

## COMPARATIVE ANALYSIS OF KOLB'S 4-STAGE CYCLE MODEL OF EXPERIENTIAL LEARNING ON STUDENTS' PERFORMANCE IN VEGETABLE CROP PRODUCTION IN URBAN AND RURAL SCHOOL IN ANAMBRA STATE

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### **Abstract**

This study deems it necessary to examine the school location as a factor that may be affecting students' performance in vegetable crop production through experiential learning model of Kolb's 4-stage cycle. The study made use of a pretest post-test, non-equivalent control group. It is a quasi-experimental research design. The study was carried out in Anambra State. The population of the study was 26,121 senior secondary school students from sixty-one (61) secondary schools in Awka education zone of post primary school service commission (PPSSC) Anambra State. The sample was 141 all SS1 students of the four sampled schools in Awka Education Zone purposely chosen, those with a single stream of SSI. Instruments for data collection was Vegetable crop production performance Test (VCPPT). The VCPPT instrument was made up of 40 multiple choice test items developed from the SS1 Agricultural Science curriculum on two vegetable crops used (tomatoes and fluted pumpkin). The Instrument VCPPT was validated by three experts. Data collected were analyzed, using mean to answer the two research questions. That is the pre-test, post-test mean gain of each group- control and experiment before and after the treatment. The null hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result revealed that the use of Kolb's 4-stage cycle model of E.L was effective and improved performance of students in rural school than those students in urban school. Significant difference exists between their mean performance scores. There was also an interaction effect of location and group performance of both experimental and control group with respect to their mean performance score in VCPPT. And the interaction effect was found to be significant. Sequel to the findings, the researcher recommended that acquisition of plots of land by schools for practical should be made compulsory to all schools and its implementation followed up by the board concerned; and the use of Kolb's model be incorporated in Agricultural science curriculum, being an innovation, this calls for re-training of teachers on its use and application.

**Key words, Kolb's Model of E.L, Vegetable crops production, School Location and Students' Performance.**

## INTRODUCTION

Kolb in 1984 developed four components of the experiential learning model, called Kolb's 4-Stage Cycle Model of Experiential Learning (Kolb's 2004). The four stage cycle are; Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation. These 4 stage cycle guide the teacher on how to carries out practical or field work activities. Following the stages sequentially helps to promote mastering of a subject and asking of thought provoking questions, questions that elicit divergent thinking. Kolb's model offers strategies which among others include – giving students the freedom and security they need to take risks, providing the time that creativity needs, time to experiment with new material and ideas, so as to think in divergent directions and occasionally to make mistakes – (trial and error process) which Kolb and Kolb, (2001) termed as experiential learning strategy. Experiential learning according to Zurbrick in Okafor (2014) refers to as learning activities that involve the learner directly in the phenomena being studied. The nature of the involvement is direct and purposeful, addressing a real world problem in a natural setting. Experiential learning had been emphasized by Okafor, (2019) as a stimulating method capable of carrying students along during instruction and exposes them into learning by doing strategy

Experiential learning in view of Smith in Okafor (2014) focuses on the learning process of the individual, which the learner does through interaction with the environment thus makes discoveries and experiment with knowledge firsthand, instead of hearing or reading about others experiences. In the context of this work, experiential learning means the ability of the secondary school students to acquire skills and knowledge needed for vegetable crop production through exposure to Kolb's 4 - Stage Cycle Model of experiential learning and impact of the location where the learner is.

Experiential learning models are tools meant for understanding how the process of learning through experience works.

Experiential learning can be improved and enhanced through the use of deliberate tools, technique and strategies as in Kolb's model which compels students to be creative. Tremendous efforts have been extended in the study of the factors affecting academic performance especially in science and technology. Onyekwere (2001) stated that the degree of understanding by students depends on several interacting variables. The author stressed that the student's readiness to perform and learn while the teacher is teaching can be super fluxed by other variables such as school location among others. Location of a school means places where schools are sited. In Anambra State, some schools are located in urban areas while some are located in rural areas. Schools in urban area are considered so if they are at distances of few kilometers to State or Local Government Headquarters, situated where there are availability of basic amenities such as pipe born water, market, electricity and communication network. Where all these are not readily available such area is considered to be rural. Harris in Okafor (2014) maintained that school location creates different learning experiences to students. This is because students tend to grow with the activities that happen around their learning environment. That is the base of social-cultural learning theory which affirmed that school location is a contributing factor to learners' level of mastering skills and knowledge especially in crop production.

