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Influence of Location: Application of Games as a Teaching Method for Science Process Skills Acquisition in Junior Secondary School South East Nigeria

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Abstract
The present study was designed to evaluate the influenced of location on using game-based teaching method in acquisition of science process skills in junior secondary school south east Nigeria. The quasi-experimental design was used for this study. The population of this study consisted of the entire Junior Secondary School, Basic Science students one (JSS 1) of the thirty-five (35) public secondary schools in Enugu Education Zone. The sample for the study was one hundred and sixty (160) Basic Science students and four Basic Science teachers from co-education secondary schools in Enugu Education Zone of Enugu state. Stratified random sampling was employed to obtain the schools used for the study. The instruments used for the study was the Test of Science Process Skills Acquisition Test (TOSPSAT). The instruments were given to four (4) experts in science education, two (2) science educators (measurement and evaluators) and two (2) experienced integrated teachers for face and content validation. The reliability of TOSPSAT was done using Kuder-Richardson formula 20 (K-R 20). The research questions were answered using mean and standard deviation. Analysis of covariance (ANCOVA) was used for testing hypotheses at $P<0.05$ level of significance. The students taught using game teaching approach had higher mean science process skills acquisition scores in all the skills studied than those taught using conventional method. There was a significant difference in the mean science process skills acquisition scores of subjects exposed to games than those exposed to conventional method. Location of school had no significant effect on the mean science process skills acquisition scores of students exposed to treatment and conventional method. The interaction effect of instructional methods and location on mean science process skills acquisition scores was not significance. The findings of this implies that students, teachers and curriculum planners should adopt the use of games in teaching and learning processes.
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1. Introduction

The demerits of conventional teaching method such as being one directional flow method, non-learners' based, and other disadvantages such as lack of process oriented learning, lack of emphasis on critical thinking, lacks interactivity have attracted the interest of many researchers innovative teaching methods that will be learners focused and involving especially teaching of science. Consequently, some researchers have designed games-based teaching methods (Ejilibe et al. 2020).

Games as a teaching method have been widely used in teaching (Lawrence, 2006). Instructional game according to Harbor Peter (2001) is a type of game where participants made decision as if they were in actual situations, involving strategies, tactics and initiatives from players. Educational game is an activity where by students use data and skills in a competitive situation. The value of games in teaching and learning cannot be over emphasized (Finely in Umo (2001). Pollyn (2003) stressed that games motivate, develop skills, abilities and strategies. Glickman as cited in Ese (2007) revealed that games enhance participation, creativity, curiosity and understanding. In addition, games enhance inquiry and help in developing scientific attitudes such as carefulness and patience. Therefore, the significances of games have made it an important instructional approach for the teaching and learning of science especially at junior secondary level. The students taught using game teaching approach had higher mean science process skills acquisition scores in all the skills studied than those taught using conventional method (Ejilibe et al. 2020).

Location is referred to a particular place in relation to other areas (Quirk, 2003). The location of a particular school could influence the acquisition of science process skills. This is because schools located in the urban area may have some advantages over the rural schools. Akpan (2008) indicated that schools in urban locations have electricity, water supply, more qualified science teachers and other learning facilities and infrastructure. Study on location have revealed that the location of school's students attends tend to influence performance in science process skills acquisition (Mari, 2002). Based on our review on the existing literature, most of the study on location and acquisition of science process skills were mainly on achievement, interest and conceptual change. In addition, debate still exists amongst researchers on location difference influence: effects of games on acquisition of science process skills in junior secondary school.

In view of the foregoing, the present study was focused on evaluation of location difference influence: effects of games on acquisition of science process skills in junior secondary school south east Nigeria.

1.2 Statement of the problem

Poor performance of students in Junior Secondary School Certificate Examination in Integrated Science now called Basic Science had consistently been recorded. This according to research findings were attributed to poor teaching methods explored by science teachers, quality of science teachers, lack or inadequate science facilities, teachers'/ learners' attitude among other factors. In order to help the students, improve in their performance, there is need to explore the efficacy of other students'- centered methods such as games in teaching Basic Science. Games as an instructional approach had been employed in teaching various subject areas especially mathematics**.** Unfortunately, most studies on games in Nigeria were mainly based on interest**,** achievement and retention in a subject like mathematics**.** However, there is death of literature on the use of games for the acquisition of science process skills in Nigeria. Location issues relating to performance in Science Education tasks had not been conclusive. There is still debate on influence of location (urban and rural) in students' performance in science education.

