COMPARING LABORATORY APPROACH (LABA) AND CONVENTIONAL APPROACH (CONA) OF TEACHING AREA OF PLANE SHAPES IN JUNIOR SECONDARY SCHOOLS IN EKITI STATE, NIGERIA

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ABSTRACT

In recent time, views have been expressed on the notion that some methods are better and more effective than others for students understanding of mathematics. While some schools of taught contended that one teaching style is not inherently better than any other but some teachers can be more effective in teaching one way than another. The focus of this study therefore was to compare Laboratory Approach (LABA) and the Conventional Approach (CONA) of Teaching Area of Plane Shapes in Junior Secondary Schools in Ekiti State, Nigeria. A sample of 400 Junior Secondary School II students consisting of 200 males and 200 females were randomly selected for the study. Student's t-test statistic was used to analyzed the data collected at = 0.05 level of significant. The result of the finding showed that there was significant difference between the mean scores in favor of Laboratory Method. It was on the bases of the findings of this study that it was recommended to both the teachers and the students to employ laboratory approach in finding area of plane and solid shapes for the attainment of maximum benefit and efficiency so as to achieve the objectives of mathematics lessons.

Keywords: *LABA, CONA, Plane shaes Junoir Secondary Schools, Teaching, Teacher*

INTRODUCTION

Laboratory Approach in teaching is one of the hallmarks of Education in the sciences. Obodo (1991) defines Laboratory Approach as mathematical activities carried out by a student or group of students under the teachers guide so as to make observations of processes, products or events. Here the truth of abstraction is demonstrated in a concrete form for even slow learners to comprehend and appreciate them more easily. It is a means of ascertaining the relationship between cause and effect. Laboratory approach is a way of teaching mathematics through discovery method.

It is essentially a systematic development lesson that uses the best available materials to provide the students with practical experience they need in order to learn the lesson at hand with deep understanding and application. It throw into a more practical light what is being done through rote learning in ordinary class work, thus help the slow learners to understand the abstraction therein and in turn lead to far greater understanding of mathematics than could ever be obtained by chalk and talk methods.

One high school students was once asked to define mathematics. He responded by saying, "Mathematics is the most difficult subject taught by wicked teachers". It is clear that the student found mathematics to be quite uninteresting and too tough to cope with. He sees mathematics teachers to be generally inaccessible and cruel. This incredible and unfortunate impression created in the mind of this young student could have been avoided if mathematics lessons have been interesting and enjoyable to the students. This could largely be achieved through the use of mathematics kits and laboratory approach. In addition, mathematics teachers should try as much as they could to be receptive.

Gallagher (1987) concludes that laboratory approach is an accepted part of science instruction; Layton (1989) claims that many teachers lack the understanding of scientific inquiry or the skill to teach it. Tobia (1990) ethnographic study of 15 teachers shows that both teacher and student value laboratory work. He also found that most laboratory activities are not well implemented to facilitate genuine enquiry. Views have been raised concerning different approaches of teaching. Some school of taught says there is no method that is better than the other, while for others the reverse is the case. Nworgu (1985) categorizes certain methods as superior to others. Eniayeju (1983) argues that there is no single superior method of teaching but that a combination of various methods result in excellent teaching to enhance students' understanding.

Ale (1989) reinstates that poor achievement in mathematics can be combated by the use of teaching from the known to the unknown properties; Calculation of area, being an activities based content required that students should be exposed to the rudiment of its teaching by starting from known properties to establish an unknown property so as to arouse the interest of the students and increase their achievement in the subject. Odili (1990) indicates several uses of the laboratory approach in Mathematics Education. He made measurement of two variables in an everyday setting to ascertain the relationship between them. For example, comparison of the area of rectangular plane shapes and area of triangular plane shapes.

The teaching and learning of some topics in mathematics in the Junior Secondary Schools across the country is in dismal state. Just as students find it difficult to understand the topics taught teachers equally fine it difficult to achieve effective teaching. Hence, teaching as being practiced today in mathematics had been found to be ineffective Oyedeji (1992). Teachers in Senior Secondary Schools (SSS) have always attributed the poor performance of students to their poor background at the Junior Secondary School (JSS) level. Student in JSS consistently fail some categories of mathematics questions especially in area of plane and solid shapes, over the years. Hence, this research is a comparative study of the effectiveness of laboratory approach and conventional approach (full of rote learning of formulae) in teaching area of plane shapes on the academic achievement of Junior Secondary Schools’ students.

