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Comparative Effects of Scaffolding and Collaborative Instructional Approaches on Secondary School Students' Psychomotor Achievement in Basic Electronics in North-Central Nigeria

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Abstract: **-** The study was designed to determine the Comparative Effects of Scaffolding and Collaborative Instructional Approaches on Secondary School Students' Psychomotor Achievement in Basic Electronics in North Central, Nigeria. The study adopted quasi-experimental, pre-test post-test non-equivalent control group design. The area of study was Benue, Nasarawa, and Niger states. A total of 105 SS II students, comprising of 77 males and 28 females, took part in the study. Two research questions and three hypotheses tested at .05 level of significance guided the study. The research instrument: Basic Electronics Psychomotor Achievement Test (BEPAT) was developed, validated, pilot tested and used for the study. The inter-ratter reliability of BEPAT was calculated using Spearman rank order correlation coefficient and was found to be 0.83. Mean was used to answer the research questions, while ANCOVA was used to test the hypotheses. Findings revealed that scaffolding and collaborative instructional approaches are effective in improving student achievement in Basic Electronics. However, collaborative instructional approach is more effective than scaffolding instructional approach. Also, there is no statistically significant difference between the mean scores of male and female students when taught Basic Electronics using scaffolding and collaborative instructional approaches. It was therefore recommended that teachers of Electronics in secondary schools should adopt collaborative instructional approach for teaching the subject.

Keywords: **-** *Basic Electronics, Collaborative Instructional Approach, Gender, Psychomotor Achievement, Scaffolding Instructional Approach*

I. INTRODUCTION

Basic Electronics is one of the vocational courses offered at the upper level of the Nigerian secondary school system. It is a branch of science and technology which deals with the study of the flow and control of electrons in electrical circuits and their behaviour and effects in vacuums, gases, and semiconductors. The curriculum has 4 objectives for its products [1]. For these objectives to be realized, teachers who are the implementers of this curriculum, apart from being versed in the subject matter, the selection of an appropriate instructional methodology and its effective use greatly determine their level of success which itself is measured by their students' achievement [2].

In recent time, there have been reports that the academic achievement of students has been below expectation [3]. According to [4] this failure to meet expected standard is attributable to the continuous use of unsuitable instructional methodologies (mostly traditional instructional approach) by teachers in teaching their students. Consequent upon this, teachers of courses like basic electronics are therefore faced with the challenge of presenting relevant classroom activities that can facilitate conceptual change, allow understanding, and recognize individual differences amongst students. The instructional technique having these qualities is constructivist-based instructional approaches.

[5] Construed constructivist-based instructional approaches to be teaching approaches that places the locus of control and the manner in which knowledge is processed with the learner, who is encouraged to generate self-relevant knowledge through critical, interactive and collaborative inquiry. Constructivist instruction has a number of important approaches and they are; situated learning, concept mapping, collaborative learning, anchored instruction, problem based learning, cognitive apprenticeship, discovery learning, and scaffolding [6, 5, 7, 8, 9] But this study will focus on scaffolding and collaborative learning.

According to [10], scaffolding refer to the process by which a teacher, an instructor or a more knowledgeable peer assists a learner, altering the learning task so the learner can solve problems or accomplish tasks that would ordinarily be impossible for him and to learn from the experience. While [11] defined Collaborative Learning as a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. If the potentials

of scaffolding and collaborative learning are fully utilized, the academic achievement of student of subjects like basic electronics could improve significantly.

In line with Bloom's taxonomy of educational objectives, and from past question papers of the examination bodies testing students at the secondary level in Nigeria, the type of testing employed for a subject like Basic Electronics, measures both cognitive and psychomotor achievement. But this study focused on psychomotor achievement. Psychomotor achievement reveals how well the educational objectives in the psychomotor domain have been realized by a student. It is measured using a psychomotor achievement test. The psychomotor domain hierarchy model proposed by [12] was adopted for the design of the psychomotor achievement test used in this study. When designing achievement tests, whether it is product or process assessment, care is often taken so that it is not gender bias.

Gender refers to state of being male or female. For a long time, gender was listed by researchers as one of the factors that influenced the academic achievement of the child [13, 14]. Hence, there has been a lot of debate on whether gender really affects academic achievement. Some researchers believed that boys often out-perform their girls counterparts in most subject areas, while some conclude the other way round [15, 16]. But current trends show that the gap that once existed between genders is fast closing [17]. This suggests that women are getting more exposure to educational activities more than ever.