Since games can be used as instructional materials and as teaching methods, there is the need to explore the efficacy of the use of games for science process skills among these students. Hence, the problem of this study posed as a question is**,** what are the effects of location on the acquisition of science process skills among male and female students?

1.3 Purpose of the study

This study specifically determined:

- differences on the level of the acquisition of science process skills among students that were taught with games and those taught using conventional method.
- differences among students from urban and rural areas that were taught using games and those that were taught using conventional method on acquisition of science process skills.

1.4 Significance of the study

The findings of this study are expected to be of benefit to the students, Basic Science teachers**,** educational administrators**,** parents**,** teachers and training institutions**.**

It was expected that the findings would lay credence to the effectiveness and authenticity of the tenets of the cognitive theory of Piaget**,** Brunner and Vygotsky social learning theory. The findings would help to strengthen the implications of these theories in teaching and learning of science in secondary schools especially while working co-operatively and socially.

The students would benefit from the findings of this study as the efficacy of the findings might enhance the student's active participation in science which may help in improving the understanding of science process skills and Basic Science better. It may also help students to spend their leisure time wisely if they will continue to play the games after classroom activities**.**

It is hoped that the findings of this study would help the teachers to know the extent of the efficacy of game and incorporate it in teaching and so enrich the method of teaching. The extents of the efficacy of the findings of this study are hoped would help the teachers to present their lessons down to the level the learners will understand**.** It may likewise help teachers to introduce science inquiry principles in the schools which may help to reduce the degree of interactions with the students thereby having enough time to complete the curriculum.

Furthermore, the study would help the curriculum planners to know the need for games in the curriculum and translate it into action and plan seminars as well as workshops for teachers**.**

The institutions that train teachers would likewise benefit from the findings of this study which may provide the extent of the efficacy of the games. This may help the student teachers who may use this approach on graduation.

The findings of this study would be of immense benefit to the parents, because effective science games at home may enable the parents encourage the children to utilize leisure time properly by learning science at home. This will help improve science learning thus making parents to spend less in the education of the students in terms of paying double school fees if the child performs poorly in science activities.

1.5 Scope of the study

This study was conducted using Junior Secondary School students (JSS1) in Enugu Education zone of Enugu State. The study was limited to Enugu Education zone because it was found out that games are not commonly used for science teaching in this zone. In investigating the effects of games on the acquisition of some Basic and some Integrated Science process skills, junior secondary school I students were used for the study. This was because the units under living and non-living things used for this study are covered in JSS 1 curricula content.

1.6 Research questions

The following research questions guided the study.

1. What are the mean science process skills acquisition scores of various skills of students when taught using games compared to those taught using conventional method?
2. What are the mean science process skills acquisition scores of JSS1 students of urban and rural students when taught using games and conventional methods?

1.7 Hypotheses

The following null hypotheses were tested at 0.05 level of significant.

$H0_1$: There is no significant difference in the mean science process skills acquisition scores of students when taught using games compared to those to be taught using conventional method.

$H0_2$: There is no significant difference in the mean science process skills acquisition scores of the JSS1 students of urban and rural schools when exposed to games.

$H0_3$: there is no significant interaction effect of the instructional methods and location on the level of science process skills acquisition when taught using each of the teaching methods.

2. Research method

2.1 Design of the study

The quasi-experimental design was used for this study. This is because intact classes were used to minimize Hawthorne effect and disruption of normal classes. Specifically, the non-randomized control group Pre-Test-Post-Test design was used to ensure homogeneity of groups (Smith, 2009).

2.2 Area of the study

The study was carried out in Enugu State. Enugu State has six Education Zones which include Agbani, Awgu, Enugu, Nsukka Obollo-Afor and Udi Education Zones. Enugu Education Zone was chosen for the study. This is made up of Enugu North and Isi-uzo local government areas. These areas were chosen because many schools are located in the zone. This would result to a lot of students and teachers benefiting from the study. Also, the primary occupation of majority of people there, is farming and acquisition of science process skills wound enable them solve the farming problems that might confront them.

