *shiva* and *uyerver* children play of the Tiv people of Akor village in Guma Local Government Area of Benue State, Nigeria. Six research questions were formulated to guide the study. Related literatures were reviewed under theoretical framework, conceptual framework and empirical studies. The study adopted a phenomenological research design and methodology to achieve the objectives of this study. The population for the study comprises of the entire people in Akor Village of Guma Local Government Area of Benue State. A sample of 12 respondents was used for the study. The instrument for data collection were a semi-structured rubric and a photographic/video recorder. The narrative analysis method was used to analyse the collected data. The findings revealed that the *shiva* and *uyerver* game has divers mathematical dimension especially among pupils in basic education.

Conclusion

This study which investigated the mathematical dimension of the *shiva* and *uyerver* game of the indigenous people of Akor village of Benue State, Nigeria. The study has revealed that early childhood experiences, no doubt influences basic education level to socialize, learn their language, become creative and acquire problem solving skills. Therefore, the need for adequate/appropriate instructional strategies for preschool child environment, facilities and instructional materials cannot be over-emphasized. In basic education level, games and play dominate the instructional materials used in teaching and learning. Children use games and play to discover their identity, help their bodies grow strong, learn cause and effect, explore relationships and practice skills they will need in future. They provide entertainment while fulfilling an educational role and help in developing the psychomotor, affective and cognitive domains of the child.

The study has shown that by introducing pupils to traditional games like the *uyerver* and *shiva*, the familiar and enjoyable experience may stimulate curiosity and interest in children to continue their mathematics learning and there by become useful members of the community. Concisely, this is the grand plan of the entire education process. This exploration on has been able to unveil captivating opportunities for mathematics education professionals, particularly teachers of the subject at the basic education level, to design augmented pedagogies that incorporate local and culturally relevant games.

Recommendation

Based on the findings of the study, the following recommendations were made:

i. Pupils should be encouraged to play with traditional game like *shiva* and *uyerver* in their environment since through their interaction with these games, they achieve all-round development more so academic excellence. Therefore teachers should find the need to conserve resources and not flood the school arena with wanton toys that may not have any cognitive relevance.
ii. Educational policy makers in Benue State should make room for the introduction of traditional games to serve as a replacement for the use of toy since they are readily available in the socio-cultural environment of the learners.
iii. The findings of this study also have implication for child-care practitioners. They can also collaborate with government and non-governmental agencies to retrain early childhood education teachers with knowledge of *shiva* and *uyerver*. This could improve the general knowledge of care givers to explore the mathematical dimension of the games.
iv. The government should pay more attention to basic education especially with regards to supporting and providing adequate play materials in primary schools.
v. The early childhood programme should provide regular training opportunities for staff to improve skills in caring for children and to ensure that the practitioners update ideas about child development through the use of traditional games like *uyerver* and *shiva*.
vi. Curriculum developers and planners should introduce ethnomathematical components into mathematics education from basic to secondary school level to influence on the mathematical skills development of students.

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