Therefore, the study is designed to test the validity or otherwise, of the significances of the following hypotheses at alpha level of 0.05.

Ho_1: There is no significant difference between the mean performance of students using Laboratory Approach (LABA) and students taught with Conventional Approach (CONA) before treatment.

Ho_2: There is no significant difference between the mean performance of students in the Experimental group (LABA) and Control group (CONA) after treatment.

Ho_3: There is no significant difference between the mean performance of male and female students in the Experimental group (LABA).

METHODOLGY

The design adopted for this study was a quasi-experimental design. Those to be taught in laboratory approach (LABA) would be the experimental group while those with conventional approach (CONA) are the control group. Both of them have their own system of instruction. The sample is made up of 400 students, randomly selected from four Junior Secondary Schools in Ekiti State. 100 students comprising 50 male and 50 female were selected from each school. The selected students were equally divided into Experimental group and Control group. Each group comprises of 100 male and 100 female students.

The data used for this study were collected through the administration of each approach. The students' achievement-test scores were obtained through Pre-test and Post test for the analysis.

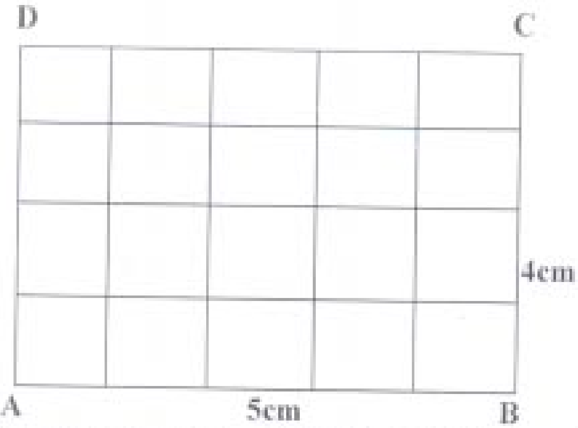
i. Pre-test: This is a 20 items test constructed by the researcher, which covered those topics that are basic to the teaching of area of plane shapes such as perimeters of quadrilateral triangles and composite figure; properties of plane shape; drawing of plane shapes; units of measurement and circumference of circular objects etc.

ii. Post-test: The test covered 50 items from all the topics taught during instruction. The topics included area of Rectangles, Parallelograms, Squares, Rhombuses, Triangles, Trapezium, Circle and Composite plane shapes.

All the data collected during Pre-test and Post-test were analyzed using t-test statistic. They were tested for significance statistically at critical level of 0.05. The tests used in the pilot and experimental study as Pre-test and Post-test were evaluated and found to have high content validity and average K-R reliability of 0.85. The instruction given to the control group (CONA) is just teachers' chalk and talk approach as it is being done by most of the Junior Secondary School teachers. While the treatments given to Experimental group (LABA) were based on the following activities:

Activity I: Area of Rectangles and Squares.

Rectangle: Consider the rectangle below, drawn on a graph sheet of 1cm square grid by individual student.



In the rectangle ABCD, the length (l) = DC = 5cm and the breadth (b) = BC = 4cm.

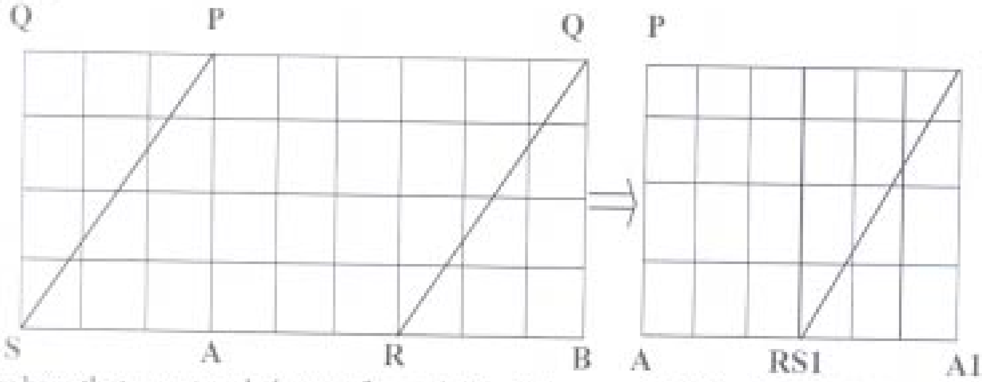
i. By counting the number of 1cm square grids that cover ABCD, we have 20:. Area of rectangle ABCD = $20cm^2$.

ii. By multiplying length (l) by Breadth (b) = l x b = 5 x 4 = 20:. Area (A) of rectangle ABCD = l x b = $20cm^2$.

