Effectiveness of Activities Collaborative Group Poster Strategy on the Academic Achievement of Senior Secondary Students on Genetics Concepts in Dawankin-Kudu Educational Zone Kano, Nigeria

Mamudu Samson Toyosi and Alairu Aminat

Abstract
The research examined the effectiveness of activities collaborative group poster strategy and on academic achievement of senior secondary school students on genetics concept in Dawakin-kudu Educational Zone Kano State, Nigeria. The study has three research objectives guided by three research questions and three hypotheses. Quasi experimental and control group involving pretest and post test design was used. Experimental group was taught using activities collaborative group poster strategy and control group was taught using lecture method, two instrument used for the study ware Genetics Achievement Test (GAT) and Genetics Attitude Questionnaire (GAQ). Research question ware answered statistically using mean and standard deviation, while the activities collaborative group poster strategy hypotheses was analyzed using t-test a 0.05 level of significance. The major finding revealed the significance difference between student exposed to activities collaborative group poster strategy and those to lecture method. The study recommended that, Kano State Government to organize seminar/training programs, workshops, conferences and continuing sponsorship of biology teachers in order to update their knowledge and adopt activities collaborative group poster strategy method that evolving the use of posters and text book diagrams in teaching biology concept.

Keyword: Effectiveness, Activities Collaborative Group Poster, Strategy, Academic Achievement

Introduction
Biology is the study of life. It is a practical oriented subject which focuses more on knowledge application than on mere knowledge acquisition. The biology teachers of the 21st century should as a matter of urgency make a paradigm shift from being instructors, expositors, fact givers and verifiers to facilitators and stimulators because objective of biology curriculum as stated in National policy on education are to acquire meaningful and relevant knowledge of the subject to have the ability to apply scientific knowledge to day to day activities (Okoli, 2011). Incorporating activities based into biology lessons is imperative if the students must acquire the relevant scientific knowledge, skills and competencies needed for survival in the present scientific and technological age because many advancement in humankinds, agriculture mechanization, colony in health sectors etc, understanding of the basic processes and components of life (Ahmed, 2011).
Unfortunately, student’s performance in this subject at senior school certificate examination had remained persistently poor. While some student’s look at genetic concepts as abstract in nature without paying attention to necessary detail, Okoli, (2011). They attributed it to ill-equipped laboratories and the biology syllabus that was overloaded and also included were student attitude, Cultural believe/value, classes are usually too large and heterogeneous in terms of ability level and overpopulation of students in relation to teacher-pupil ratio in our schools. The Federal Government of Nigeria in her National Policy on Education (2004) stipulated and recommended the number of teacher-students ratio in practical classes to be ratio 1:24. However, in our public secondary schools nowadays the scenario was ratio 1:70 and even more than that.

Ose-Algbekaen and Stella (2014) indicated that, (WAEC) Chief examiners report for 2008, 2009 2010, 2011 and 2012 listed some of the weakness that were observed generally in the scripts of the candidates in genetic concepts responsible for their poor performance and suggested remedies amongst which are; i) lack of practical skills, ii) Production of poor diagram as a result of using blunt pencil with broken lines; iii). Free hand guidelines and non-horizontal labels; v) Poor spelling of labels and techniques; vi) Not conforming with size specification of diagrams. Ose-Algbekaen and Stella, (2014) enumerated the following remedies to overcome these weaknesses:

1. Teachers should expose the students to practical classes/ activities base and students centre
2. Teachers should make their lessons more real, activities based and participated by students.

These weaknesses exhibited by the student’s results in their poor performance in senior secondary certificate examination Akubuilo, (2004) attributed student’s poor performance to teacher’s lack of competence, skills and creativity to organize activities based in Biology. Teachers at all levels need a new orientation in rearranging and delivering scientific information to learners.