Studies in recent time has proved that school location has in one way or the other contributed to the level of performance of students in various discipline. Seburu, Jessica, James, Dexter and Richard (2006) carried out studies on agricultural literacy of urban/suburban and rural Twelfth Grade students in five Illinois High Schools. Their purpose among others was to determine strengths and weaknesses of Agricultural knowledge for General Education students and Agricultural Education students in

selected urban/suburban and rural schools using five thematic or five different sub-areas of agriculture. They found out that students enrolled in urban/suburban schools scored much lower in agricultural knowledge than students in rural school for all the five thematic areas. Could the case be the same in the vegetable crop production in agriculture, this study will find out.

This study gave more attention to these two vegetable crop tomatoes (*Lycopersicum esculentum*) and fluted pumpkin (*Telfairia occidentalis*). The two crops seem to be among the most consumed vegetable crops in Anambra state. Both have similar production skills and can be grown and are harvested within 2-3 months. Students if well taught on the production skills of these vegetable crops can engage in it as a source of their livelihood. This calls for the involvement of students on the production process of these crops during their period of study in secondary school. It was based on this fact that Egbule (2004) stated that the teaching of agriculture should be followed up with what he called “hands-on-activities. Through this, students are equipped with the requisite skills for effective performance in agricultural production.

Performance is an action brought about or accomplished by effort, skill or courage. In other words, Students’ performance depicts the level of knowledge; skill accomplishment in an area of endeavor. Such performance is depended upon several factors among which are instructional methods, the learning environment/location and the learner according to (Athson, 2002). The 4- cycle model of Kolb’s was modeled to take the learner into action of better performance if well guided by a facilitator especially in learning by doing, hence the Study.

### **Statement of the Problem**

High academic performance is an indication of the attainment of stated objectives in any subject. It should be noted that the main objective of teaching Agricultural Science

in secondary school is to enable students be self-employed and to acquire more employable skills. ( Okafor 2018).

Despite some conditions spelt out by the Nigerian, Educational and Research Development Council (NERDC) on how to teach agricultural science in senior secondary schools to achieve the stated objective of which among them is to inculcate in the learner the skill to master production of some crops for a means of livelihood after graduation from secondary school.

Observations revealed that almost all the schools in Anambra State offer agricultural science yet most of the secondary school graduates are jobless. Despite all the career and job opportunities provided by this subject (Agricultural Science) students graduate without any practical skills to equip them for life. This is the main reason; the researcher felt that this study is necessary in Anambra State. The researcher also observed that most schools tried as much to adhere to the spelt conditions to offer agriculture in schools such, is availability of plots of land for practical yet some factors still hinders the sustainability of this intended goal, among these factors is the location of the school. This study deems it necessary to examine the school location as a factor that may be affecting students' performance in vegetable crop production through experiential learning model of Kolb's 4- stage cycle; to find out if school location is actually a determinant to acquisition of plots of land or availability of land to schools to practice agriculture. It is through learning by doing that skills are impacted.

### **Purposes of the Study**

This study looked at how students in schools located in urban and rural areas improved in their performance in vegetable crop production when exposed to Kolb's 4- stage cycle model of experiential learning.

Specifically the study tends to determine:

- 1.The effect of Kolb's 4- stage cycle model of Experiential Learning EL on mean Performance test score of students in school located in rural and urban areas.
2. The interaction effects of school location and performance scores of students taught vegetable crop production, using Kolb's 4-stage cycle model of E.L

### **Research Questions**

1. What is the effect of Kolb's 4-stage cycle model of Experiential Learning E.L. on mean performance test score of students in schools located in rural and urban area?.
2. What is the interaction effect of school location and performance scores of students taught vegetable crop production using Kolb's 4-stage cycle model of E.L?

### **Null Hypothesis**

- H0<sub>1</sub>: There is no significant difference between the mean performance scores of students in urban and rural areas taught vegetable crop production using Kolb's 4-stage cycle model.
- H0<sub>2</sub>: There is no significant interaction effect of school location and performance scores of students taught vegetable crop production using Kolb's 4- stage cycle model of Experiential Learning EL.

### **Methodology**

The study adopted quasi-experimental design. The researcher made use of pre-test, post-test, non-equivalent control group. Quasi-experimental design was adopted because it is an empirical intervention on target population without random assignment. The use of quasi-experimental design was necessary in order not to disrupt the normal classes of the students and school time table for the experiment Cohen and Manion, in ( Okafor 2014). The use of intact classes make the reactive effects of experimentation

to be more easily controlled thereby making subjects less aware of an experiment being conducted than when subjects are drawn from classes and put into experimental classes as in true experimental design.