1.1 Statement of the Problem

[3] Revealed that despite the huge resources expended by Nigerian stake holders in the educational sector, mass failure in public examinations, especially in Science and Technology related areas which include Basic Electronics, is still being recorded every year. Recent statistics of academic achievement among students of Basic Electronics over a period of five years (2008-2012) corroborates this. During this period 2,176 candidates sat for examination in the subject in Nigeria. Out of this number, only 771 candidates scored a credit grade or higher, representing a paltry 35.4% success rate [18].

It was observed by chief-examiners of Basic Electronics [19] that this mass failure could be attributed to teachers' use of unsuitable instructional methodologies, especially traditional method, which is teacher-centred, in teaching the subject. Hence, teachers need to adopt a learner-centred instructional approach, which will emphasize contextualized and constructive processes, and equip the students with higher-order thinking skills for easy adaptability and flexibility.

Moreover, studies carried out by many researchers have indicated that constructivist approaches are very effective teaching techniques in modern day teaching. Because students taught using the approaches demonstrated a higher academic achievement than those taught using the traditional approach. Since constructivist-based approaches are learner-centred, they emphasize contextualized and constructive processes, and equip the students with higher-order thinking skills [5]. Literature also revealed that scaffolding and collaborative learning are among the most popularly adopted of constructivist approaches. Therefore, the problem of this study is since constructivist-based instructional approaches are more effective than traditional approaches, which of them is the most effective? Hence, the present study was designed to find out the Comparative Effects of Scaffolding and Collaborative Instructional Approaches on Secondary School Students' Psychomotor Achievement in Basic Electronics in North-Central Nigeria, with a view of finding out between scaffolding approach and collaborative instructional approach which is more effective.

1.2 Purpose of the Study

The aim of this study was to determine the Comparative Effects of Scaffolding and Collaborative Instructional Approaches on Secondary School Students' Psychomotor Achievement in Basic Electronics in North-Central Nigeria. The objectives of the study were to determine the effect of:

1. Scaffolding and collaborative instructional approaches on students' psychomotor achievement in Basic Electronics.
2. Gender on students' psychomotor achievement in Basic Electronics when taught with scaffolding and collaborative instructional approaches.

1.3 Research Questions

This study sought to provide answers to the following questions: What is the effect of

1. Scaffolding and collaborative instructional approaches on students' psychomotor achievement in Basic Electronics.
2. Gender on students' psychomotor achievement in Basic Electronics when taught with scaffolding and collaborative instructional approaches.

1.4 Research Hypotheses

The researcher tested the null hypotheses stated below at 0.05 level of significance:

H_{O1} There is no significant difference between the mean scores of students in Basic Electronics Psychomotor Achievement Test when taught with scaffolding instructional approach and those taught with collaborative instructional approach.

H_{O2} There is no significant difference between the mean scores of male and female students when taught with scaffolding and collaborative instructional approaches in Basic Electronics Psychomotor Achievement Test.

H_{O3} There is no significant interaction effect of treatments given to students and their gender with respect to their mean scores on the Basic Electronics Psychomotor Achievement Test.

II. RESEARCH METHODOLOGY

2.1 Research Design

The study employed a quasi-experimental pre-test-post-test, non-equivalent control group design. Quasi-experimental design was defined by [20] as an experiment where random assignment of subjects to experimental and control groups is not possible. Therefore, intact or pre-existing groups are used. The researcher randomly assigned intact classes to groups. This is in order not to interrupt the normal classes of the students and the school time-table. The design is symbolically represented as follows:

EG_A O_1 ⊗ O_2

EG_B O_1 ⊕ O_2

Where,

EG_A stands for experimental group A.

EG_B stands for experimental group B.

O_1 stands for pre-test observation.

O_2 stands for post-test observation.

⊗ stands for treatments using Collaborative Instructional Approach.

⊕ stands for treatments using Scaffolding Instructional Approach.

2.2 Area of the Study

The study was carried out in North Central, Nigeria. North Central, Nigeria, comprises of Niger, Kogi, Kwara, Nassarawa, Plateau, Benue and the F.C.T.