Activities Collaborative posters are great ways to help students synthesize their understanding in a visual form with close reference to the text. Creating a poster encourages student’s creativity while assisting student's self-assessment via a rubric. Collaboration is a team to solve a particular problem at hand. The team could be in small groups or larger groups depending on how the teacher wants it done. Jongur and Mohammed (2011) reported that collaborative learning is an instructional strategy in which students team up together on a given instructional objectives either in form of assignments, class discussion and the teacher being a guide. This strategy is applicable to any topic as well as beneficial for students’ use as a means to express creativity and to familiarize students with this type of performance task throughout the year. Students are given time to think about how to represent the information from the text on a Collaborative- poster. Students are to discuss and reach a consensus on which images, quote, or original phrases are to be included in the collaborative poster. As groups plan and create their poster, a rubric is essential to ensure that they discuss the text, stay on task, and use images to highlight main ideas rather than merely to decorate the poster. Each student in the team uses a single and distinct color marker which uses different color to represent his/her work on the poster. After the completion of poster the groups present the information to the whole class or groups share the information in gallery walking format (Ose-Algbekaen and Stella, 2014).

Academic achievement as noted by Popoola, (2010) is the student scholastic standing and which is a function of a various factors such as method of teaching, teachers' qualifications,
child's home background, school environment, among others. Several reports indicated that students achieved poorly in biology. For instance, report by Chief Examiner, National Examination Council of Nigeria (Nwagbo, 2006) revealed that student's performance in science subjects including biology is declining at considerable rate. This might not be unconnected with factors such as teaching method and negative attitude of students toward science subjects. It is against this background that this study examines the effectiveness of activities collaborative group poster teaching strategy on the students' academic achievement of Senior Secondary Schools on genetics concept Dawakin-Kudu Educational Zone, Kano, Nigeria.

**Statement of the problem**

Students' persistent poor performance has been partly ascribed to inadequate teaching and instructional methods adopted by science teachers (Okebukola, 1997 & Derek, 2007). Supporting this view, the seriousness of the deplorable performance of secondary school students in science subjects and identified persistent use of the traditional mode of instruction as one of the major short-coming affecting the learning and higher achievement in science subjects. Biology as a science subject is broader in nature and scope expected to be covered within three years of senior secondary school Federal Republic of Nigeria (2008) in an attempt to cope with the wider nature of biology, the subject teachers usually adopt lecture method in teaching in order to cover the syllabus within the stipulated time and this do not give room for proper understanding of the subject. The Chief WAEC Examiner Report (2008-2014) noted that the rush over the topics to be covered could be responsible for the poor performance in Biology. Therefore this research study seek to investigate the effectiveness of activities collaborative group poster strategy on the academic achievement of senior secondary on genetics concepts in Dawakin-Kudu Educational Zone, Kano, Nigeria.

**Objectives of the study**

The objectives of this study are to:

1. Determine the effectiveness of activities collaborative group poster strategy and Lecture method on academic achievement of biology students on genetics concept of biology.
2. Examines the effectiveness of activities collaborative group poster strategy on gender in genetics concept.
3. Determine the attitude of student's toward genetic concepts due to teaching method.

**Research Question**

The following research questions were formulated for this:

1. Is there a difference in achievement of students exposed to collaborate postal strategy and those exposed to lecture method in genetic concept?
2. What are the differences in the academic achievement of male and female students taught on genetics concept of biology using activities collaborative group poster strategy only?
3. What are the differences in the attitude of students in experimental and control group towards genetic concept due to exposure to teaching method?

**Hypotheses**

The following null hypotheses were formulated and tested at p≤ 0.05 level of significance

H₀₁: There is no significant difference in the academic-achievement of students who were taught genetics concept of biology using activities collaborative group poster strategy and those exposed to Lecture method.
H02: There is no significant difference in the academic achievement of male and female students who were taught genetics concept of biology using activities collaborative group poster strategy only.

H03: There is no significant difference in the attitude of students in the experimental and control group towards genetics concept of biology.

Significance of the Study
- The result of this study is expected to be important to academics, curriculum planners to design a suitable curriculum that puts into consideration the best methods, particularly Science educators, Science teachers as well as students.
- It is expected that the result of the study will help to; equipped the teacher and students in planning and trained as a researcher
- It will also encourage the various tier of government to contribute their quota to the schools, support and development best strategy in schools-

Research Methodology
The study utilized a quasi experimental and control group of pre-test and post-test group design. This is made of two groups: experimental and control. The experimental group was exposed to activities collaborative group poster strategy while the control group was exposed to lecture method. A pre-test was administered first to determine the equivalence in performance of students in the three groups before the treatment, a post-test was administered after the treatment to determine whether the two teaching methods has an effect on student academic achievements and attitude. This can be illustrated as follows.

