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# Mastery learning approach and biology students' retention in secondary schools in Gokana local government area rivers state

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**Abstract**
This study was designed to investigate the effect of mastery learning approach and Biology students' retention in secondary schools in Gokana, L.G.A, Rivers State. This study was guided by two objectives, two research questions and two hypotheses. The research design for the study was the quasi experimental design, a population of 1556 SS1 Biology students was used and a sample size of 100 students was drawn from 2 secondary schools out of the 12 secondary schools in Gokana L.G.A, using simple random sampling technique. The instrument for the study was the Biology Retention Test (BRT). The consistency of the research instrument was carried out using K-R21 and a reliability coefficient of 0.85 was obtained. Data was analyzed using mean, standard deviation and ANCOVA. The findings of this study showed that mastery learning approach increased the retention ability of Biology students than active learning approach, it also showed that female students retained better than their male counterpart when taught with mastery learning approach. Based on the findings of this study it was recommended above other things that mastery learning approach should be used in teaching and learning of Biology to improve retention.

**Keywords:** mastery learning approach, retention of biology students, Gokana L.G.A, Rivers State, Nigeria

## Introduction

Biology is concerned with the study of living and non living organism. The Biology teacher being the implementer of the curriculum, needs to be dynamic in the use of teaching methods, strategies and pedagogic resources that will help achieve set objectives and also become fruitful in gaining responses from the students. To ensure quality in the teaching and learning of Biology, the teacher has to consider some important factors such as the nature and quality of instructional materials, technological tools etc. Ndioho (2014) [4] reported that the brain is not a passive consumer of information. This means that for effective teaching and learning, learners should be able to consciously construct meaning to what have been taught to them.

WAEC (2012) reported that the performance in science subjects are very poor in the secondary schools and this has been steady over the years. It is best to inculcate learning approaches suitable for students and that can make them retain better. Ones a student retains what is being taught then learning has taken place.

Mastery learning is a learning approach where the learners are given the opportunity to master a particular unit of lesson before proceeding to the next unit. It divides the subject matter into units with objectives and expectations and students will have to work through each unit in an organized format. The teacher will have to review the students and grade them to know who has mastered each unit and who has not. Students will have to master each learning unit before moving further to the next unit. Mastery learning enables students to acquire necessary knowledge to be promoted to the next class, it also assists the instructor to identify the weak point in students and work on it, thus reducing the failure rate.

Retention of concept is an important factor in determining students achievement in a given task or activity. When concepts are taught, it is the wish of the teacher that the students remember what has been taught. Retention is said to have occurred when the topics taught have been absorbed and can be recalled at any point in time. Without retention there cannot be a successful transfer of knowledge. If retention is not the top priority in the classroom, then teachers spend most of their time re teaching and reviewing. This means that the type of retention depends on the material whether it has meaning, familiar, concrete or related to a formal experience. Retention is the ability to remember an experience that most have happened in the past.

Research studies have shown that improved instructional strategies leads to the improvement of learner's retention. The researcher therefore in this study intends to determine the effect of Mastery learning approach on Biology students' retention in Secondary Schools in Gokana L.G.A, Rivers State

Jacob, Joel and Linus (2017) [3] studied on mastery learning approach and learning retention: effects on senior secondary school students' achievement in physical Geography in Ganye Educational Zone, Nigeria. The study made use of quasi experimental design. The multi-stage sampling technique at four levels was used to select four co-educational schools. The sample size used was 218 senior secondary 2 students offering geography. Instrument used for data collection was the physical geography achievement and retention test. The reliability of the instrument was done using Kendall tau b statistics and a coefficient of 0.74 was gotten. Mann-whitney U and t-test were used for data analysis. The result gotten showed that mastery learning strategy has the potentials to improve students' learning outcomes, retention and achievement than the conventional method. It was recommended that the teaching strategy be used during instruction. While they used SS2 geography in

Ganye Educational zone, the present researcher used SS1 Biology students in Rivers State. They are similar because they both looked at academic performance and retention.