2.3 Population of the study

The population of this study consisted of the entire Junior Secondary School, Basic Science students one (JSS 1) of the thirty-five (35) public secondary schools in Enugu Education Zone. Twenty-five (25) of the public schools were located in the urban metropolitan while ten (10) schools were located in the rural area. These schools were five (5) single male sex schools and fourteen (14) single female sex schools and sixteen (16) co-educational schools. The total number of JSS1 students in Enugu Education Zone was six thousand, nine hundred, and twenty-six (6,926). Out of these, two thousand seven hundred and twenty (2,720) were boys while four thousand two hundred (4200) were girls. There was also one thousand four hundred and thirty (1,430) teaching staff in Enugu Education Zone (Planning, Research and Statistic Unit Enugu State Post Primary School Management Board (PPSMB), 2010).

2.4 Sample and sampling technique

The sample for the study was one hundred and sixty (160) Basic Science students and four Basic Science teachers from co-education secondary schools in Enugu Education Zone of Enugu state. Stratified random sampling was employed to obtain the schools used for the study. The sixteen (16) co-educational schools in Enugu Education Zone were stratified into urban metropolitan and rural schools. Two schools were purposively selected from each stratum (urban and rural) and were randomly assigned to experimental and control groups. Hence in each location (one from each school) two intact classes of JSS 1 students was chosen using purposive sampling and randomly assigned to experimental and control groups. Therefore, a total number of four (4) intact classes of JSS 1 students were chosen for the study. The choice of the teachers was dependent on the class selected since the class teachers were used in teaching both experimental and control groups.

2.5 Instruments for data collection

The instruments used for the study was the Test of Science Process Skills Acquisition Test (TOSPSAT). The instruments were used as pretest for the purpose of assessing students' entry behaviour on the acquisition of science process skills. The same instruments were used at the end of the instruction as Post-Test for the purpose of measuring the level of science process skills acquisition among the students. However, items were reshuffled.

2.6 Development of instruments

The TOSPSAT was designed from the selected topic\content (living and non-living things) in the JSS1 Basic Science Curriculum. The TOSPSAT consists of 16 practical test items and 9 multiple choice items. The responses of the subjects on TOSPSAT was scored four (4) marks each for both practical and multiple-choice test items for the correct answer.

2.7 Validation of the instruments

The instruments were given to four (4) experts in science education, two (2) science educators (measurement and evaluators) and two (2) experienced integrated teachers for face and content validation. The validators validated the items in terms of proper wordings of the items, clarity of instrument to the subjects and for appropriateness and adequacy of the item. For the content validation of the TOSPSAT a test blue print was prepared in the relevant content and science process skills. The items that measured science process skill were used, because of the significance of its acquisition at JSS level. Initially forty (40) items were developed but after validation it was reduced to twenty-five (25) based on the comments made by the validators.

2.8 Trial testing for reliability of the instruments

The reliability of TOSPSAT was done using Kuder-Richardson formula 20 (K-R 20). This is because the instrument was dichotomously scored. The reliability of TOSPSAT was determined through trial testing of the instruments which was carried out using JSS 1 students of a school situated outside the environment of the study for the purpose of reliability. The items were administered to co-education school in Enugu South local government area. The reliability coefficient obtained was 0.84. The games were also trial tested and improvement was made on the games that were difficult for the students to play.

2.9 Administration of the instruments

The items were administered twice, before and after the experiment by the research assistants that were the class teachers teaching the classes selected. The same test items were administered as pretest and Post-Test. However, the items in the pretest were reorganized in Post-Test. This was to make the items for test look different to the students.

2.10 Initial group difference

To control this variable, the control for the non-equivalent of intact classes was randomly composed; analysis of covariance (ANCOVA) was employed to reduce the disparity. The Pre-Test scores were used as a covariate to the Post-Test scores in an ANCOVA.

2.11 Testing effect

The subjects in the experimental and control groups were taught the same content areas using the same length of time and examples. The Pre-Test and Post-Test were administered to all the streams at the same time. The question papers were retrieved from every student at the end of the Pre-Test and only the scripts for those subjects were scored. The students scored scripted were not returned to them until the end of the experiment.

2.12 Method of data analysis

The research questions were answered using mean and standard deviation. ANCOVA was used for testing hypotheses at $P<0.05$ level of significance. ANCOVA was used to test the hypotheses in order to get the required precision of the data obtained in the experimental group and to remove biases that may arise in using intact groups.