This study was carried out in Anambra State. Anambra State is one of the five states in the South-Eastern geo-political zone of Nigeria with six educational zone. Its inhabitants customarily regard vegetable crops as part of daily meal diet; therefore its demand is high. Almost every community in the state has a co-educational secondary school commonly called community secondary school made up of junior and senior secondary school. Population for this study was 26,139 senior secondary students from Awka Education zone of Anambra State. The sample for the study was 141 senior secondary school one (SS1) students. The sampled students were the entire senior secondary school students one (SS1) of the four schools used for the study. The four schools were purposively sampled from 61 public secondary schools in Awka Education zone. All the four schools SSI classes, two for treatment and two for control were made up of a stream each therefore all students offering agriculture in their intact classes were used. 67 students were from two control schools and 71 were from the two experimental schools. Two situated at Urban and the other two at Rural Area.

Instruments for data collection was vegetable crop production performance test.(VCPPT). The VCPPT instrument was made up of 40 multiple choice test items developed from the SS1 Agricultural Science curriculum on two vegetable crops used (tomatoes and fluted pumpkin). The instrument was developed based on Simpson's Taxonomy of psychomotor domain (Simpson 1972). This instrument was used to collect data on students' performance. It was developed by the researcher. The Instrument VCPPT was subjected to both content and face validation by three experts from Agric Education Department in the Faculty of Vocational Technical Education, University of Nigeria, Nsukka for suitability and clarity of the statements and for any ambiguous or irrelevant statements.



The trial test for determining the coefficient of stability of vegetable crop production performance test (VCPPT) was carried out using test re-test reliability technique. The instruments were administered on forty equivalent samples of SS1 students in Awka Anambra State. The answer sheets were marked by the researcher and the scores kept. The tests were re-administered after two weeks to the same group, the answer sheets were marked too. The scores of the 1<sup>st</sup> and 2<sup>nd</sup> tests were correlated. The reliability coefficient of the VCPPT was found to be 0.88. Kuder Richerdson formular (K-R 20) was used, since the items of the tests are of multiple –choice type. Cronbach alpha technique was used to determine the reliability coefficient of VCPPII and it was found to be 0.82

The research assistants helped to administer the pre-test of VCPPT and collected the scripts at the end of the stipulated time. Students provided their answers inside the space within the question paper; they were expected to tick the option letter of their choice. These were for both pre-test and post test. Pre-test exam of the vegetable crop production performance test (VCPPT) was marked at the end of the examination by the researcher and the scores recorded against each individual subject. This provided data base for comparing the effect of the treatment on the variables at the end of the experiment. At the end of the treatment, the teachers (research assistants) administered the post-test to the experimental and control groups and scripts collected at the end of the stipulated time. The researcher marked the scripts and recorded the students' scores on the post-test column for the two groups at the end of the treatment. Data collected were analyzed, using mean to answer all the research questions. That is the pre-test, post-test mean gain of each group- control and experiment before and after the treatment. The null hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance.



This study also employed experimental procedure and training of research assistants for proper use of Kolb's 4-stage cycle model as a strategy in teaching vegetable crop production for skill acquisition.

### **Experimental Procedure**

- Sample grouped into two intact classes one urban one rural.
- Consultation of standard agricultural science curriculum on vegetable crop production.
- Determination of the basic topic in tomatoes and fluted pumpkin to cover.
- Determination of objectives required in the vegetable crops – tomato and fluted pumpkin.
- Lesson plan drawn – objectives of each topics on tomatoes and fluted pumpkin listed out
- Vegetable crop (Tomato and fluted pumpkin) broke into units of lesson topics
- Identification of the teaching materials/resources best suited for accomplishing each lesson topic.
- Designation of class-activities that involved stages of Kolb's model of E.L, that is for experimental class – to be reflected in teacher's activities and students' activities as shown below;