Yau (2014) [7] also studied the effect of field trip on retention and academic achievement in ecology among secondary school students in Zaria, Nigeria. Experimental design was used using pre-test post-test control group design. 2934 SS1 students from 19 public schools in Zaria educational zone of Kaduna State made up the population. 4 schools were selected as the sample size from both urban and rural school. The instruments used were the ecology achievement test (EAT) and 0.83 reliable value was gotten using PPMC. And ecology retention test (ERT) with 0.85 reliable value. The research questions were tested with descriptive statistics such as mean and standard deviation and hypotheses were tested using independent t test. The findings of the study showed that the field trip teaching strategy favored the experimental group in ecology concepts. One major recommendations made was that government should make field trip teaching strategy compulsory particularly in teaching and learning of ecology concept at the senior secondary school level. While Yau used field trip as the strategy to determine the retention of students in ecology the present researcher will be using mastery learning approach to determine the retention of Biology students. He also used SS1 students in Zaria, Nigeria, the present researcher used students in Rivers State, Nigeria. Similar statistics was used in the present study.

Eze, Ezenwafor and Obidile (2016) [2] studied the effect of gender on students academic performance and retention in financial accounting in technical colleges. Quasi experimental design of pretest non randomized group was used for the study. A population of 168 national business certificate (NBC) year 11 students from 11 state owned technical colleges was used and a sample of 138 was purposely selected. The instrument for data collection was the accounting achievement test (AAT) with reliability coefficient of 0.83. Arithmetic mean was used to analyze data relating to research questions while analysis of covariance was used to test the null hypothesis. The findings showed that male and female students taught financial accounting using problem based teaching (PBTM) performed better than those taught with lecture method. It also shows that there was no significant difference in the post test mean scores and in the mean retention scores of male and female students taught financial accounting using PBTM. It was recommended that accounting teachers at post basic education level should use PBTM which is more practical and stimulating involving all students to enhance students' academic performance and retention in the subject. While Eze *et al*. used PBTM method; the present researcher used mastery learning approach. The present researcher used lesser sample size and instead of using lecture method the present researcher usedactive learning approach.

Owodunni and Ogundola (2013) [5] studied gender differences in the achievement and retention of Nigerian students exposed to concept in electronic works trade through reflective inquiry instructive technique. The design used for the study was the quasi experimental design. The research was carried out in Lagos State. The sample size comprised of 43 students for the control group and 62 students for the experimental. The instrument used for data collection was the electronic work trade achievement test (EWTAT) which was validated by 5 experts in the field of electronic technology and vocational teacher education. A reliability coefficient of 0.83 was gotten using Kuder-Richardson 20 Formula. The analysis was done using mean, standard deviation and ANCOVA. The result showed that the mean score of boys was higher than the mean score of girls taught electronic work trade using reflective inquiry instructional technique but the mean score of girls were higher than that of the boys in the test for retention of learning. The research recommended that technical college teachers should adopt the use of reflective inquiry instructional technique to the teaching of electronic works trade and ministry of education. This study is different from the present study because the present study looked at the extent gender influences students academic performance in Biology using mastery learning but the present researcher used same statistical tools in analysis.

Ajai and Imoko (2015) [1] also studied on gender differences in mathematics achievement and retention scores: A case of problem – based learning method. This research used the quasi experimental design, a population of 428 involving senior secondary school one students. A sample size of 260 male and 167 female was used, the instrument used for the research was the algebra achievement test (AAT). Two hypotheses were raised and tested using t-test. The result showed that male and female students taught algebra using problem based learning (PBL) did not significantly differ in achievement and retention scores thereby revealing that male and female students' are capable of competing and collaborating in mathematics. In addition this finding shows that performance is a function of orientation not gender. The study recommended the use of PBL by mathematics teacher to overcome the male image of mathematics and enhance students (male and female) achievement and retention. This study is different from the present study because the present study looked at the extent gender influences students academic performance in Biology using mastery learning.

**Statement of the problem**

Biology which is one of the science subjects taught in secondary schools has witnessed tremendous failures in both external and internal examinations. Students tend to look at Biology as an abstract subject, thereby using only memorization skills. The researcher is of the opinion that when proper approach is used in teaching students they will understand and retain what is been taught thereby performing excellently. Therefore the problem of the study is to ascertain if mastery learning approach could help students' retention ability in biology.

**Aim and objectives of the study**

The aim of the study is to find out the effectiveness of mastery learning approach on Biology students' retention in Secondary Schools in Gokana L.G.A, Rivers State.

Specifically to:

1. Find out the effect of mastery learning approachon students' retention of concepts in biology.
2. Examine the influence of gender on students' retention of concept using mastery learning approach.

