



Effects of Indigenous Game Strategies on Academic Performance of Pupils in Numeracy in Ilorin East Local Government Area of Kwara State, Nigeria

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Received 23 March 2021, Revised 12 May 2021, Accepted 10 June 2021, Published 01 July 2021

Abstract: This study investigated effects of indigenous game strategies on academic performance of pupils in numeracy in Ilorin East Local Government Area of Kwara State. A pretest-posttest control group non-equivalent quasi-experimental design was used in the study. A stratified random sampling technique was adopted to select six schools for the study. The only instrument used was the Numeracy Performance Test (NPT) with reliability coefficient of 0.76. ANCOVA was used to analyse the data. The findings revealed that there was a significant effect of indigenous game strategies on pupils' academic performance in numeracy ($F_{(2,25)} = 159.022, P < 0.05$); there was no significant effect of gender on pupils' performance in numeracy; there was no significant interaction effect of treatment and gender on pupils' performance in Numeracy ($F_{(2,25)} = 0.578, p > 0.05, \eta^2 = 0.102, p < 0.05$); there was no significant effect of school type on pupils' performance in Numeracy in Kwara State ($F_{(2,25)} = 0.826, p > 0.05, \eta^2 = 0.104$). There was no significant interaction effect of treatment and school type on pupils' performance in Numeracy in Kwara State ($F_{(2,25)} = 0.323, p > 0.05, \eta^2 = 0.126$). It was concluded that indigenous game strategies enhanced better performance in numeracy than the conventional method of teaching, also gender and school type had no significant effect on academic performance of pupils in numeracy. Based on these findings, it was recommended among other things that numeracy teachers should be encouraged to use indigenous games strategies, rather than the use of conventional methods, to teach pupils at the primary schools, particularly in basic two.

Keywords: Indigenous Game Strategies, Gender, School Type, Academic Performance and Numeracy skill

INTRODUCTION

Numeracy is necessary for everyday living, from daily activities like telling the time, cooking, and setting the table to more difficult tasks such as understanding mobile phone plans, planning a trip, reading a map, and understanding timetables. However, as children move through life stages, numeracy demands become more complex. Numeracy is a way of reasoning, and children do it quite naturally everywhere. The skills acquired in numeracy enable children to effectively communicate and transact in society (Badru, 2020; Nnamdi, 2014; Olufunke & Elizabeth, 2020). The foundation for children's numeracy skills is established in the early years. For instance, Stephens (2014) posits that for pupils to become numerate, they must be given opportunities to practice and

apply the mathematics they have learnt at their tender age in the mathematics classroom and also in all areas of the curriculum. Saad, Adamu and Sadiq (2014) also claim that the quality and quantity of early numeracy skills are the key factors in determining subsequent achievement. Numeracy is the ability to communicate and apply simple numerical concepts. The basic numeracy skills comprise comprehending or understanding fundamental arithmetic like addition, subtraction, multiplication, and division. For instance, if a child can understand simple arithmetic equations such as $2 \times 2 = 4$ and $2 + 2 = 4$, then it is likely to prepare such a child for the basic numeric concept.

Numeracy is the ability to use mathematics to solve problems and meet the demands of day to day living or



activities. Numeracy can be seen as a way of thinking, making an inquiry, and hypothesizing, which all children everywhere do quite naturally. However, the essence of primary education for the overall development of the child is to inculcate permanent literacy and numeracy and the ability to communicate effectively. This is to say that each child at primary school is taught simple mathematics and language skills. The skills acquired enable him to effectively communicate and transact in society (Ahmed & Lawal, 2020; Asiat, 2018). However, low performance in numeracy was evidenced among pupils. To buttress this point on mathematics performance among students, Saad et al. (2014) revealed that the percentage of students with five credits rose to 30.9% and continued to rise to 38.81% in 2012. Unfortunately, in 2013, the performance declined to 36.57% and further declined to 31.28% in 2014.