2.3 Population of the Study

The population of the study consisted of all the 122 SS II students of Basic Electronics in the 8 secondary schools offering Basic Electronics in Benue, Nasarawa, Niger and plateau states. These states have the only schools offering Basic Electronics in North-Central Nigeria.

2.4 Sample and Sampling Techniques

The sample was made up of 105 (77 males and 28 females) SS II Basic Electronics students. A purposive sampling technique was used to select schools from the target population. This was because schools offering Basic Electronics in the area of study were few and their student population was small. A purposive sampling technique is a sampling technique in which specific elements which satisfy predetermined criteria are selected [20]. The criteria which a school must meet for it to be selected were:

1. Schools that have at least one graduate Basic Electronics teacher with at least two years of teaching experience.
2. Schools that have well equipped and functional Basic Electronics laboratory.
3. Schools that are currently presenting candidates for Senior Secondary School Certificate Examination (SSCE).
4. Schools whose Basic Electronics students are not less than 10 (ten).
5. Schools that have both boys and girls offering Basic Electronics.

From the purposive sampling that was carried out, only five schools met the criteria, and these five schools are from Benue, Nassarawa and Niger states. From the five schools met the criteria, four schools were randomly selected for the study. Out of these four schools selected for the study, two schools were randomly assigned to Experimental Group A (EG_A) and the other two were assigned to Experimental Group B (EG_B).

2.5 Instrument for Data Collection

The instrument used in this study; Basic Electronics Psychomotor Achievement Test (BEPAT), was constructed by the researcher. It contained one performance test question, with seven tasks to be performed and scored a total of 35 marks (then converted to 50 marks) using a researcher constructed competency rating guide based on process assessment technique.

2.6 Validation of the Instruments

The research instruments were validated by three experts. One of them is a lecturer of Electrical and Electronics Technology Education drawn from Department of Industrial and Technology Education (ITE), Federal University of Technology, Minna; the second is an experienced teacher of Electronics at the secondary school level and the third is an experienced staff of the Department of Examination Development, National Examinations Council, who was a teacher of Basic Electronics before joining the council as a Basic Electronics examination officer. To aid the validation exercise, the statement of the problem, purpose of the study, research questions and the hypotheses were also given to the experts. The validators were requested to examine the adequacy of content, logical sequence and suitability of the technical terms that were used, as well as make corrections in the grammatical expressions used where necessary. Their corrections and suggestions helped in making necessary adjustments in the final draft of the instruments.

2.7 Reliability of the Instruments

After the validation of the instruments, a pilot study was conducted at Government Secondary School, Danbatta, Kano State. To determine the reliability of the BEPAT, two ratters guided by the BEPAT competency guide rated 30 Basic Electronics students at Government Secondary School, Danbatta, Kano State. The inter-ratter reliability was calculated using Spearman's rho correlation coefficient. The rank order correlation coefficient was found to be 0.83. This indicated that there was high agreement between the two ratters who rated the students.

2.8 Lesson Plan

The researcher prepared two (2) sets of lesson plans for teaching of the six Basic Electronics topics selected for the study. Each set contained six lesson plans that were used to teach the students. Each contact lasted for 80 minutes (double periods). This spanned over a period of six weeks. One set of the lesson plans was prepared based on Collaborative Instructional Approach, and was used by the subject teacher to teach experimental group A throughout all the stages of the treatment period. The other set of the lesson plans were prepared based on Scaffolding Instructional Approach and were used by the subject teacher to teach experimental group B throughout all the stages of the treatment period.

2.9 Experimental Procedure

The study took place during the normal school setting. The time table of each school and lesson duration was followed without alteration. Detailed instructions with lesson plan on electrical conduction properties of elements, majority and minority charge carriers, p-n junction diode, diode parameters, electrical rectification and dc power supplies were given to the four research assistants during the one week training that was conducted for them. Experimental group A was treated to Collaborative Instructional Approach, while experimental group B was treated to Scaffolding Instructional Approach.