3. Results

3.1 Research question 1

What is the mean science process skills acquisition scores of students taught using games compared to those taught using conventional method?

Table 1 (a&b): Mean Science Process Skills Acquisition Scores and Standard Deviation of Students Taught Using Games and Conventional Methods of Teaching.

Table 1 (a): Pre-Test

Groups	Observing		measuring		classifying		inferring		Predicting		Communicating		hypothesizing		Experimenting	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Experimental	0.80	0.67	0.35	0.59	0.31	0.56	0.45	0.64	0.22	0.58	0.09	0.43	0.35	0.66	0.26	0.53
Control	0..81	0.67	0.41	1.07	0.43	0.85	0.78	1.43	0.29	0.66	0.33	0.93	0.40	1.02	0.15	0.39

Table 1 (b): Post-Test

Groups	observing		Measuring		Classifying		Inferring		Predicting		communicating		hypothesizing		experimenting	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Experimental	4.81	1.71	2.50	1.02	3.72	1.52	2.62	1.05	2.60	1.05	2.35	1.15	2.20	1.16	2.23	1.20
Control	1.50	0.81	0.93	0.89	0.98	0.91	0.90	0.72	0.77	0.92	0.55	1.03	0.55	0.71	0.38	0.70

Table 1(c): Summary of the aggregate score

Groups		Pre- Test	Post- Test	Gain score
Experimental	No of students (N)	80	80	
	Mean	9.10	53.20	44.10
	Std. Deviation	5.20	7.75	
Control	No of students (N)	80	80	
	Mean	11.60	17.40	5.80
	Std. Deviation	7.93	7.44	

Results on Table 1(a) indicated that Pre-Test scores for both groups (experimental and control) were low for each of the science process skills studied (all were below 1.0) and the aggregate science process skills were 2.83 for experimental and 3.61 for control respectively. The standard deviation for the two groups for Pre-Test were also low, for instance (0.53) and (0.39), (0.35) and (0.41) (1.71) and (0.56) and (0.85) and so on for the experimental and control groups respectively. This showed homogeneity in the cognitive ability levels of the two groups. For the Post-Test scores, results show that the mean aggregate score of 6.54 for the control group and 23.03 for the experimental group (Table 1b). Thus, the gain score for the control group after being taught using conventional method was 5.80 while that of the experimental group taught using games was 44.10. While the standard deviation for the Post-Test were 7.44 for control and 7.75 for experimental group. Therefore, the difference was as a result of treatment (the use of games). Hence games enhanced the acquisition of science process skills. For the individual score's games enhanced scores (ll. However, the students scored higher for the skills of observing (4.81) then classifying (3.72) followed by inferring (2.62), predicting (2.60), measuring (2.50), communicating (2.35), Experimenting (2.23) and hypothesizing (2.20).

The results also showed that science process skills are better acquired when games are employed in teaching. For the experimental group the mean standard deviation for the Pre-Test score (5.20) and post- test score (7.75) were close and low whereas in the Post-Test the standard deviation was a bit higher than that of the Pre-Test. This also indicates homogeneity of groups in cognitive ability.

The implication is that treatment enhanced science process skills acquisition scores among JSS students and the acquisition scores of observing and classifying were the highest. For the control group the mean deviation for the Pre-Test and Post-Test were low and close showing homogeneity in cognitive ability. These findings also showed that for Pre-Test students in the control group scored low in science process skills acquisition scores in the individual skills studied and the aggregate scores was higher than those in the experimental group but after the Post-Test those taught using games scored higher in all the skills studied.

Hypothesis 1: There is no significant difference in the mean science process skills acquisition scores of students when taught using games compared to those taught using conventional method.

3.2 Research Question 2

What are the mean science process skills acquisition scores of J.S.S. 1 students of urban and rural schools when taught using games and conventional methods?