The foundation for children's numeracy is established in the early years. Numeracy learning builds inquisitive and inspired children naturally from their experience. Numeracy in early years, if appropriately connected to a child's world could be more than getting ready for school or hastening them into fundamental or basic mathematics (Kayode, Ogundokun, Mohammed & Olorundare, 2020). Several studies have discovered that pupils' achievement in numeracy lies in the context. Numeracy in the early years, if appropriately connected to a child's world, is more than getting ready for school or accelerating them into elementary arithmetic (Asiat, 2018). Understanding how children learn in the area of early numeracy is essential to meaningful teaching and learning of numeracy (Umameh, 2011). Also, Clements and Sarama (2012), in addition to Kazima (2013), suggested that the use of appropriate teaching strategies help children to develop numeracy concepts; as, it aids reciting number sequences and placing values. Umameh (2011) revealed that mathematics as a subject was taught in abstraction and to remove the abstractness associated with mathematics, the use of teaching through play is essential.

Games generally are a subset of play and play can be seen as activities done for pleasure. Many educators recognize that the major goal of play is to provide children with experience. Similarly, indigenous games are a subset of play that could aid children to learn and develop appropriate skills necessary for learning, such as building strength and agility; they could also promote physical skills which are comprised of sensory, fine, and gross motor skills. Hunting and gathering of knowledge could be certain during gaming; this is because games require the use of all sense organs and could foster the overall development of each child. Indigenous games could teach valuable skills that combine mental and physical wellbeing of a child. Indigenous game strategies are the collection of traditional games and activities. According to Kazima (2013), indigenous games are an integral component of indigenous knowledge systems.

Indigenous game strategies are student-centered strategies; the use of student-centered game elements in non-game educational systems improves pupils' experience, drives engagement with learning activities and models, teaches effective learner skills, and enhances pupils' attitude and identity as learners (Nnamani & Oyibe, 2016). According to Juliya (2016), most indigenous game activities are provided by adults teaching the child to play, who also introduce him or her to socially established ways of game action. Several indigenous game activities can put children in touch with nature; however, *suwe* and *ten-ten* indigenous games will be considered as strategies to teach numeracy in this study. This is because *suwe* and *ten-ten* are very common indigenous games amongst every other indigenous game; they are usually called hop-scotch and *ten-ten* in English culture and have a lot of mathematical terms, such as counting, multiplication, fractions, and comparing the height of shapes, such as squares, triangles, circles, rectangles, and trapeziums. The researcher is also of the view that *suwe* and *ten-ten* indigenous games could foster and captivate participants interest to engage holistically during the teaching and learning of numeracy. However, indigenous games are several, such as *suwe*, *ten-ten*, *talowaninu ogbana*, *boju boju*, *twinko twinko* and others.

Indigenous games are universal phenomena that could be relevant. Children's lifespan lies between the ends of playing, gaming, and exercising. In fulfilling the play side of life, children from various communities engage in various indigenous games. Indigenous games have existed among many ancient peoples and are known in all contemporary human cultures. It has been suggested by Nnamani and Oyibe (2016) that the playing of games is one of the keys for defining the characteristics of man. Oladiti (2016) opines that: "it is an activity that involves physical, mental, and psychological forces exercised competitively through human actions. Akinola (2018) is of the view that the infusion of indigenous methodologies and pedagogies into the curriculum should not diminish the value of traditional western methodologies and pedagogies that have been used in schools for decades. Academic performance varies; differences in academic achievement (Driessen & Van Langen 2013; Krinzinger & Willmes, 2015) report that there is no differences in the academic performance of boys and girls during school activities. Nnamani and Oyibe (2016) report on the relationship between gender and cognitive skills which has to do with pupils' academic performance, stating that gender is one of the many contributing factors influencing numeracy performance. They emphasize in a study on gender differences that academic achievement is strongly influenced by various factors. Ali, Haider, Munir, Khan and Ahmed (2013) report that, the cognitive and motor development of boys and girls subsequently contributes to gender differences in the academic achievement of



learners. Guzel (2004) posits that there is a significant difference in the recalling of numerals and process calculations amongst boys and girls. Shuaib (2019) explains academic achievement can be referred to as what an individual can gain within a specific time.