EG → O1 → XI → O2
CG → O1 → XO → O2

Fig.1: Research Designed Illustration
EG = Experimental group 1 (activities collaborative group poster strategy)
CG = Control group (Lecture Method group)
X = Activities collaborative group poster strategy (treatment)
XO = Teaching using lecture method only (no treatment).
O1 = Pre-test
O2 = Post-test

Population of the study
The population of the study consist all the thirty secondary schools offering biology in Dawakin Kudu education zone. There were 19 senior secondary schools with a total number of 1307 senior secondary school students offering biology in the study area was observed. The sample size for the study was made up of 100 of SS II Biology students, this is because it is in line with the central limit theory that recommends (N ≥30) sample size as pointed out by (Kellinger, 1973), that The researcher used random sampling techniques in selecting the students that formed the subjects of the study. This was done through a piece of paper draw method, whereby alphabets were used to represent the students selected, i.e. 'S' for selected 'M' for not selected These pieces of papers were thoroughly shuffled before the students were asked to pick one piece from the pool of the pieces of papers. Stratified Randomly Sampled technique was used for the study this is because the study involves gender testing from two Schools using the random table of numbers -- for the experimental group and 56 for control group...
(lecturer method) in order to have a fairer representation of the subjects in the study a proportionate random sampling was carried out in the two schools.

Table 1: Sample Selected for the research

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Status</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.A.S.S Jido</td>
<td>Experimental</td>
<td>24</td>
<td>20</td>
<td>44</td>
</tr>
<tr>
<td>G.A.S.S Danladi Nasid</td>
<td>Control</td>
<td>38</td>
<td>18</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>62</td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>

Research Instruments
Two research instruments used for this study were tagged Genetic Achievement test (GAT) and Genetics Attitude Questionnaire (GAQ). The Genetic Achievement test (GAT) consisted up of forty objectives choice items from the topic: genetics concepts. This was achieved with the aid of table of specification (Test Blue print). While Genetics Attitude Questionnaire (GAQ) was a ten item that sought to ascertain the attitude of students towards genetic concept of Biology.

Table 2 GAT TEST Blue print

<table>
<thead>
<tr>
<th>CONTE</th>
<th>WEIG</th>
<th>Knowledge 30%</th>
<th>Comprehension 22%</th>
<th>Application 17%</th>
<th>Analysis 12.5%</th>
<th>Synthesis 10%</th>
<th>Evaluation 7.5%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT</td>
<td>HT</td>
<td>5%</td>
<td>3%</td>
<td>17%</td>
<td>12.5%</td>
<td>10%</td>
<td>7.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Genetics concept 25%</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Genetics terms 20%</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Mendel’s law 17%</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Variation Concept 20%</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Application genetics 17.5%</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td><strong>40</strong></td>
<td></td>
</tr>
</tbody>
</table>

Faces and content validity was carried out by three juniors in Department of Sciences Education in the Ahmadu Bello University Zaria to determined the validity of the instruments. The reliability coefficient of Genetic Achievement Test (GAT) was determined using test re-test. The two results were analyzed using Pearson Product Moment Correlation Co-efficient which was found to be 0.79. This showed a positive correlation between the instruments used. While in ensuring reliability of Genetics Attitude Questionnaire (GAQ), pilot test was carried out and split-half method was observed and correlated using Spearman Rank Order correlation. The result was found to be 0.78.
Results
Research Question 1: What are the difference in the academic achievement of students on genetic concept of biology when exposed to activities collaborative group poster strategy and Lecture methods?