Table 2(a&b): Mean Science Process Skills Acquisition Scores of Students by School Location and Teaching Methods Pre-Test

Location	Observing		Measuring		Classifying		Inferring		Predicting		Communicating		hypothesizing		experimenting	
Exp. Rural	0.62	0.94	0.27	0.62	0.41	0.63	0.47	0.71	0.31	0.56	0.06	0.32	0.44	0.70	0.44	0.63
Exp. Urban	0.50	0.55	0.36	0.59	0.32	0.57	0.44	0.64	0.24	0.59	0.10	0.43	0.36	0.66	0.67	0.54
Cont. Rural	0.80	0.67	0.14	0.40	0.57	0.54	0.67	0.79	0.26	0.67	0.27	0.54	0.44	0.70	0.14	0.40
Cont. Urban	0.73	0.70	0.45	0.92	0.30	0.51	0.37	0.60	0.34	0.65	0.26	0.67	0.36	0.56	0.18	0.38

Post-Test

Location	Observing		Measuring		Classifying		Inferring		predicting		communicating		hypothesizing		experimenting	
Exp. Rural	3.75	1.15	2.15	1.40	2.80	0.83	2.14	1.15	2.97	1.21	2.10	0.94	2.73	0.82	2.14	1.19
Exp. Urban	3.82	1.11	2.59	0.89	2.77	0.72	2.69	0.86	2.39	1.05	2.28	1.34	2.74	0.97	2.10	1.11
Cont. Rural	1.89	0.63	0.54	0.84	0.87	0.75	0.76	0.40	0.47	0.71	0.31	0.72	0.43	0.63	0.20	0.48
Cont. Urban	1.15	0.94	0.93	0.91	0.97	1.05	1.03	0.93	0.83	1.07	0.71	1.24	0.56	0.79	0.53	0.84

Table 2c Summary of Aggregate Score

Group	**Location**		**Pre-Test**	**Post-Test**	**Gain score**
Experimental	Urban	N	40	40	
		Mean	9.30	53.20	43.90
		Std. Deviation	4.99	7. 74	
	Rural	N	40	40	
		Mean	11.60	50.70	39.10
		Std. Deviation	4.99	9. 60	
Control	Urban	N	40	40	
		Mean	8.50	21.50	13.00
		Std. Deviation	5.37	9.44	
	Rural	N	40	40	
		Mean	11.60	17.40	8.69
		Std. Deviation	7.91	8.69	

The results above indicate that rural students in the experimental group scored highest in the mean Pre-Test of observing (3.75) with standard deviation of 1.15 then predicting (2.97) with the standard deviation of 1.21 followed by classifying(2.80) with the standard deviation of 1.21, hypothesizing (2.73) with standard deviation of 0.82, communicating 2.28 with standard deviation of 1.34, measuring (2.15) with the standard deviation of 1.40, inferring (2.14) with the standard deviation of 1.15, experimenting 2.14 with standard deviation of 1.19.Whereas, the urban counterparts had highest mean Post-Test scores of observing (3.82) with standard deviation of 1.11 then classifying (2.80) with standard deviation of 0.83, hypothesizing (2.74) with the standard deviation of 0.97 followed by inferring (2.69) with the standard deviation of 0.86, measuring (2.59) with standard deviation of 0.89, predicting (2.39)with the standard deviation of 1.05, communicating (2.28) with the standard deviation of 1.34, experimenting (2.10) with the standard deviation of 1.11.While the mean Post –Test scores and standard deviation of the rural students in the control group were observing 1.89 with the standard deviation of 0.63, measuring 0.54 with the standard deviation of 0.84, classifying 0.87 with standard deviation of 0.75, inferring 0.76 with the standard deviation of 0.40, predicting 0.71 with standard deviation of 0.47,communicating 0.72 with standard deviation of 0.31,hypothesizing 0.63 with the standard deviation of 0.43, experimenting 0.48 with the standard deviation of 0.20.

The results further show that the urban students in experimental group had mean science process skills acquisition Pre- Test scores of 9.20. The standard deviation was 5.52 while the rural counterparts score 11.60. For the Post-Test, the urban students taught using games score 52.80 and the standard deviation of Post-Test was 8.26. The mean gain score was 43.60. Whereas the females in the experimental group had 9.00 Pre-Test score and 53.60 Post-Test score while the standard deviation of Pre-Test was 5.00 and that of Post-Test was 7.38. The mean gain score was 44.60.