Gender as the moderating variable in this study is a social connotation that has a sound psychological background and specific cultural patterns of behaviour attributed to human sexes, and a constructed phenomenon that society ascribes different roles, duties, behaviours, and mannerisms to (Nnamani & Oyibe, 2016). This is to say that gender connects both male and female characteristics, with the percentage-point gap between girls and boys who reached the minimum competency in math and English language was 5.3 and 2.9 respectively (MOE, 2014). Guzel (2004) states that the female students' attitude towards Mathematics is more positive than male students. Robin (2011) claims that 'boys perform wonderfully well in traditional approaches to learning which require memorizing abstract, unambiguous facts and rules that have to be acquired quickly. Machin and Pekkarinen (2018) postulate that mixed gender in numeracy could be achieved in the part of the higher variance of boys in comparison to girls' school achievement. Contrarily, Fauto and Friedman (2019) revealed that there was no significant difference between male and female academic performance ability.

It is generally said that private primary schools provide more valuable education than public primary schools. Private schools seem stronger on observable measures and are widely perceived as superior. Private schools in urban areas screen pupils before any consideration for admission. Lubienski & Lubienski (2014) posits that many private school students are selected for secondary education whereas public schools do not screen their candidates. Ali et al (2013) opine that the learning outcomes and educational performance of students are strongly affected by the type of educational institution where they received their education. Studies by Ali et al. (2014) on public and private schooling suggest that reform efforts and financial investments in the educational system should promote public schools' implementation of policies and management ability. Based on the reviewed, there was no empirical evidence on indigenous games particularly *suwe* and *ten-ten*, as combined in this study. This created a research gap, which the researchers tried to address in relation to the effect of indigenous game strategies on pupils' academic performance in numeracy based on school type. Onekutu (2002) assessed the difference in the academic achievement of students in both private and public secondary schools in Akwa Ibom State. The findings of this study showed that students in private secondary schools performed better in Social Studies than those in public schools.

Alimi, Ehinola and Alabi (2012) investigated the influence of school types and their facilities on students' academic performance in Ondo State. The study was constructed to find out the possibility of facilities and students' academic performance being connected in private and public secondary schools, respectively. The study revealed a significant difference in facilities available in public and private schools in Ondo State. The study also revealed that there is a significant difference in the facilities available between public and private senior secondary schools. It, however, revealed no significant difference in the academic performance of students in the two types of schools. However, school type could determine what is taught, how it is taught, and what materials are available for subjects taken in primary schools especially in relation to numeracy. Ali et al. (2013) also opine that the learning outcomes and educational performance of students are strongly affected by the type of educational institution where they received their education.

STATEMENT OF THE PROBLEM

Children are seen to be propelled by curiosity driven from their environment. Unfortunately, as children grow, their passion for learning numeracy subjects appears to shrink. Learning of numeracy has become associated with boredom instead of delight. Numeracy is a prerequisite subject that pupils must pass in primary education to proceed to the next level. As important as the numeracy subject is to the primary school child, the researcher observed in a quiz competition conducted in primary schools in Ilorin East Local Government Area of Kwara State that the failure rate in the subject is still on the increase. Based on the previous studies reviewed, the researchers observed that nothing has been done on *suwe* and *ten-ten*. All this created part of the existing gap which this study intended to address and explains why the researchers intended to examine the effect of indigenous game strategies on pupils' academic performance in numeracy, particularly in Ilorin East local government area of Kwara State. The researchers therefore used indigenous games, such as *suwe* and *ten-ten*, as strategies to teach numeracy, so as to check the effectiveness of pupils' academic performance in numeracy.