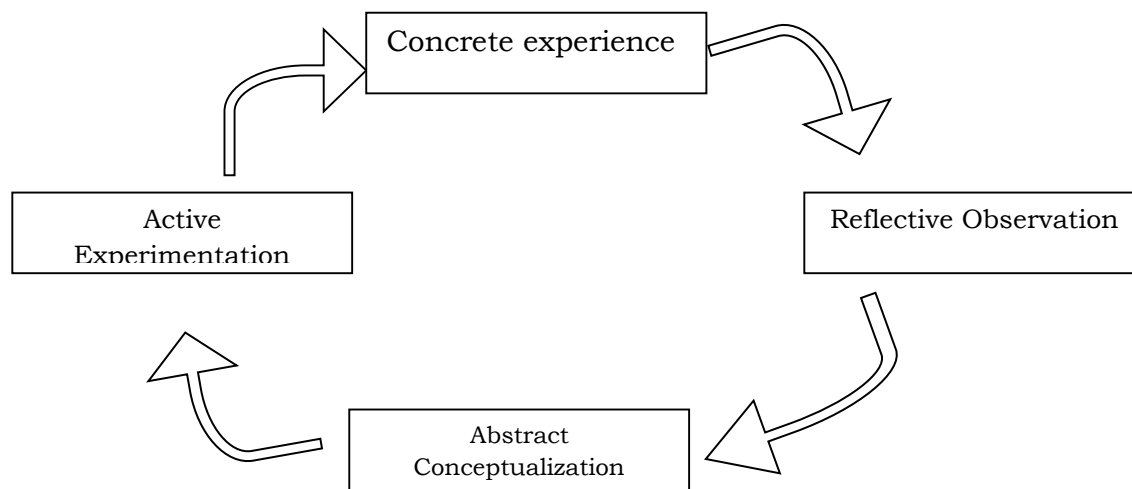
#### **Kolb's Stages**

1. Concrete experience:

#### **Steps: (Teachers/Students Activities**

- Students taken to the farm to expose them to practical activities/experiences going on in the farm.
- Involve the students to carry out the activity themselves under the teacher's supervision.

2. Reflective Observation:
- Students should be allowed to touch, feel the teaching materials, and observe the ongoing activities. The teacher used questions to evoke and stimulate reasoning and learning in the students.
  - Students asked questions on the observed activities to understand the phenomenon.
3. Abstract Conceptualization
- Deducing of facts and principles and concepts surrounding the activities going on in the farm (on the growing of vegetable crops, tomatoes and fluted pumpkin). The abstract conceptualizations are as a result of exposure to concrete experience where the students, watch, observe and think critically brainstorming. Students made suggestions on ways of achieving the production activities other than the way they observed.
4. Active Experimentation:
- At this stage, the teacher allowed the students to put into practice what they have observed and internalized. The on-going activities can be the beginning of another cycle as concrete experiences. The stages/cycle continues.



#### **KOLB'S 4- Stage Cycle Model OF EL extract from KOLB (1984)**

- Designation of lesson plan for control group that pay less attention to field work, on the same topics as in experimental group. Most often, the teachers and students activities only occur in the classroom because the method often used was lecture method, Note taking are not student-activity-based. Even when in the farm there is no driving tool into real practical activities no sequence as in kolb's. model.
- Summary of the previous lesson to link with the day's lesson.
- For the new (lesson), test the students' previous knowledge (entry behavior) with generally stimulating questions that are familiar but in the direction of the lesson on tomato and fluted pumpkin.
- Ask questions to guide the learners.
- Give students opportunity to answer the questions and carryout the operation as indicated in the steps above.

## **Training of the Agricultural Science Teachers as Research Assistants for the Study**

The researcher organized one week intensive training for the Agricultural Science teachers from the sampled schools to be used in experiment. The training was for both the control group and the experimental group teachers; each group was trained for one week on one of the schools of the research assistants, and the other group, another one week on an agreed place. The training covered the purposes of the study, the use of Kolb's 4-stage cycle model of experiential learning, the topics in the lesson plan, the use of lesson plans, duration of the experiment, and the general conduct of the study. The administration of the pretest to the students took off immediately after training before the actual teaching begins.

Research Assistants were instructed on how to administer the instruments on the first day before the take off of the teaching. Vegetable crop production performance test (VCPPT) was administered as pretest to both the experimental and control groups after which the proper instruction started. The teachers in experimental schools taught using lesson plan (1) with steps on Kolb's 4-stage cycle model of experiential learning (Learning by doing). While the teachers on control groups, used lesson plan (2) which was prepared following traditional/lecture method of teaching in the school classroom that involve less of students' activities. All the necessary field trip, teaching materials as stated in the lesson plans of both group were followed strictly. The researcher observed and supervised the teaching process of both groups to ensure they did not deviate from the required process.