These observations imply that students exposed to game teaching approach had higher mean science process skills acquisition scores irrespective of the school location compared with the students exposed to conventional method of teaching who had lower mean science process skills acquisition score. But students exposed to games in the urban schools scored slightly higher than those students in the rural school who were exposed to games. The mean deviation of the Pre-Test for Students exposed to games in the urban and rural schools were low and close to each other while the mean deviations of the Post-Test scores were also close to each other but a little bit higher than those of the Pre-Test. Therefore, the students in the control group who were exposed to conventional method of teaching had low standard deviation in Pre-Test and Post-Test and individual scores are close to each other. The implication is that all the groups are homogeneity in cognitive ability. Worthy to note is that the students in urban schools exposed to games scored slightly higher than those students in the rural school who were also exposed to games in process skills like classifying and predicting. In contrast the students in urban schools who were exposed to games score slightly higher in process skills of observing, measuring and inferring.

Hypothesis 2

There is no significant difference on the mean science process skills acquisition scores of the JSS1 student of urban and rural students when exposed to games.

Tables 3

ANCOVA Result on the Mean Science Process Skills Acquisition Scores of JSS1 Students by Treatment and Location

Source of variation	Type 111 sum of squares	DF	Mean squares	F	Sign of Frequency	Decision	Result
Corrected model	299.79	2	149.89	2.00	.14		
Intercept	42168.47	1	42168.47	563.31	.00		
Pre-test	174.79	1	174.79	2.33	.13		
Location	186.09	1	186.95	2.48	.11		NS
Error	5764.00	77	74.85				
Total	221968.00	80					
Corrected Total	6063.80	79					

R Squared = .786 (Adjusted R Squared).

Table 3 revealed that F calculated value of 2.48 is not significant at .11. The level of significance is greater than 0.05 level of significant at $P \leq 0.05$. This implies that there was no significant difference in the mean science process skills acquisition scores of urban and rural students exposed to games. Hence, the null hypothesis Ho_3 is accepted. In essence school location has no significant effect on science process skills acquisition rather any difference that result may be as a result of teacher factor.

Hypothesis 3

There is no significant interaction effect of the instructional methods and location on the science process skills acquisition scores of the students taught using each of the two teaching methods.

Table 4 ANCOVA Result on Interaction Effect of the Instructional Methods and Location of the Subjects on Science Process Skills Acquisition

Source	Type 111 Sum of Squares	DF	Squares	F	Mean Sig	Remark
Corrected Model	2565.46	4	6466.35	113.54	.00	
Intercept	23930.46	1	23930.69	420.69	.00	
Pre-Test	103.93	1	103.93	1.84	.18	
Group	24780.60	1	2478.60	435.12	.00	
Location	13.27	1	13.27	.23	.63	
Group location	21.66	1	21.66	.37	.54	NS
Error	4271.33	75	56.95			
Total	129824.00	80				
Corrected Total	30316.80	79				

The results on the above Table shows that t-cal value was .37 is not significant at .54. The level of significant is greater than 0.05 of significant at $P\leq 0.05$. The null hypothesis (Ho_5) is rejected. The implication is that instructional methods did not combine with location to affect science process skills acquisition score of the subjects. Again, treatment enhance acquisition of science process skills, was consistence and the value did not vary due to location. Therefore, there is no significant interaction effect of instructional methods and location on science process skills acquisition scores of the subjects.

4. Discussion

The relevance of instructional games has made it an important instructional approach for the teaching and learning of science especially at junior secondary level. Result from table 1 showed that the mean science process skills acquisition scores of students in both control and experimental groups in the Pre-Test were close before the commencement of the treatment, showing homogeneity of group in intellectual ability. But after the treatment the students in the experimental group had higher mean science process skills acquisition scores in all the skills studied but the skill of observing was highest then classifying followed by predicting and measuring than students in control group. These skills are basic science process skills which are expected to be acquired at this educational level (Ejilibe et al. 2020). Notice that higher order skills (hypothesizing and experimenting) were acquired in this educational level after the treatment. The mean deviation in scores was close to each other. The mean gain score was also high after the treatment indicating the efficacy of games as activity-based instructional procedure in science process skills acquisition score. This showed that active participation of the students during lesson enhanced science process skills acquisition scores among the students. This was further confirmed from the result 0n table 4 which revealed that treatment was a significant factor on students mean science process skill acquisition scores since f = 435.12.This showed that at 0.05 level of significant that f=435.12 is less than 0.05.Therefore the null hypothesis of no significant difference is rejected. So, game as the main effect is significant on science process skills acquisition scores of students (Ejilibe et al. 2020).