PURPOSE OF THE STUDY

The main purpose of this study was to find out the effects of indigenous game strategies on academic performance of pupils in numeracy in Ilorin East Local Government Area of Kwara State. Specific purposes of the study were:

1. To examine the main effect of indigenous game strategies (*suwe* and *ten-ten*) on pupils' academic performance in numeracy



2. To determine the main effects of gender on pupils' academic performance in numeracy
3. To determine the main effects of school type on pupils' academic performance in numeracy
4. To determine the interaction effects of indigenous game strategies and gender on pupils' academic performance in numeracy
5. To determine the interaction effects of indigenous game strategies and school type on pupils' academic performance in numeracy
6. To determine the interaction effect of gender and school type on pupils' academic performance in numeracy
7. To determine the interaction effects of indigenous game strategies, gender and school type on pupils' academic performance in numeracy.

A. Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

H₀₁: There is no significant main effect of treatment on pupils' academic performance in numeracy.

H₀₂: There is no significant main effect of gender on pupils' academic performance in numeracy.

H₀₃: There is no significant main effect of school type on pupils' academic performance in numeracy.

H₀₄: There is no significant interaction effect of treatment and gender on pupils' academic performance in numeracy.

H₀₅: There is no significant interaction effect of treatment and school type on pupils' academic performance in numeracy.

H₀₆: There is no significant interaction effect of gender and school type on pupils' academic performance in numeracy.

H₀₇: There is no significant interaction effect of treatment, gender and school type on pupils' academic performance in numeracy.

B. Methodology

The study adopted pre-test, post-test, control group non-equivalent quasi-experimental design using 3X2X2 factorial design. The first three levels were meant for the independent groups, which comprise two experimental groups (*Suwe* and *ten-ten* indigenous game strategies) and the control group. The second factorial level was based on gender (male and female) and third factorial level was based on the school type (public and private). Primary two pupils from private and public schools in Ilorin East Local Government Area of Kwara State were the target population. There are 206 primary schools in Ilorin East Local Government Area of Kwara State out of which 52 and 154 are private and public schools respectively. Private schools have 2670 male and 1,290 female pupils; while public schools consist of 5,649 male and 2822

female pupils, as provided by Kwara State School Census Report 2015-2016. The sample for this study was 6 primary school two pupils of Ilorin East local government Area of Kwara State. A stratified sampling technique was used to classify three private and three public schools as the experimental groups and control group (One private and one public school as experimental group one), (one private and one public school as experimental group two) and control group (one private and one public). Thereafter, 37 primary two pupils were selected for the experimental groups as well as the control group.

Four instruments were used to elicit information from the respondents. The instruments used include Numeracy Performance Test (N.P.T), Instructional Guide for *Suwe* Indigenous Game Strategy (IGSIGs), Instructional Guide for *ten-ten* Indigenous Game Strategy (IGTIGs) and Instructional Guide for the Control Group (IGCG). However, the four instruments were made of one performance test which was the Numeracy Performance Test (NPT) and 3 instructional packages (IGSIGs, IGTIGs and IGCG). The NPT consists twenty multiple-choice test items on instructional content (numeracy). The multiple-choice questions were drawn by the researcher from the school curriculum through the scheme of work, and the questions were based on the topic taught (Counting of numbers, addition of numbers, subtraction of numbers, multiplication of numbers, inequalities and two dimensional shapes), and the researcher subjected the instrument to validity and reliability tests.

The data collection lasted for five weeks. Training of the research assistants took place in the first week. The second week was used for administering the Numeracy Performance Test (NPT) as the pre-test (to both the experimental and control groups). Treatment for all groups lasted for two weeks; while, the Numeracy Performance Test (NPT) was administered as post-test to all the groups (both the two experimental groups and the control groups) in the fifth week. The class teachers for the control groups assisted in teaching the control groups the same topics as scheduled for the treatment groups, using the conventional method. The concerned topics include: Counting of numbers, addition of numbers, subtraction of numbers, multiplication of numbers inequalities and dimensional shapes. The arrangement is summarized as follows:

1 st week:	Training of teachers
2 nd week:	Administration of pre-test
3 rd - 4 th Week:	Treatment

Suwe Game Activities

Week 3: Description of *suwe* game and numeracy skill (Emphasis on drawing of mathematical shapes and figures); holding of pebble (Metal or Plastic) for drawing

of circular related diagrams as a point against the opponents in Suwe game.