Similarly, Area of Squares can be done in the same way.

Activity II: Area of Parallelogram and Rhombus.

Direct the students to draw a parallelogram PQRS on graph sheet of 1cm square grid. Also perpendicular line PA = h is indicated from P to base SR as shown below. Let them cut out right-angled triangle PSA and place it on the RHS as in the translation below:



Note here that a rectangle is now formed: Parallelogram PQRS = Rectangle PP1A1A.

By counting 1cm grids implies

Area of parallelogram PQRS = $28cm^2$ = Area of Rectangle PP1A1A.

Hence, by calculation: length l = AA1 = SR = 7cm

Perpendicular height h = QB = P1A1 = 4cm.

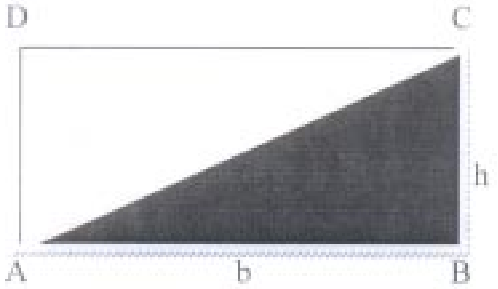
Area A = lh = 7cm x 4cm = $28cm^2$.

Note also that Rhombus is treated in the same way.

Activity III: Area of triangles and trapezium:

Triangle: Let the students note the following:

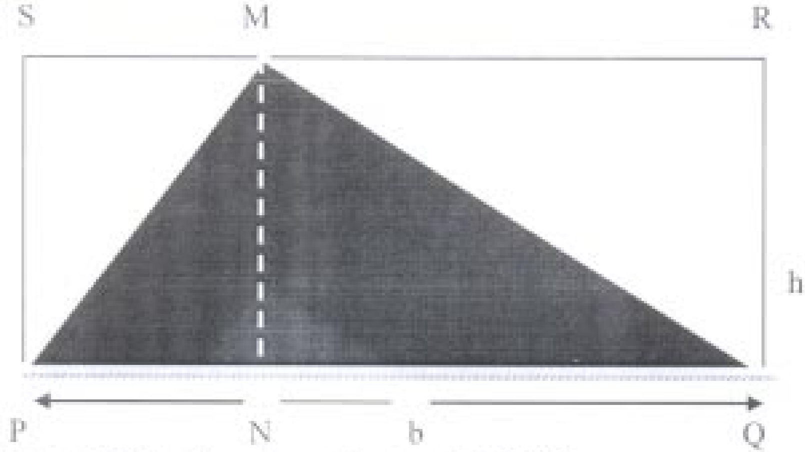
i. When a diagonal of a rectangle is drawn, the rectangle is divided into equal right-angled triangle thus:



:. Area of triangle ABC = ½ Area of rectangle ABCD = ½ bh

That is Area of triangle ABC = ½ x base x perpendicular height.

ii. Similarly, consider the diagram below:



Area of triangle PNM = ½ x Area of rectangle PNMS

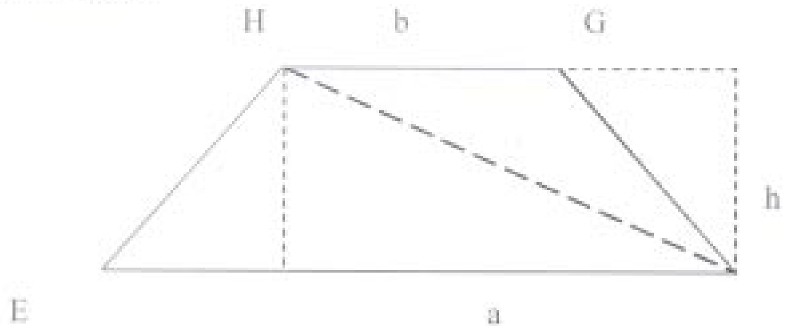
Area of triangle MNR = ½ x Area of rectangle MNQR

:. Area of triangle PQM = ½ Area of rectangle PQRS

= ½ base x perpendicular height.

Trapeziums:

Consider the trapezium EFGH below, whose parallel sides are a and b and the distance between them is h.



The diagonal HF divides the trapezium into two triangles EFH and HGF

Area of EFH = ½ ah (base a and height h)

Area of HGF = ½ bh (base b and Height h)

:. Area of trapezium EFGH = Area of EFH + Area of HGF

= ½ ah + ½ bh

= ½ (a + b) h.