Furthermore, the students exposed to conventional method of teaching had low mean science process skills acquisition score. This is because the data obtained indicate that the scores are low and very close to each other both in Pre-Test and Post-Test. The mean gain score was also low. Hence, students who were taught Basic Science using games scored higher in science process skills acquisition test than those taught using the conventional method. The findings support the findings of other previous researchers such as Nwosu (1991) where teachers' sensitizations enhanced the level of acquisition of science process skills among Biology students. The findings also confirmed the result of Ibe (2004) that Biology students exposed to guided inquiry method perform significantly better than those taught using demonstration and conventional method. Again, the result is in line with the finding of Chukwuemeka (2006) that revealed that science process skills were better acquired through active participation of pupils in the use of resources than conventional method. Hence, new method of teaching science as experimental treatment proved better than the use of conventional method. Mandor (2002) revealed that constructivism which is activity oriented enhance skills acquisition among students than those exposed to conventional method of teaching. Therefore, active participation of the students in games during Basic Science lesson enhanced learning as was propounded by Brunner (1966).

More so, Table 3 revealed that the mean science process skills acquisition scores of both the rural and urban students in the experimental group were higher for all the science process skills studied compared to their count parts exposed to conventional method. The results showed that rural students exposed to games scored higher in skills of classifying and predicting while the urban counterparts scored higher in observing, hypothesizing and predicting. The mean deviation between scores was close and the gain score was high among the rural and urban students in the experimental group. For the control group the deviation was very close and low while the gain score was very low and close to the mean. These indicate homogeneity in cognitive ability among all the groups. Hence the method employed by teacher has great effect on students' science process skills acquisition score. Thus, game teaching method promoted science process skills acquisition score of students. Further investigation on Table 3 ANCOVA result on mean science process skills acquisition scores of JSS1 students by treatment and location also confirmed that the location of school had no significant difference in the mean science process skills acquisition scores of urban and rural students exposed to games. Since F value = 2.48 which shows that F is greater than 0.05. So, the null hypothesis is accepted. The implication is that school location has no significant effect on science process skills acquisition scores of students. But the difference observed may be as a result of teaching method and style of teaching. The finding is also in line to the findings of Chukwumemeka (2005) that there was no significant difference in the mean score between urban and rural groups that manipulated resources. But the difference that exists may be as a result of teacher factor and style of teaching.

It is evident from the findings of this study that location did not combine with games to effect science process skills acquisition .Since there was no interaction as a result of teaching method and location, one might assume that the high mean score and gain score observed in the science process skills acquisition scores even among individual science process skills which are ascribed to games which enhanced science process skills acquisition score of urban and rural students. This finding confirms the finding of Anaekwe (1997) who found no significant difference in achievement in cognitive rating in primary science of rural and urban students in the study on effect of interaction patterns on cognitive achievement. The finding is also in line with that of Chukwuemeka and Nwosu (2008) that school locations made no difference in the acquisition of science process skills among students in urban and rural schools.

Conclusion

From the result of this investigation, the following conclusion were made:

Active participation of students and co-operation during the science lesson through game approach promoted science process skills acquisition. Location of school had no significant effect on the mean science process skills acquisition scores of students exposed to treatment and conventional method. The interaction effect of instructional methods and location on mean science process skills acquisition scores was not significance. The acquisition of science process skills was not due to location of schools but active participation and collaboration of students through games during class activity.

Educational Implications of the Study

Students should now be aware of the use of games in learning science concept. This is because the games used by the teachers made the students active participant in teaching and learning process. Students should also study science beyond lesson periods using games. But those taught with conventional method had low mean science process skills acquisition scores in both Pre-Test and Post-Test. There is need for regular reorientation of teachers on development and use of games that enhance science process skills acquisition through seminars, workshops and conferences by every tier of government.

The findings of the study is significant to the curriculum planners on the need to restructure and infuse games as teaching method in the science curriculum and in teacher Education Programme such that class room activities do not only based on process based learning, but also sustain students' learning and interest throughout and beyond the lesson periods. This finding will also assist the curriculum planners on the need for the provision of relevant games as teaching methods and instructional material for effective teaching and learning. The inclusion of games in the curriculum will make learning friendly and more meaningful.

From the study also, science process skills were better acquired through active participation of learners in the use of games. Therefore, the policy makers in the Ministry of Education should utilize this information to choose a method of instruction to be adopted in teaching science in schools.

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