Week 4: Relating the drawing of circles to mathematical figures and counting; then allowing the participants to draw complex mathematical diagrams such as planes and solid shapes.

Ten-Ten Game Activities

Week 3: Description of the *Ten-Ten* game and numeracy skill (Emphasis of Mathematical operation of Addition and subtraction); holding of pebbles (Metal or Plastic) to note rules violator as a point against the opponents in the *Ten-Ten* game.

Week 4: Relating the rules violations to mathematical operations (Addition, subtraction, multiplication and division) and other Bracket f Division Multiplications Additions and Subtraction (BODMAS) cases; then

allowing the participants to apply the rule violation to complex mathematical operations in BODMAS.

Week 5: Post-test administration.

The data was analyzed using descriptive and inferential statistics. The demographic data of the participants, as well as their numeracy performance test scores, were analyzed using frequency counts, mean and percentage; while, the research hypotheses were tested, using Analysis of Covariance (ANCOVA) at 0.05 level of significance. ANCOVA was considered appropriate because it was capable of handling interaction effect of the independent variables and the moderators.

RESULTS

H₀₁: There is no significant main effect of treatment on pupils' academic performance in Numeracy.

Table 1. Summary of 3x2x2 Analysis of Covariance (ANCOVA) Showing the Significant Main and Interactive Effect of Indigenous Game Strategies, Gender and School Type on Pupils' Academic Performance in Numeracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2948.501 ^a	11	268.046	16.598	.000	.870
Intercept	80.862	1	80.862	5.007	.000	.303
Pre-test	1815.347	1	1815.347	112.413	.355	.011
Treatment	132.777	2	66.389	4.111	.000	.798
Gender	9.334	1	9.334	.578	.116	.102
School type	13.333	1	13.333	.826	.204	.104
Treatment group * gender	10.441	2	5.221	.323	.133	.126
Treatment group * school type	124.238	2	62.119	3.847	.076	.065
Gender * school type	51.130	1	51.130	3.166	.512	.017
Treatment group * gender * school type	12.543	1	12.543	.777	.383	.032
Error	775.149	25	16.149			
Total	21785.000	37				
Corrected Total	3723.650	36				

a. R Squared = .792 (Adjusted R Squared = .744)



Table 1 shows that there is a significant main effect of treatment on pupils' academic performance in numeracy ($F_{(2, 25)} = 4.111, p < .05, \eta^2 = .798$). This implies that there was a significant difference in the pupils' academic performance in numeracy of the treatment groups. Therefore, the null hypothesis is rejected. The table further reveals that treatment groups (*suwe* and *ten-ten* game strategies) explained 79.8% variance in pupils' performance in numeracy. For further clarification on the margin of differences between the treatment groups and the control group, a Scheffe post-hoc analysis was computed, and the result is shown in Table 2 respectively.

Table 2. Scheffe Post-hoc Analysis Showing the Significant Differences of Pupils' Academic Performance in Numeracy Among Various Indigenous Game Strategy and the Control Group

Treatment group	N	Subset for alpha = 0.05		
		1	2	3
Suwe Indigenous Game Strategy (SIGS)	12	19.6667		
Ten-Ten Indigenous Game Strategy (TIGS)	12		19.5000	
Control group (CG)	13			8.7692
Sig.		1.000	1.000	1.000

From Table 2, it is revealed that experimental group I (*Suwe* Indigenous Game Strategy (SIGS) ($\bar{x} = 19.6667$) had the highest mean followed by the experimental group II *Ten-Ten* Indigenous Game Strategy (TIGS) ($\bar{x} = 19.5000$) and control group ($\bar{x} = 8.7692$). By implication, *Suwe* Indigenous Game Strategy (SIGS) was more potent in enhancing pupils' academic performance in numeracy than the *Ten-ten* Indigenous Game Strategy (TIGS). The coefficient of determination (Adjusted $R^2 = .744$) overall indicates that the differences that existed in the group account for 74% in the variation of pupils' academic performance in numeracy. However, there was no significant difference in the main effect of gender and school type on pupils' academic performance in numeracy in Ilorin East Local Government Area of Kwara state.