The study was conducted during the normal school periods. The regular school teachers teaching agricultural science in those SS1 classes in each of the sampled schools for the study were used. Each lesson lasted for eighty (80) minutes (two double periods of 40 minutes each). The experimental group tried and made use of the time judiciously. The

whole teaching and treatment lasted for six (10) weeks, though the field work continued for the treatment group. At the end of six weeks, the post tests on the vegetable crop production performance were administered on both groups and the scores collected and marked. The experiment was carried out within April through June. This was end of second term to entire period of third term of secondary school calendar in Anambra State.

## Result

### Research question one

1. What is the effect of Kolb's 4-stage cycle model of Experiential Learning E.L. on mean performance test score of students in schools located in rural and urban area?.

**Table 1: Mean of pretest and posttest scores of rural and urban school students taught vegetable crop production using Kolb's 4-stage cycle model of E.L.**

Location	N	PreTest $\bar{X}$	PostTest $\bar{X}$	Mean Gain
Rural	38	46.95	63.58	16.63
Urban	36	33.47	44.19	10.72

The data presented in the Table 1 showed that students in the rural school who were taught vegetable crops production with Kolb's 4-stage cycle model of E.L had a mean score of 46.95 and 63.58 in pretest and post test respectively, with the mean gain of 16.63. Students in urban school on the other hand had mean score of 33.47 in pretest and 44.19 in the posttest with a mean gain of 10.72. The above results showed that

students in the rural school who were taught vegetable crop production using Kolb's 4-stage cycle model of E.L performed better than students in the urban school taught with the same method. This indicated that the teaching of vegetable crop production using Kolb's 4-stage cycle model of E.L was more effective with students in the rural school than those in the urban school. It was deduced from this result that student in rural areas are more practically exposed to Agriculture than students in urban areas.

Ho<sub>1</sub>: There is no significant difference between the mean performance scores of students in urban and rural areas taught vegetable crop production using Kolb's 4-stage cycle model of E.L.

**Table 2: Summary of analysis of Covariance (ANCOVA) for testing significance in the mean performance scores of rural and urban school in vegetable crop production**

Source	Sum of square	DF	Mean square	f	Sig
Corrected Model	14829.972	2	7414.986	79.829	.000
Intercept	5561.989	1	5561.989	59.880	.000
Pretest	10962.980	1	10962.980	1188.027	.000
Group	854.258	1	854.235	9.197	.003
Error	12818.170	138	92.885		
Total	388497.000	141			
Corrected total	27648.142	140			

Significant at < 0.05.

The data presented in Table 2 revealed that F-calculated values for group location of rural and urban school students in vegetable crop production were 9.197, with a significance of F. at 0.003. This is less than 0.05 leading to the rejection of null hypothesis at 0.05 level of significance. This result showed that there is significant difference between the mean performance score of students in rural and urban school taught vegetable crop production using Kolb's 4-stage cycle model of E.L. It can be deduced from this result that locations influences rate of students and teachers involvement in Agricultural activities. It also implies that a particular location fits production of a particular crop.

### Research Question 2

What is the interaction effect of school location and performance scores of students taught?

vegetable crop production using Kolb's 4-stage cycle model of E.L?.

**Table 3: Mean scores of rural and urban students in the experimental and control groups**

Group	Location	N	X
Control group	Urban	37	46.84
	Rural	30	46.43
	Total	67	46.66
Experimental	Urban	36	44.19
	Rural	38	63.58
	Total	74	04.15
Total	Urban	73	45.53
	Rural	68	56.01



The summary of the result presented in Table 3 showed that urban students in the control group had a mean score of 46.84, while rural students had a mean of 46.43, There is slight difference between the two control schools. On the other hand, the experimental group urban students had a mean score of 44.19 while rural student had 63.58. However, the slight difference that exists between students in the control groups and the wide range of deference in the mean scores of students in the experimental group revealed that there is interaction between location and group.