Hence, area of trapezium = ½ x (sum of parallel sides) x height.

Activity IV: Area of circle: This could be explained laboratorial as follow:

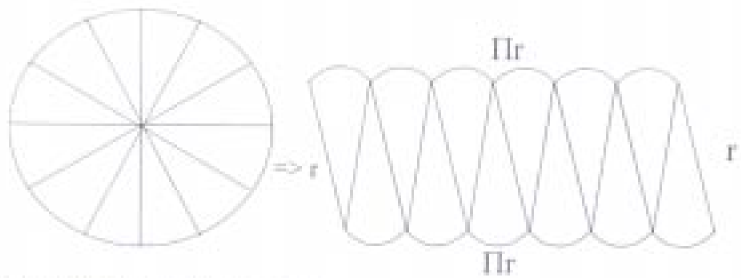
i. Instruct the students to draw a circle of radius r. here you can take r = 5cm.

ii. Divide the circle into even number n of parts here you can take n = 12

iii. When n = 12 each sector makes 3600 ÷ 12 = 300 at the centre of the circle.

iv. Cut the circle into 12 equal sectors.

v. Arrange them in alternative positions to form an approximate parallelogram as follows:



The circumference of the circle = Πr

:. The base of the parallelogram = ½ of the circumference = Πr

Height of the parallelogram = r (radius of the circle)

:. Area of the parallelogram = Πr x r

$= \Pi r^2$

:. Area of the circle ≈ Area of the parallelogram = Πr^2

Note: Examples should be treated in line with each laboratory approach content.

RESULTS AND DISCUSSION

Table 1: t-test analysis of the students in Pre-test

Group	**N**	**Mean**	**SD**	**DF**	t_{cal}	t_{tab}	**Result**
LABA	200	11.554	6.891	398	0.813	1.960	NS
CONA	200	12.146	7.652				

Table 1 revealed that there is no significant difference in the students' performance before treatment. Since t_{cal} (0.813) < t_{tab} (1.960). Also their mean is very close range. Further more from the standard deviation, the F_{max} calculated is 1.233

and less than the Fvalue of 2.990 which shows that both groups are homogenous. Hence, the null hypothesis is accepted.

Table 2: t-test analysis of students in Post-test

GROUP	N	Mean	SD	DF	t_{cal}	t_{tab}	Result
LABA	200	38.545	12.452	398	10.969	2.990	S
CONA	200	25.368	11.551				

Table 2 showed that the T_{cal} of 10.969 > T_{tab} of 2.990 which means that the null hypothesis 2 has to be rejected and the alternative hypothesis accepted. That is there was significant difference in the Post-test between the performance of students taught with the use of Laboratory Approach (LABA) and those with Conventional Approach (CONA) after receiving treatment. The mean also showed that the approach is in favor of Laboratory approach.

Table 3: t-test analysis of male and female students in Post-test

GROUP	N	Mean	SD	DF	t_{cal}	t_{tab}	Result
LABA	100	35.952	12.012	198	2.097	2.99	NS
CONA	100	32.473	11.443				

Table 3 result showed that the main effect of gender ability level is not significant at 0.05 level. Thus implies that the null hypothesis of no significant difference should be accepted. Furthermore, the mean of students subjected to laboratory approach is high and indicated that the approach is good.

CONCLUSION AND RECOMMENDATIONS

The results show that students' performance in finding the area of plane shapes when taught in the use of laboratory approach is better and preferred than the performance of students in conventional approach. This result is consistent with earlier suggestion of Nworgu (1985), and Sule (1997) which indicated that academic achievement of students in this area of study can be improved through the use of practical approach like LABA. The finding that the Post achievement scores of the students involved in this study were differentiated along the lines of the treatment has implications for improving the performance of students in mathematics. The problem of poor performances of student in some topics such as area of plane shapes, solid shapes among others could be traced to lack of professional training and knowledge of the subject matter and lack of adequate approach to be used.

To effectively teach mathematics topics to student in the lower secondary schools, the teachers should try to exemplify the concepts by creating activities which would in turn enable the students to modernized and appreciate the concepts. Students need to participate actively in the learning process. The instructional style go beyond teacher "telling or lecturing" the student and more towards involving the students, monitoring them and checking for understanding. At this juncture, it is pertinent to note that the lecture approach can features prominently at the tertiary institution but not popular at the primary and secondary schools.

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