H₀₂: There is no significant main effect of gender on pupils' academic performance in numeracy

Table 1 further shows that there was no significant main effect of gender on pupils' academic performance in Numeracy in Ilorin East Local Government Area of Kwara State $F_{(2,25)} = 0.578, p > 0.05, \eta^2 = 0.102$. Hence, the null hypothesis is therefore not rejected in light of the result, since the significant value (.102) is greater than 0.05. This

implies that there is no significant difference in pupils' academic performance in numeracy of males and females.

H₀₃: There is no significant main effect of school type on pupils' academic performance in numeracy

Table 1 further shows the effect of school type on pupils' academic performance in numeracy in the Ilorin East Local Government Area of Kwara State. There was no significant main effect of school type on pupils' academic performance in Numeracy using indigenous game strategies $F_{(2,25)} = 0.826, p > 0.05, \eta^2 = 0.104$. Hence the null hypothesis is not rejected in light of the result, since the significant value (.104) is greater than 0.05. This implies that there is no significant difference in pupils' academic performance in numeracy based on school type.

H₀₄: There is no significant interaction effect of treatment and gender on pupils' academic performance in numeracy

Table 1 reveals that there is no significant interaction effect of indigenous game strategies and gender on pupils' academic performance in numeracy $F_{(2,25)} = 0.323, p > 0.05, \eta^2 = 0.126$. Hence, the null hypothesis is not rejected in light of the result, since the significant value (.126) is greater than 0.05. This implies that gender did not significantly moderate the effect of treatments (indigenous game strategies) on pupils' academic performance in numeracy.

H₀₅: There is no significant interaction effect of treatment and school type on pupils' academic performance in numeracy

Table 1 further reveals that there is no significant interaction effect of indigenous game strategies and school type on pupils' academic performance in numeracy $F_{(2,25)} = 3.847, p > 0.05, \eta^2 = 0.065$. Hence, the null hypothesis is therefore not rejected in light of the result, since the significant value (.065) is greater than 0.05. This implies that school type did not significantly moderate the effect of treatments (indigenous game strategies) on pupils' academic performance in numeracy. The interaction effect between treatments (indigenous game strategies) and school type accounted for a 0.6% variance in participants' academic performance in numeracy.

H₀₆: There is no significant interaction effect of gender and school type on pupils' academic performance in numeracy

The results in table 1 indicate that there is no significant interaction effect of gender and school type on pupils' academic performance in numeracy ($F_{(2, 25)} = 0.512, p > .05, = .017$). Therefore, the null hypothesis is not rejected in light of the result, since the significant value (.017) is greater than 0.05. This implies that gender did not



significantly moderate the effect of school type on pupils' academic performance in numeracy.

H₀₇: There is no significant interaction effect of treatment, gender and school type on pupils' academic performance in numeracy

The results in table 1 indicate that there is no significant three-way interaction effect of treatment (indigenous game strategies), gender and school type on pupils' academic performance in numeracy ($F(2, 25) = 0.777, p > .05, = .032$). The null hypothesis is therefore not rejected in light of the result, since the significant value (.032) is greater than 0.05. By implication, gender and school type are not a significant moderator of the effect of treatment (indigenous game strategies) on pupils' academic performance in numeracy.