**Research questions**

The following research questions guided the study:

1. How does mastery learning approach affect students' retention of concepts in Biology?
2. What is the influence of gender on students' retention

of concept when taught with mastery learning approach?

**Hypotheses**

The following null hypotheses were formulated to guide the study and were tested at 0.05 level of significance.

$H0_1$. There is no significant difference in the retention ability of students taught biology with mastery learning approach and those taught using active learning approach.

$H0_2$. There is no significant difference between retention ability of male and female students taught using mastery learning approach and those taught using active learning approach.

**Methodology**

A quasi- experiment, pretest – post-test – control group design was adapted for the study. Quasi- experimental designs are partly true experiment designs but they do not employ randomization procedure during assignment of subjects to groups. The population of the study was made up of one thousand five hundred and fifty six (1556) senior secondary school 1 (SS1) students from the 12 secondary schools in Gokana Local Government Area, Rivers State. A sample of 100 students was used for the study. The instrument used for the study was the teacher made Biology Retention Test (BRT) which consisted of 30 multiple choice questions. The instrument was tested for internal consistency using Kuder-Richardson's Formula 21 (K-R 21). The instrument yielded a reliability coefficient of 0.85 indicating that it is reliable.

**Presentation of data**

**Research Question 1: How does mastery learning affect students' retention of concepts in Biology?**

**Table 1:** Mean, standard deviation and gain scores of students taught Biology using Mastery learning approach and those taught using the active learning approach

| Post – test | | | | Retention Test | | |
|---|---|---|---|---|---|---|
| Approach | N | Mean | SD | Mean | SD | Mean Gain |
| Mastery Learning | 50 | 18.00 | 4.56 | 14.24 | 4.17 | 3.76 |
| Active learning | 50 | 13.14 | 4.62 | 11.44 | 5.00 | 1.76 |

Table 1 indicates that students that were taught Biology with mastery learning approach had a mean retention score and standard deviation of ($\bar{x}$ = 14.24 and SD = 4.17). While students' that were taught Biology with active learning had a mean retention score and standard deviation of ($\bar{x}$ = 11.44 and SD = 5.00).

**Research Question 2: What is the influence of gender on students' retention of concepts when taught with Mastery learning approach?**

Table 2 revealed that male students who were taught Biology with mastery learning approach had a mean retention score and standard deviation of ($\bar{x}$ = 13.88 and SD = 5.36). While female students who were also taught Biology with mastery learning approach had a mean retention score and standard deviation ($\bar{x}$ = 12.15 and SD = 4.29).

**Table 2:** Mean, standard deviation and Mean gain scores of the male and female students' retention taught Biology using mastery learning approach.

| Post- test | | | | Retention test | | |
|---|---|---|---|---|---|---|
| Gender | N | Mean | SD | Mean | SD | Mean Gain |
| Male | 20 | 15.73 | 4.72 | 13.88 | 5.36 | 1.85 |
| Female | 30 | 15.47 | 5.50 | 12.15 | 4.29 | 3.86 |

**Hypotheses**

**Hypothesis 1: There is no significance difference between the retention ability of students taught Biology using mastery learning approach and those taught using active learning approach.**

Table 3 indicated an ANCOVA [between-subjects factor: methods (use of mastery learning, active learning approach); covariate: Post-test] which revealed main effects of approaches, ($F$ (1, 97) = 4.05, $p < 0.05$).

**Table 3:** summary of ANCOVA of students' retention taught Biology using mastery learning and those taught Biology using active learning approach

| Dependent Variable: Retention test | | | | | |
|---|---|---|---|---|---|
| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
| Corrected Model | 240.121[a] | 2 | 120.061 | 5.728 | .004 |
| Intercept | 876.495 | 1 | 876.495 | 41.813 | .000 |
| Posttest | 44.121 | 1 | 44.121 | 2.105 | .150 |
| Approaches | 84.911 | 1 | 84.911 | 4.051 | .047 |
| Error | 2033.319 | 97 | 20.962 | | |
| Total | 18760.000 | 100 | | | |
| Corrected Total | 2273.440 | 99 | | | |

**Hypothesis 2: There is no significance difference in the retention ability of male and female students taught using mastery learning approach.**

Table 4 indicated an ANCOVA [between-subjects factor: Gender (male, female); covariate: Pre-test] which revealed no main effects of gender, (F (1, 157) = 0.214, $p > 0.05$).

