EFFECTS OF LABORATORY INSTRUCTIONAL STRATEGIES ON SENIOR SECONDARY SCHOOL STUDENTS GEOMETRICAL PERFORMANCE IN MATHEMATICS IN EKITI STATE.

BY

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Abstract
This study examined the effects of mathematical laboratory instructional strategy on students’ geometrical performance in some selected secondary schools in Ekiti State, Nigeria. The study adopted quasi-experimental of pre-test, post-test, control group design. The population comprised of 2,483 SS II students in Ekiti State. The sample for the study was 200 SS II students randomly selected from the four selected secondary schools in Moba Local Government Area of Ekiti State. The instrument used were Geometric Achievement Test (GAT) was used to collect data for the study. The reliability of the instrument was determined by using test-re-test method of testing reliability. The data obtained was adjudged adequate for this study. Two hypotheses were generated and tested using t-test analysis at 0.05 level of significance. The findings revealed that there was significant difference between the pre-test and post-test means scores of the experimental and as control groups respectively. There was also, a significant difference among the male and female students’ performance in Mathematics. On the basis of these findings, recommendations were made some of these are as follow: Mathematics teacher should be encouraged to use Mathematics laboratory instructional strategy by providing all the materials needed for effective implementation. Students’ attitude towards Mathematics should be positively changed by involving them to participate actively in learning process.

Introduction
Education is totality of life experiences that people acquire and which enable them to cope with and derive satisfaction from living in the world. It is on this premise that it is believed that the quality of a nation’s education is proportional to the level of its prosperity. Today, it is a reality to say that the standard of living of a nation is dependent on the level or science and technology of that nation. While science is the bedrock of technology, Mathematics is the gate and key to sciences. According to (Agwagah 2001), it is the level of Mathematics that determines the level of science and technology component of any nation. Mathematics has made inroads into every human pursuit.
Mathematics is already the most important subject of learning for all. A conceptual understanding of Mathematics has come to be a universal necessity for enlightened living. In Nigeria, emphasis is being placed on a minimum ‘credit’ in Mathematics at WASSCE/NECO examination as prerequisite for admission to most or the Faculties and Departments in post secondary, institutions in Nigeria’s. Etukudo, (2006), attributed the students’ poor performance in mathematics to the present study attempts to find out as part of the focus whether or not the Mathematical laboratory instructional strategy used as treatment has any efficacy on the learners. Factors such as the notion among students’ that Mathematics is an abstract and difficult subject, inadequate qualified teachers to teach the subject as specialist, improper method of teaching Mathematics, lack of Mathematics laboratory, insufficient instructional aids and poor use instructional materials. It is disheartening that research and data from National Examination Bodies like West African Examination Council have shown a consistent poor performance in this subject. Majority of secondary school students often dread and show negative attitude towards Mathematics (Awofala, 2000) and the trends of their performance in the senior secondary school certificate examination is also a source of worry to the stakeholders. The present study attempts to find out as part of the focus whether or not the Mathematical laboratory instructional strategy used as treatment has any effects on the learners.

**Statement of the Problem**

Many students in post-primary schools today show negative attitude towards the learning of Mathematics. Most students think that Mathematics means ‘getting the solution of a problem right or wrong’. When they get it wrong they think that they are not good enough in Mathematics and loose interest in learning. Society’s belief about Mathematics itself seem to drive away many students from liking the subject. The conventional instruction used all along had been found to be inadequate for effective teaching and learning. Also, lack of Mathematics laboratory, non use of laboratory technique in teaching Mathematics is one of the major factors that contribute to poor achievement in Mathematics by Senior Secondary School students. To this effect the study investigated the effects of laboratory instructional strategy on Senior Secondary School students geometrical performance in Mathematics.
Purpose of the Study
The purpose of this study were to:
1. Investigate the effects of the use of laboratory instructional strategy on the performance of students in Senior Secondary School in geometry Mathematics
2. Examined the performance of male and female students taught geometry with laboratory instructional Strategy.

Research Hypotheses
Based on the stated problems, two hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference between the performance means scores of students taught geometry using laboratory instructional strategy and those taught using conventional method.
2. There is no significant difference between the performance mean scores of male and female students taught geometry using laboratory instructional strategy.

Research Method
Research Design
The research design for this study is quasi-experimental of pre-test, post-test control group. Two groups of students were used for data collection (experimental and control) groups. In this study, the experimental group was taught Geometry using laboratory instructional strategy, while the control group was exposed to normal classroom instruction. The experiment lasted for six weeks. A post-test was administered to both groups of students to evaluate the effectiveness of the treatment. The population is made up of 2,483 public Senior Secondary School two (SS 2) students found in the 14 co-educational schools in Moba L.G.A of Ekiti State. The sample of 200 Senior Secondary School Two (SS2) students were randomly selected from four schools out of 14 co-educational government owned Secondary Schools in Moba L.G.A.