DISCUSSION OF FINDINGS

The first hypothesis stated that there is no significant main effect of treatment on pupils' academic performance in numeracy. The result shows that there was a significant main effect of treatment on pupils' academic performance in numeracy. This implies that there is a significant difference in pupils' academic performance in numeracy. The Scheffe posthoc analysis further reveals that experimental group I (*Suwe*) had the highest academic performance in numeracy post-test mean score, followed by experimental group II (*ten-ten*) and control group. By implication, *suwe* indigenous game strategy was more effective in enhancing pupils' academic performance in numeracy than *ten-ten*. The result of this study is consistent with Saad, Adamu and Sadiq (2014) who reported that students' negative performance toward numeracy/mathematics is a result of anxiety and fear of mathematics; inadequate qualified teachers, poor teaching methods, inadequate teaching materials, and overcrowded classes; as were some of the causes of poor performance in mathematics in senior secondary schools in Bauchi. On the other hand, *ten-ten* was also found to be effective in enhancing academic performance in Numeracy but not as effective as the *suwe* indigenous game strategy. Nevertheless, the effectiveness of *ten-ten* indigenous game strategy corroborated with Umameh (2011), who revealed that mathematics as a subject tends to be abstract, and in order to remove the abstractness associated with mathematics, the use of teaching aids is very essential. Shortage of instructional materials in mathematics also cause the low performance of students in numeracy/mathematics. The finding also supports that of Akinola (2018) who reported that the infusion of indigenous methodologies and pedagogies into the curriculum should not diminish the value of traditional western methodologies and pedagogies that have been used in schools for decades. Playing indigenous games may motivate learners' attitudes towards learning to

improve their performance at school, particularly in lower primary school, which is the area of the researchers' concern.

The second hypothesis stated that there is no significant main effect of gender on pupils' academic performance in numeracy. The result shows that there was no significant main effect of gender on pupils' academic performance in numeracy. This indicates that the pupils' academic performance in numeracy doesn't vary along their gender. The post-hoc analysis showed that female pupils performed better in academic numeracy than males. This result agrees with the findings of Oladiti (2016) who reported that sex differences may have little or no impact on academic performance. Oladiti (2016) also accented that eventual performance on learners is dictated by personal attempts than the sex variable. Furthermore, Shuaib (2019) also reports that the influence of gender on academic achievement could also be an issue of concern to most researchers. This is because gender appears to have powerful effects on learning.

The third hypothesis states that there is no significant main effect of school type on pupils' academic performance in numeracy. The result shows that there was no significant main effect of school type on pupils' academic performance in numeracy. The Scheffe post-hoc analysis further showed that private school pupils performed better than those in the public school in academic numeracy. This implies that there is a significant difference in the academic performance in numeracy. This result negates the findings of Also, Alimi, Ehinola and Alabi (2012) who reported there is a significant difference in the facilities available between public and private senior secondary schools. In the same vein, Shuaib (2019) also reported that findings from his study revealed that the level of students' academic performance was low. It was also showed that school type, sex and location had no significance on students' academic performance.

The fourth hypothesis states that there is no significant interaction effect of treatment and gender on pupils' academic performance in numeracy. The hypothesis was tested using ANCOVA at 0.05 alpha level of significance. The result revealed that there was no significant interaction effect of treatment and gender on pupils' academic performance in numeracy. This suggests that gender of pupils did not moderate the effect of treatment on pupils' academic performance in numeracy. By implication, gender of pupils did not moderate the effect of *Suwe* on pupils' academic performance in numeracy more than *ten-ten* and control. The result of this study supports the findings of Fauto and Friedman (2019) who reported that there is no significant difference between male and female cognitive ability. Research results vary widely, with different conclusions that males are more abstract learners, females have more anxiety about study success, males are more instructive, and



females are more analytical and organized and vice versa. The finding also negates that of Guzel (2004), who had reported that the female students' attitude towards Mathematics is more positive than the male students. Students' perceptions of parental, teachers and peer expectations were found to significantly influence gender differences and attitudes towards the learning of Mathematics.