The influences of extraneous variables were checkmated as follows: firstly, the influence of Hawthorne effect was checkmated by using each school's regular Basic Electronics teacher. Who were grouped into two and trained in isolation of each other. The training pack included detailed lesson plans for the instructional approach to be undertaken by each research assistant, on the six Basic Electronics topics; as well as the procedural steps for implementing the instructional approach on which they were trained. Secondly, the influence of pre-test sensitization was checkmated by retrieving all pre-test question papers and by rearranging the post-test questions in such a way that the first question in the pre-test became the last in the post-test. Thirdly, the influence of initial group difference was checkmated by the use of analysis of covariance (ANCOVA) for the data analysis. Fourthly, the influence subjects' interaction was controlled by the use of intact classes for each treatment group in each school used for the research, so that subjects (students) from one treatment group do not introduce biases in the results by crossing to a treatment group they were not originally assigned to.

In the first week, BEPAT were administered on both the experimental A and experimental group B. This was followed by a six weeks period of treatment of the two groups. Each lesson lasted for 80 minutes (double periods). At the end of the treatment period, a post-test was administered on both groups. The scores that were obtained from both groups were compared to determine if there is any significant difference in their psychomotor achievement. Therefore, the scores were collected and kept in the custody of the researcher for use in further analyses.

2.10 Method of Data Analysis

The Data collected for the study were analyzed using mean statistics and Analysis of Covariance (ANCOVA). Mean statistics was used to answer the four research questions of the study. While the null hypotheses were tested using ANCOVA at 0.05 level of significance. ANCOVA was considered suitable because the study involved two independent variables (teaching methods and gender), a dependent variable (post-test scores) and a covariate (pre-test scores). Also, [20] stated that the most appropriate statistical technique for analyzing data from a pre-test-post-test control-group design is ANCOVA.

III. RESULTS

The results were presented according to the research questions and null hypotheses that guided the study.

3.1 Research Question One

What is the effect of scaffolding and collaborative instructional approaches on students' psychomotor achievement in Basic Electronics?

Table 1: *Pre-test and Post-test Mean Scores of Treatment Groups Taught Basic Electronics with Scaffolding and Collaborative Instructional Approaches in the Psychomotor Achievement Test.*

Group	N	Pre-test $\bar{X}$	Post-test $\bar{X}$	Mean Gain $\bar{X}$
Experimental Group A	52	11.29	37.91	26.62
Experimental Group B	53	11.59	26.68	15.09

Table 1 shows that Experimental group A (group treated with Collaborative Instructional Approach) had a pre-test mean score of 11.29 and a post-test mean score of 37.91, this gave a pre-test, post-test mean gain of 26.62. However, Experimental group B, (group treated with Scaffolding Instructional Approach) had a pre-test mean score of 11.59 and a post-test mean score of 26.68, giving a pre-test, post-test mean gain of 15.09. With these results, the students in Experimental Group A performed better in the psychomotor achievement test than the students in Experimental Group B. Hence, collaborative instructional approach is more effective than scaffolding instructional approach in Basic Electronics.

3.2 Research Question Two

What is the effect of gender on students' psychomotor achievement in Basic Electronics when taught with scaffolding and collaborative instructional approaches?

Table 2: *Pre-test and Post-test Mean Scores of Male and Female Students Taught Basic Electronics with Scaffolding and Collaborative Instructional Approaches in the Psychomotor Achievement Test*

Gender	Scaffolding Instructional Approach				Collaborative Instructional Approach			
	N	Pretest $\bar{X}$	Posttest $\bar{X}$	Mean Gain $\bar{X}$	N	Pretest $\bar{X}$	Posttest $\bar{X}$	Mean Gain $\bar{X}$
Male	40	11.50	27.03	15.53	38	11.24	38.26	27.02
Female	13	11.87	26.15	14.63	14	11.43	37.77	26.34

Table 2 shows that male students taught Basic Electronics using Scaffolding Instructional Approach had a pre-test mean score of 11.50 and a post-test mean score of 27.03 giving a pre-test, post-test mean gain of 15.53, while their female counterparts taught using Scaffolding Instructional Approach, had a pre-test mean score of 11.87 and a post-test mean score of 26.15 giving a pre-test, post-test mean gain of 14.63. Also, male students taught Basic Electronics using Collaborative Instructional Approach had a pre-test mean score of 11.24 and a post-test mean score of 38.26 giving a pre-test, post-test mean gain of 27.02, while their female

counterparts taught using Collaborative Instructional Approach, had a pre-test mean score of 11.43 and a post-test mean score of 37.77 giving a pre-test, post-test mean gain of 26.34. From these results, male and female students taught Basic Electronics using Collaborative Instructional Approach had a higher mean gain score than their Scaffolding Instructional Approach counterparts in the psychomotor achievement test. Also male students performed better than the females. This could point to the existence of an effect attributable to gender on the achievement of students taught Basic Electronics.