Research Instrument
Geometry Achievement Test (GAT) was used for pretest and protest of students. The GAT test items were made up of twenty multiple choice questions with four options A, B, C and D respectively. The items in the test cover the entire unit taught by the researcher on areas of parallelogram, angle of elevation and depression, bearing and distances. The Geometry Achievement Test items with the marking scheme were validated by three experts in the
department of Science Education, AhmaduBello University, Zaria. The experts gave both face and content validity of the instrument such as appropriateness of the items, ability of the items to actually test basic ideas in geometry.

Procedure
The Geometry Achievement Test was administered to the students before treatment started and from this pre-test results were obtained. Immediately after the six weeks of teaching (treatment) period, the same instruments were administered to the students in their classrooms under the same classroom conditions. The teachers of the participating classes in each school administered the test under the guidance of the researcher.

Results
Hypotheses 1: There is no significant difference between the performance mean scores of students taught geometry using laboratory instructional strategy and those taught using conventional method.
Table 1: t-test analysis of students’ Performance mean scores of Experimental and Control groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. dev</th>
<th>Std. Err</th>
<th>df</th>
<th>t-cal</th>
<th>t-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Experimental</td>
<td>100</td>
<td>24.22</td>
<td>3.70</td>
<td>0.30</td>
<td></td>
<td>7.73</td>
<td>1.99</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>100</td>
<td>20.04</td>
<td>2.83</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p d” 0.05

Table 1 shows the t-test statistics of the experimental and control groups. It was revealed that t calculated (7.73) greater than t table (1.99) at 0.05 level of significance. Therefore, the hypotheses is rejected. Hence there is no significance difference between the performance mean scores of students taught geometry using laboratory instructional strategy and those without in Mathematics.

Hypothesis 2: There is no significant difference in the mean scores of male and female SS II students taught geometry using laboratory instructional strategy (experimental group).
Table 2: t-test analysis of Male and Female Students taught geometry using Laboratory Instructional Strategy (Experimental Group)

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>Std.Err</th>
<th>df</th>
<th>t-cal</th>
<th>t-tab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40</td>
<td>24.00</td>
<td>3.61</td>
<td>0.41</td>
<td>98</td>
<td>0.73</td>
<td>0.47</td>
</tr>
<tr>
<td>Female</td>
<td>60</td>
<td>24.44</td>
<td>3.80</td>
<td>0.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not significant at p > 0.5

Table 2 showed the t-test statistics of male and female students taught geometry using laboratory instructional strategy (experimental group) it was revealed that t calculated (0.73)is greater than t-table (0.47) at 0.05 level of significance. Therefore the hypotheses is rejected. Hence there is no significance different in the means score of male and female SS II students taught geometry using laboratory instructional strategy.

Discussion
The discussion on findings is done in relation to the outcomes of the research hypotheses raised.
Result in Table 1 showed that significant difference exist between students exposed to geometry using Mathematical laboratory instructional strategy for teaching (experimental group) and those exposed to conventional method in their Mathematics performance. The calculated performance mean scores were found to be 24.22 and 20.04 by experimental group and control group students respectively. The result of this hypothesis enables the null hypothesis to be rejected. This outcome is expected as students who were exposed to the laboratory instructional strategy is exposed to various teaching aids such as charts, symbols that enhance their academic performance in the subject. The result of this study agreed with that of Manjunath (2008) where he discovered that students taught with mathematical laboratory instructional strategy performed significantly better than the control group in geometry. The superiority of the strategy over the conventional teaching method has also reported by Etukudo (2006), who carried out a study on the effect of laboratory and discussion method of teaching on student’s performance in Mathematics at the Secondary School level.
Outcome in Table 2 revealed that there is no significant differences in the performance mean scores of male and female SS II students taught Mathematics concept using laboratory instructional strategy (experimental group). This enables the null hypothesis to be retained. Their calculated mean scores were 24.00 and 24.44 by male and female experimental group respectively. The implication of this result is that the treatment is good for both male and female student alike. It is not gender selective. This outcome is not surprising as both male and female students were exposed to the treatment. The finding of this study is in line with Janet (2008), Okigbo and Osuafor (2008). The fact that neither the male nor the female performed significantly better than the other seem to make the method gender friendly.

Conclusion
Based on the findings of the study, the following conclusions were generalized.
· Students exposed to laboratory teaching strategy had significantly higher academic achievement than their counterparts that were exposed only to the conventional method.
· The laboratory instructional strategy is suitable for both male and female students in the teaching of mathematics.

Recommendations
These following recommendations were made in this study.
· Student attitude towards Mathematics should be positively changed by involving them to participate actively in learning process.
· Mathematics teachers should be encouraged to use Mathematics laboratory instructional strategy by providing all the materials needed for effective implementation.

References

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