H0<sub>2</sub>: There is no significant interaction effect of school location and performance scores of students taught vegetable crop production using Kolb' 4-stage cycle model of E.L

**Table 4: Summary of Analysis of Covariance (ANCOVA) for the test of significance of Interaction of location with respect to the mean performance score in (VCPPT)**

Source	Sum of square	DF	Mean square	f.	Sig
Corrected Model	17484.865	4	4371.216	58.49	000
Intercept	6312. 940	1	6312.940	84.477	000
Pretest	8562.019	1	8562.019	114.573	000
Group	3501.131	3	1169.710	15.652	000
Error	10163.277	136	74.730		
Total	388497.000	141			
Corrected total	27648.142	140			

Significant of F <0.05

The data presented in Table 3 showed that F. Calculated for interaction effect of school location and students' performance scores stood at 15.65 for a significance of F at. 000. This value is less than 0.05. With this result, the null hypothesis was rejected at 0.05 level of significant. This is an indication that there is significant interaction effect of location and group with respect to students performance score in VCPPT. It implies that location of a place decides activities that go on in that area. Things are natured and nurtured based on the characters and the principles of the location within which they exist.

## **Discussion of Findings**

### **Effect of School Location on the Students' Academic Performance**

The finding revealed that students in the rural school performed better than students in the urban school in vegetable crop production performance test. The analysis of Covariance (ANCOVA) used to test for the hypothesis 1, showed significant difference in their vegetable crop production performance test (VCPPT). These findings were in consonant with the finding of the study of Seburu, Jessica, James, Dexter and Richard (2006) who carried out study on agricultural literacy of Urban, suburban and rural Twelfth grade Students in five Illinois high schools. They found out that students enrolled in urban/suburban schools scored much lower in agricultural knowledge than students in rural school for all the five thematic areas.

This significance difference in the mean performance of urban /rural students could be due to the instructional strategy adopted, the researchers reported, On the same vein, positive response of the rural students to Kolb's 4-stage cycle model of E.L as revealed by the result of this study could be due to some environmental factors associated with rural settings- such factors as availability of school farmland, suitability of the soil for the production of a particular crop, some of these factors determine the extent of farm land utilization and the involvement of students to practical agriculture. Such activities

are readily found with rural school, than with urban schools, it could be, due to the teachers attitude towards practical agriculture because, the researcher observed that agricultural science teachers in rural area exhibit better attitude to practical work than their urban counterparts. All these, could be attributed to the good performance of students in rural areas than those in urban area. Again, the use of Kolb's model must have compelled or lured students into Hand on Activities that is, learning by doing or by experience. This finding compares well with that of Anyigbo in Okafor (2014) the researcher found that such an instructional strategy indulges students into carefully, structured, sequence of activities which include observing, hypothesizing, experimenting and making inference, as a result they gain knowledge on their own and develop their minds by using it to solve problems; therefore the finding is a true fact and never misleading.

The finding showed that there was a slight difference in the mean performance of the Urban and rural students in the control group, in vegetable crop production performance test. It also revealed that a great variance exist between the mean performance of the rural and Urban students in VCPPT. Analysis of covariance (ANCOVA) which was used to test for the significant interaction difference between the performance of these groups indicated that difference existed was statistically significant. The strength of the significance level indicated that there was an interaction effect of the school location and the group performance. The finding also was in line with the study of (Harrison 2021), who also found out that different aspect of school environment (rural and urban) influences students achievement. This result established that the application of Kolb's model which lay more emphasis on learning by doing was more applicable in rural setting than in urban school area. The result also indicated that students in rural schools showed willingness and skill in practical activities than their urban counterparts.

## **Conclusion**

The findings of this study revealed that the use of a model such as Kolb's 4- Stage cycle model of EL in instruction delivery is one of the surest ways of spurring the learner to make reflective reasoning/observations in the learning process hence able to acquire necessary skills inherent in the learning process. Moreover, students tend to learn fast when what the teacher teaches seem to be a replica of natured and nurtured based on the principles of the location within which they exist. This is because different aspect of school environment (rural and urban) influence students' achievement in different ways especially on subjects that are activity based.

## **Recommendations**

In line with the above findings of the study; the following were recommended,

1. The use of Kolb's 4-stage model being an innovation which seems to be effective, there is need for Science teachers' workshop and seminars to acquaint and trained them on how to use and apply this model especially in practical activities
2. Curriculum in Agriculture should be strengthened to give attention to learning by doing (hand-on-activities.) where teachers must be present to facilitate the students' practical activities.
3. Government should enforce all school within urban or rural to have large piece of land for Agricultural activities.
3. Agricultural science teachers should make teaching more of student activity based where students will partake in their learning process.
4. Practical activities of the teacher of Agriculture with the students will be recorded and made Part of the things to supervise during clinical supervision to make teachers to be serious with this important aspect of learning process in teaching Agriculture.

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