3.3 Hypotheses

H_{O1}: There is no significant difference between the mean scores of students in Basic Electronics Psychomotor Achievement Test when taught with scaffolding instructional approach and those taught with collaborative instructional approach.

H_{O2}: There is no significant difference between the mean scores of male and female students when taught with scaffolding and collaborative instructional approaches in Basic Electronics Psychomotor Achievement Test.

H_{O3} There is no significant interaction effect of treatments given to students and their gender with respect to their mean scores on the Basic Electronics Psychomotor Achievement Test.

Table 3: *Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Three Effects: Treatment, Gender and Interaction on Students' Psychomotor Achievement in Basic Electronics.*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4425.905	4	1106.476	93.857	.000
Intercept	4559.788	1	4559.788	386.783	.000
Pretest	1116.891	1	1116.891	94.740	.000
Gender	4.627	1	4.627	.392	.532*
Treatment	2306.586	1	2306.586	195.656	.000*
Gender* Treatment	5.687	1	5.687	.482	.489
Error	1178.901	100	11.789		
Total	114751.392	105			
Corrected Total	5604.807	104			

*Significant at sig. of F < .05

The data in Table 3 shows the F-calculated values for Three Effects: treatment, gender and interaction on students' psychomotor achievement in Basic Electronics. The F-calculated value for treatment is 195.656 with a significance of F at .000 which is less than .05. This result shows that there is a significant difference between the mean scores of students in Basic Electronics Psychomotor Achievement Test when taught using scaffolding instructional approach and those taught with collaborative instructional approach. The null-hypothesis is therefore rejected at .05 level of significance. The F-calculated value for gender is .392 with a significance of F at .532 which is greater than .05. This result shows that there is no significant difference between the mean scores of male and female students when taught with scaffolding and collaborative instructional approaches in Basic Electronics Psychomotor Achievement Test. The null-hypothesis is therefore accepted at .05 level of significance. Also, the interaction of treatments and gender has an F-calculated value of .482 with significance of F at .489. From this, .489 is obviously greater than .05. Hence, there is no significant effect of treatments given to students on their gender with respect to their mean scores on the Basic Electronics Psychomotor Achievement Test. The null-hypothesis is therefore accepted at .05 level of significance.

3.4 Findings of the Study

The following findings emerged from the analyses of data collected for the study:

1. Scaffolding and collaborative instructional approaches are effective for improving students' psychomotor achievement. But, collaborative instructional approach was more effective than scaffolding instructional approach.
2. There was an effect of gender on students' psychomotor achievement in Basic Electronics.

3. There was a significant difference between the mean scores of students in Basic Electronics Psychomotor Achievement Test when taught using scaffolding instructional approach and those taught with collaborative instructional approach, in favour of collaborative instructional approach.
4. There is no significant effect of gender on student psychomotor achievement in Basic Electronics.
5. There was no significant interaction effect of treatments given to students and their gender with respect to their mean scores on the Basic Electronics Psychomotor Achievement Test.

3.5 Discussion of Findings

The data presented in Table 1 provided answer to research question one. The finding revealed Scaffolding and collaborative instructional approaches are effective for improving students' psychomotor achievement. But, collaborative instructional approach was more effective than scaffolding instructional approach. Analysis of covariance was used to test hypothesis two, table 6, F-calculated value for treatment was 195.656, a significance of F at .000 and a level of confidence at .05. This confirmed that there is a significant difference between the mean scores of students taught with scaffolding in Basic Electronics Psychomotor Achievement Test and those taught with collaborative instructional approach, in favour of collaborative instructional approach.