**Table 4:** summary of ANCOVA of male and female students' retention taught using mastery learning approach.

| Dependent Variable: Retention test | | | | | |
|---|---|---|---|---|---|
| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
| Corrected Model | 487.733[a] | 2 | 243.867 | 13.247 | .000 |
| Intercept | 964.923 | 1 | 964.923 | 52.415 | .000 |
| Pre-test | 416.318 | 1 | 416.318 | 22.614 | .000 |
| Gender | 28.833 | 1 | 28.833 | 1.566 | .214 |
| Error | 1785.707 | 97 | 18.409 | | |
| Total | 18760.000 | 100 | | | |
| Corrected Total | 2273.440 | 99 | | | |

**Discussion**

The result of this findings shows that students in mastery learning approach retained more than those in the active learning approach. Further analysis revealed that there is a significant difference in the mean retention scores of students taught Biology using mastery learning approach and those with active learning approach. Therefore the higher mean scores in the retention scores in favor of students taught using mastery learning approach could be as

a result of other variables other than the treatment given to them. This is in line with Jacob, Joel and Linus (2017) [3], Yau (2014) [7], Okoro (2013) and Aniweze (2014) who in their research stated that treatment improved the retention of students.

The result of this finding revealed that the male students had a mean retention score higher than that of the female students. The mean gain retention scores of female students were higher than that of male students taught with mastery learning approach. This result indicated that female students who were taught Biology with mastery learning approach retained more than their male counterpart who were also taught Biology using mastery learning. After analysis with ANCOVA, the result showed that there was no significant difference between the main effects of gender (male and female) on students' retention in Biology when taught with mastery learning which confirmed that the difference between the retention of concept of male and female students in Biology was not statistically significant favoring the male students. The obvious implication of this finding is that there was no effect attributable to gender on retention of concept of students in Biology which means that the treatment is not gender biased. This finding is similar to that of Eze, Ezenwafor and Obidile (2016) [2] and Owodunni and Ogundola (2013) [5] who stated that there was no significant difference in the mean retention scores of male and female students. The finding is in disparity with Ajai and Imoko (2015) [1] who stated that male and female students did not differ in retention.

## Conclusion

The findings of this study revealed that students who were taught with mastery learning approach retained higher than students taught with active learning approach. This simply means that mastery learning approach is more effective in retention of concepts in Biology. The findings showed that female students who were taught Biology with mastery learning approach retained more than their male counterparts. This simply means the difference is not significant.

## Recommendations

Based on the findings of this study, the following recommendations were made;

1. Students should be given time to master each topic based on their cognitive level before moving over to the next topic.
2. Teacher should draft their topics according to their level of difficulty to help in mastery.
3. When students are able to retain a topic being taught to them in a previous class they are happy and tend to pay more attention to the next topic, so the teacher ultimate priority should be to enable the retention skill of the students.

## References

1. Ajai JT, Imoko II. Gender differences in mathematics achievement and retention scores: A case of problem – based learning method. International journal of research in Education and science (IJRES). 2015; 1(1):45-50.
2. Eze TI, Ezenwafor JI, Obidile JI. Effect of gender on students' academic performance and retention in financial accounting in technical colleges. British journal of education in security and behavioral science. 2016; 18(4)1-92.
3. Jacob F, Joel F, Linus KS. Mastery learning strategy and learning retention: effects on secondary school students' achievement in physical geography in Ganye educational zone, 2017. Nigeria.www.preprints.org. doi:10.20944/preprints201702.0018.v1
4. Ndioho OF. Constructivist- based instructional model and students' academic achievement. Influence of constructivist based instructional model on senior secondary school student's achievement in Biology. Germany. Lambert Academy, 2014.
5. Owodunni AS, Ogundola IP. Gender differences in the achievement and retention of Nigeria students exposed to concept in electronic works trade through reflective inquiry instructional technique. British journal of education, society &behavioral science. 2013; 3(4):589-599
6. WASCE. West African School Certificate report. Nigeria 2000-2012, 2012.
7. Yau A. Effect of field trip on retention and academic achievement in ecology among secondary school students in Zaria, Nigeria. An unpublished PhD Thesis Ahmadu Bello University, 2014.