Table 3: Comparison of the mean academic achievement scores of experimental and control group

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean (x)</th>
<th>Standard Deviation SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>44</td>
<td>30</td>
<td>10.8</td>
</tr>
<tr>
<td>Control</td>
<td>56</td>
<td>21.4</td>
<td>15.93</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>51.4</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presented data on the mean and standard deviation of academic achievement of students in experimental and control groups. From the result, students taught using activities collaborative group poster strategy have higher mean score (30) compared to those taught using lecture method (21.4). Thus, students in experimental group achieved higher than those exposed to lecture method.

Research Question 2: What are the differences in the academic achievement of male and female students taught on genetic concepts of biology using activities collaborative group poster strategy only?

Table 4: Comparison of the mean academic achievement scores of male and female academic achievement in the experimental groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean (x)</th>
<th>Standard Deviation SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>24</td>
<td>15.9</td>
<td>6.588</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>14.1</td>
<td>3.343</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 presented data on the mean and standard deviation of academic achievement of male and female students exposed to collaborator group poster strategies. From the result male students taught using activities collaborative group poster strategy has a mean score of (15.9) while female students exposed to activities collaborative group poster strategy has a mean score of (14.1). This shows that activities collaborative group poster strategy is gender friendly.

Research Question 3: What are the differences in the attitude of students in experimental and control group towards genetics concept due to exposure to teaching method?

Table 5: Comparison of the mean attitude of students in experimental and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean (x)</th>
<th>Standard Deviation SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>44</td>
<td>33.364</td>
<td>12.8803</td>
</tr>
<tr>
<td>Control</td>
<td>56</td>
<td>16.027</td>
<td>13.643</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5 presented data on the mean and standard deviation of attitude of students in experimental and control groups. From the result, students taught using activities collaborative group poster strategy have higher mean attitude score (33.363) compared to those exposed to lecture method (16.027). Thus, students in experimental group showed more positive attitude towards genetic concepts than those in control group.

Hypotheses Testing

$H_{01}$: There is no significant difference in the academic achievement of students who were taught genetics concept of biology using activities collaborative group poster strategy and Lecture method.

Table 6: $t$-test analysis of academic achievement in experimental and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Df</th>
<th>t-Value</th>
<th>p-Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>44</td>
<td>30</td>
<td>11.8</td>
<td>98</td>
<td>1.96</td>
<td>0.0000</td>
<td>Significant</td>
</tr>
<tr>
<td>Control Group</td>
<td>56</td>
<td>21.4</td>
<td>13.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>51.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at $P \leq 0.05$; df 98

Table 6 shows that $t$-value calculated was= 1.96 and $p$-value of 0.000 was observed at df=98. Since the $p$-value was less than the alpha level of $= 0.05$, there is significant difference between the two groups in the mean academic achievement scores. This suggested that student taught using activities collaborative group poster strategy showed significant difference to their lecture group counterpart, thus the null hypothesis is therefore rejected.

$H_{02}$: There is no significant difference in the academic achievement of male and female students who were taught genetics concept of biology using activities collaborative group poster strategy only.

Table 7: $t$-test analysis of male and female academic achievement in experimental groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>DF</th>
<th>t-value</th>
<th>P-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>24</td>
<td>15.9</td>
<td>6.588</td>
<td>42</td>
<td>2.02</td>
<td>0.062</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>14.1</td>
<td>5.343</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not significant

Table 7 shows that $t$-value calculated was; 2.02 and $p$-value of 0.062 was observed at df of 42. The $p$-value is greater than the alpha value 0.05. This revealed that there is no significant difference in achievement scores of males and females Biology student taught Genetics concept using activities collaborative group poster strategy. Based on this result, the null hypothesis was retained. Thus, activities collaborative group poster strategy was gender friendly.
H₀₃: There is no significant difference in the attitude of students in the experimental and control group towards genetics concept of biology

Table 8: t-test analysis of student's attitude towards genetic concepts in experimental and control groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>DF</th>
<th>t-value</th>
<th>P-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>44</td>
<td>33.364</td>
<td>12.8803</td>
<td>98</td>
<td>1.98</td>
<td>0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Control Group</td>
<td>56</td>
<td>16.027</td>
<td>13.643</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>49.388</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

significant at P > greater than 0.05; df = 98

Table 8 shows that t-value calculated was 1.98 and p-value of 0.000 was observed at df= 98. P-value is less than the alpha value = 0.05. But based on the result, there is significant difference between the two groups in their post test attitude towards genetic concepts. Experimental group tend to show positive attitude toward genetic concepts than the control group; the null hypothesis is therefore rejected.