This finding therefore, implies that scaffolding and collaborative instructional approaches are effective for teaching Basic Electronics. However, collaborative instructional approach is more effective than scaffolding instructional approach. This is consistent with several studies conducted on the effect of collaborative instructional approach on student academic achievement in various fields of educational endeavour. The studies agree that students exposed to academic activities through collaborative instructional approach, consistently record high academic achievement than student who studied individually like in scaffolding [21, 22, 23]. This higher academic achievement recorded by students exposed to collaborative instructional approach according to [21], is because the peer support system makes it possible for the learner to internalize both external knowledge and critical thinking skills and to convert them into tools for intellectual functioning. When students of Basic Electronics are exposed to collaborative instructional approach, they are availed of the opportunity of exercising their minds in higher order mental activities collaboratively. Because collaborative endeavour result in partakers striving for collective benefit so that all group members: (a) gain from each other's contributions, (b) recognize that all group members share a corporate outcome, (c) know that his accomplishment is collectively produced by himself and his team members and feel proud and jointly celebrate when a group member is recognized for accomplishment. Therefore, the difference observed between the two groups is as a result of collaborative instructional approach being more effective in improving students' psychomotor achievement in Basic Electronics than scaffolding instructional approach.

The answer to research question two was provided by table 2. The finding revealed that there was an effect of gender on students' psychomotor achievement in Basic Electronics. At the same time, analysis of covariance was employed for testing hypothesis five, table 3. The F-calculated value for gender was .392 with a significance of F at .532 at a level of confidence of .05 confirming that there is no significant effect of gender on student psychomotor achievement in Basic Electronics. This for the umpteenth time implies that both scaffolding and collaborative instructional approaches are not gender bias in teaching of subjects like Basic Electronics. This finding is similar to findings of several other studies that have been conducted on effects of gender on achievement of male and female students in sciences and other fields. For instance, [24] reported that gender had no significant interaction with teaching approach on students mean achievement in financial accounting. This position is similar to that of [4] who reported that there was no significant difference in the mean scores of male and female students taught with constructivism instructional approach (scaffolding and collaborative instructional approaches are models of constructivism) in general metal work. Also, analysis of covariance was employed for testing hypothesis six, table 6, the interaction of treatments and gender has an F-calculated value of .482 with significance of F at .489. From this, .489 is obviously greater than .05. Hence, there is no significant effect of treatments given to students on their gender with respect to their mean scores on the Basic Electronics Psychomotor Achievement Test. The null-hypothesis is therefore accepted at .05 level of significance.

This point to the fact that both scaffolding and collaborative instructional approaches are not gender discriminative in the teaching of subjects like Basic Electronics. This finding is supported by the works of several other researcher on the interaction effect of treatments given to students and their gender with respect to their mean scores in sciences and other fields [25, 26, 17], [27]. Hence, these findings confirmed that when males and females are exposed to psychomotor activities in subjects like Basic Electronics, under the same environment, conditions, and taught by the same teacher using the same methodology, their performance will not differ significantly. Hence, the gender difference detected by the mean statistics, (though not significant statistically), was not due to the effect of treatment on gender.

IV. CONCLUSION

The need to find the most appropriate instructional approach to assist Basic Electronics students in their academic activities, stimulate and sustain their interest is very important. This is because interest is a key ingredient for recording high achievement in any academic pursuit and especially in technology education. This study therefore, ascertained the Comparative Effects of Scaffolding and Collaborative Instructional Approaches on Secondary School Students' Psychomotor Achievement in Basic Electronics in North-Central Nigeria. The study found out that collaborative instructional approach is more effective in improving students' psychomotor achievement in Basic Electronics than scaffolding instructional approach. Also the study revealed that, gender had no influence on students' psychomotor achievement in Basic Electronics. The study also revealed that collaborative and scaffolding instructional approaches are not gender bias. Therefore, the effectiveness of collaborative instructional approach on students' psychomotor achievement in Basic Electronics does not depend on gender. Students recorded higher psychomotor achievement in Basic Electronics when collaborative instructional approach is used for teaching the subject irrespective of gender. These results therefore show that collaborative instructional approach is a workable teaching method for Basic Electronics.

V. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Teachers of Electronics and other related subjects in secondary schools should adopt collaborative instructional approach for teaching their subjects.
2. Nigerian Educational Research and Development Council (NERDC) should consider incorporating collaborative instructional approach into the teaching of Basic Electronics when next they are reviewing the curriculum.
3. Government and other stakeholders in the provision of qualitative technology education should provide schools with state-of-the-art tools and equipment needed for the teaching and learning of Basic Electronics.
4. The National Universities Commission (NUC) along with other sister agencies in collaboration with the Ministries of Education both at federal and states levels, should organize training and retraining workshops, seminars and conferences to enlighten teachers of technology education with a view of improving their knowledge with skills on the use of collaborative instructional approach from time-to-time.

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