The fifth hypothesis states that there is no significant interaction effect of treatment and school type on pupils' academic performance in numeracy. The result shows that there was no significant interaction effect of treatment and school type on pupils' academic performance in numeracy. This implies that school type did not significantly moderate the effect of indigenous game strategies on pupils' academic performance in numeracy. The result of this study is not in congruence with Onekutu (2002), who had reported that school type influences academic performance of learners, but there was a controversy on the influence. He further noted that public school students do better than private school; while, others had revealed that private school students do better than public school. Similarly, the result of this study disagrees with Newhouse and Beegle (2019) who had evaluated the effect of school type on the academic achievement of junior secondary school students (grades 7-9). The result showed that students that attended public junior secondary schools, moderating for other characteristics, had higher test scores upon completion than those who had attended private schools.

The sixth hypothesis states that there is no significant interaction effect of gender and school type on pupils' academic performance in numeracy. The result showed that there was no significant interaction effect of gender and school type on pupils' academic performance in numeracy. This implies that gender did not significantly moderate the effect of school type on pupils' academic performance in numeracy. This result negates the findings of Oladiti (2016), who had reported that academic achievement refers to what an individual can obtain within a specific criteria domain. The influence of gender on academic performance has also been a problem of concern to most researchers. This is because gender appears to have some powerful impacts on learning.

The seventh hypothesis states that there is no significant three-way interaction effect of treatment, gender and school type on pupils' academic performance in numeracy. The result showed that there was no significant three-way interaction effect of treatment, gender and school type on pupils' academic performance in numeracy. The result of this study is incongruent with the findings of Onekutu (2002), who was of the view that many components play key roles in the development of numeracy at a young age, such as parenting, gender, school type, socioeconomic status and age. Children who

are brought up in families with high socioeconomic status are inclined to be more engaged in developmentally enhancing activities. He also argued that children are more likely to germinate the necessary ability to acquire and become more encouraged to acquire more knowledge. Particularly, a mother's educational level is reckoned to have more of an impact on the child's ability to achieve in numeracy than that of the child's father. That is, a mother with an advanced level of education may more likely have children who will have a higher achievement in numeracy.

CONCLUSION

Based on the results above, it can be deduced that indigenous game strategies (*suwe* and *ten-ten*) can facilitate higher and better performance in numeracy than the conventional strategy of teaching. However, *suwe* is more effective than *ten-ten*. By the outcome of this study, it can therefore be affirmed that gender has no significant effect on academic performance of pupils in numeracy and school type has no significant effect on the academic performance of pupils in numeracy in Ilorin East local government area of Kwara State. There was no significant interaction effect of Indigenous Game Strategies and gender on pupils' academic performance in numeracy. Also, there was no significant interaction effect of gender and school type on pupils' academic performance in numeracy in Ilorin East local government area of Kwara State. The interaction effects of indigenous game strategies and school type had no significant effect on academic performance of pupils in numeracy in Ilorin East. Finally, the interaction effect of *suwe*, *ten-ten*, gender, and school type had no significant effect on academic performance of pupils in numeracy in Ilorin East local government Area of Kwara State.

C. Recommendations

Based on the findings of this study, the following recommendations can be made:

- i. Teachers who teach numeracy should be enlightened about the effectiveness of indigenous game strategy, especially in *suwe* and *ten-ten* game strategies, on pupils' academic performance in numeracy.
- ii. Curriculum developers in numeracy, such as the Federal and State Ministries of Education, school proprietors and NERDC, should incorporate more concepts that encourage indigenous game strategies into the numeracy curriculum as well as the day-to-day activities of pupils in both indoor and outdoor events.
- iii. It is also important that colleges and faculties of education should be sensitized in their responsibility to train pre-service teachers on the use of indigenous game strategies in learning. Similarly, practicing teachers should be encouraged to learn the use of indigenous game strategies through seminars and workshops.



- iv. Pupils' academic performance should not be determined based on their gender and school type because the two factors have been found not to be strong factors that hinder pupil's academic performance.
- v. Teachers should understand the level of individual differences and ensure that those slow learners are given adequate attention by making sure they (learners) understand the numerical concept before moving to the next phase.

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