Major Findings of the Study
i. Students in experimental group (ACGPS) achieved higher scores than those exposed to lecture method
ii. Result shows that no significant difference in achievement scores of males and females taught Genetics concept using (ACGPS).
iii. Students in experimental group (ACGPS) showed more positive attitude towards genetic concepts than those in control group (LM)

Discussion of the Findings
Table 6 suggested that there was significant difference in the academic achievement of biology student taught genetics concept using activities collaborative group poster strategy of teaching, has higher scores than those taught using lecture method. The findings are in agreement with Achufusi (2012); Ose-Algbekaen and Stella, (2014) who opined that an activity of teaching has been proved to be effective in increasing student performance. It indicates that, activity-based method appears to be more effective than the "lecture method of teaching and learning of genetic concepts. This finding was in support of study by Usman (2000) and Duniya (2009). Who says that when students are exposed to outdoor activities in scientific investigations students make use of their four senses in their immediate environment, making use of these four senses influence their learning capacities and teaching and learning process positively and have higher sores than control group.

Table 7 shows that there is no significant difference in the academic achievement of male and female students taught genetics concept using activities collaborative group poster strategy. This was in agreement with Ahmad (2011), who suggested that if boys and girls were given equal opportunity they will perform equally well. The finding also shows that activities collaborative group poster strategy of teaching biology was gender friendly. The findings in table 7, indicated that, activity-based method of teaching shows no gender difference in learning of genetic concepts. When activity-based method was used on both the males and females, all benefited equally from the teaching method. This result agreed with that of Musa, (2000), Stanley
Mamudu and Alairu (2008), which revealed that, where male and female were given equal opportunity in carrying out activities, their performance is enhanced.

From the findings in table 8 there is significant difference in attitude of the students in learning genetics concepts. Students in experimental group (ACCGPS) showed more positive attitude towards genetic concepts than those in control group (LM). This agreed with the findings of Ifeakor, (2003) and Jongur and Mohammed (2011) which indicated that activities of peers in learning bring attitudinal changes and competition for higher achiever. Experimental group (ACCGPS) are been exposed to different aider which aid them to be familiar to the genetic concepts than control group.

**Conclusion**

Activities collaborative group poster strategy was an activity-based instructional technique that involves the use of posters/charts /diagrams with students in groups of 5, 10 or more interacting with the posters and among themselves. This strategy does not only enhance students understanding of genetic concepts but also their skills in problem solving and skills in collaborative skills in learning which will improve their academic performance. Activities collaborative group poster strategy of teaching. There was significant effect on student academic achievement in genetics concept of biology and the activities collaborative group poster strategy was gender friendly. The use of activities collaborative group poster strategy was found to be very relevant in promoting positives attitude of student toward genetic concept of biology.

**Recommendations**

Based on the findings of this research, it was recommended that:

1) Kano State Government should organize in-service training programmes, workshops seminars and conferences for serving biology teachers to update their knowledge on the use of innovative teaching methods that can enhance students' academic achievement and attitude toward biology.

2) Teachers should also encourage activities collaborative learning amongst students through group work and assigning task to them to solve while serving as a guide.

3) Teachers should expose students to differentiated instruction involving observation, drawings, diagrams, graphs, posters, experiments, among others.

4). Ministry of education in Kano state should provide conducive learning environment by providing adequate Biology classrooms for the students.

**References**


Ahmad, R. N. (2011) Attitudes towards Biology and Its Effects on Students Achievement *International Journal of Biology*, 3(4), 100-104

Akubuilo, D.U. (2004). The Effect Of Problem-Solving Instructional Strategy on Student Achievement and Retention in Biology with the Respect of location in Enugu State *Journal of Science Teacher Association of Nigeria*. 39 (1&2) 94-100


Duniya, J.N. (2009). Efficacy of Indoor and Outdoor Laboratory Approaches on


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