



## Effect of Blended Learning (BL) on Students' Achievement in Electrical Installation in Technical Colleges in Bauchi State

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### ABSTRACT

This study determined the Effect of Blended Learning on Students' Achievement in Electrical Installation in Technical colleges in Bauchi State. Three research questions were formulated and three related hypotheses were tested. Quasi experimental research design was employed. The population of the study consisted of 252 students of National Technical Certificate (NTC) II electrical installation and maintenance trade in technical colleges in Bauchi State. Simple random sampling technique was used to select two (2) technical colleges from eight (8) Technical colleges and 98 students that were used as sample of this study. An experimental and control groups were randomly assigned to one existing intact class in each of the two technical colleges for the purpose of the study. Electrical Installation Achievement Test (EIAT) was used for data collection. and reliability coefficient values of 0.81 for the EIAT was obtained using split-half and. Data collected was analyzed using mean, standard deviation and t-test statistics with the help of SPSS version 21. Independent sample t-test was used to test hypothesis one and three while paired sample t-test was used to test hypotheses two at 0.05 level of significance. The study revealed that students' that received instruction using Blended Learning in Electrical Installation have effect than the students that received instruction using conventional method of teaching. Based on these findings, the study recommended that technical college teachers particularly EIMW teachers should learn BL in teaching their students. Finally, the study concluded that blended learning enhanced students' achievement in Electrical Installation at the technical college level.

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### INTRODUCTION

Technical education refers to a training which equips students with theoretical knowledge and practical skills in more specific areas of technology including Auto-mechanics, wood-work, plumbing, computer craft, mechanical trades, radio, television (RTV) and electronics

works, electrical installation and maintenance works. Electrical installation trade is one of the major skills based courses offered in technical colleges in Nigeria and comprises basic electricity, industrial installation, domestic installation, electric machine, winding and cable jointing. Electrical installation trade prepares students to understand diverse skills in the design,



development, production, management and utilization of trending electrical devices and circuits (Ede, Miller & Bakare, 2010).

The objective of Electrical installation is to provide the students with the knowledge and skills that enable them perform electrical installation and maintenance of common machineries in industries. In addition, it helps students to perform domestic works which include fixing home electrical fittings and appliances as well as their maintenance. National Board for Technical Education (NBTE, 2012) also stated that the objectives of electrical industrial installation includes providing the trainees with skills and knowledge that will enable them undertake factory and industrial installations (conduit, surface or trunk) wiring using appropriate conductors and cables.

For a teacher to communicate the knowledge in a topic to the pupils, the teacher needs to decide what teaching method or technique to use. Teaching method is defined as an overall plan for the orderly presentation of content or learning material, and usually a method is driven by a philosophy about how children learn. Lecture method according to Lyop and Mangut (2001) is characterized by a steady flow of information from teacher to the students, the teacher dispenses facts and opinions about procedures or contents, expresses his own ideas or citing an authority. Ogwa (2002) states that lecture method of instruction is the process of speaking to students, while they sit and listen to the teacher. Ogwa further emphasized that in lecturing method, the teacher acts as a conference organizer while the students listen as the audience. The lecture method is the most common of these traditional teaching methods. Lyop and Mangut (2001) points out the inherent setbacks of lecturing method. They affirm that it does not promote meaningful learning as it appeals only to the sense of hearing. According to them more effective learning goes on only when many senses are involved. They opined that schools consist of many ability groups in each class; the abilities of student they believed vary considerably and therefore conclude that the lecture method cannot meet the different needs of the students.

The system of education at this presents is a transition stage. To meet the challenges of increases and for catering individuals need it is trying to adopt new technologies and exploring new paths to reach the goal of quality educational opportunities for all, at the same time due to various factors like deficient budgets, lack of facilities, advantages of face to face interaction, it is not completely ready to leave the traditional modes of knowledge transfer. Even the students are in a state of dual mind. When a group of teacher trainees were inquired about the mode of teaching they will prefer ICT supported teaching to tradition classroom teaching (Lalima & Kiran, 2017). Such ICT supported teachings include teaching using computer assisted instruction (CAI), virtual learning, e-learning, blended learning etc.

Blended learning is an innovative concept that embraces the advantages of both traditional teaching in the classroom and ICT supported learning including both offline learning and online learning. It has scope for collaborative learning; constructive learning and computer assisted learning (CAI). Blended learning needs rigorous efforts, right attitude, handsome budget and highly motivated teachers and students for its successful implementation (Bonk & Graham 2006).

Blended learning is the concept that includes framing teaching learning process that incorporates both face to face teaching and teaching supported by ICT. Blended learning incorporates direct instruction, indirect instruction, collaborative teaching, individualized computer assisted learning (Lalima & Kiran, 2017).

Lalima and Kiran (2017) described the following advantages of Blended Learning which include both online and offline mode so that teachers and students get more time in the classroom for creative and cooperative exercise. In addition, Students gain advantage of online learning and CAI without losing social interaction element and human touch of traditional teaching. Furthermore, it provides more scope for communication cycle which is completed in comparison with traditional approach. Lastly, Students become more techno savvy and gain enhanced digital fluency as they develop qualities



like self-motivation, self-responsibility and self-discipline.

### Research Questions

1. What is the difference between pre-test mean achievement scores of the students in Electrical Installation in the experimental and control?
2. What is the difference between pre-test and post-test mean achievement scores of the students in Electrical Installation in the experimental group?
3. What is the difference between post-test mean achievement scores of the students in Electrical Installation in the experimental and control group?

### Hypotheses

- H<sub>01</sub>:** There is no significant difference between pre-test mean achievement scores of the students of Electrical Installation in the experimental and control groups.
- H<sub>02</sub>:** There is no significant difference between pre-test and post-test mean achievement scores of the students of Electrical Installation in the experimental group.
- H<sub>03</sub>:** There is no significant difference between post-test mean achievement scores of the students of Electrical Installation in the experimental and control groups.

### METHODOLOGY

A quasi experimental design (Non-equivalent Control Group Design) was employed. This design was adopted because the researcher used two existing intact classes in the schools selected. The study was carried out in two among the eight Bauchi State Government Technical Colleges which are: Government Day Technical College Bauchi and Government Technical College Azare. Population is a group of individual that share common characteristics from which data can be gathered and analyzed. The population for this study comprises 252 NTC II

electrical installation and maintenance work students from eight (8) technical colleges in Bauchi State. Two Technical colleges out of the eight Colleges were randomly selected and assigned into experimental and control groups respectively. A total of 98 NTC II students of Electrical Installation and Maintenance were used as the sample of the study out of the two existing intact classes. An intact class of 47 NTC II students from Government Day Technical College, Bauchi were used as experimental group while 51 from Government Technical College Azare were used as control group. This implies that the class sizes for the two technical colleges are within the range of good and conducive learning environment.

Electrical Installation Achievement Test (EIAT) was used as an as instruments for data collection. The instrument has 30 multiple choice objective test items that were selected from NABTEB past question papers from 2014 – 2019 based on the four topics of NTC II Electrical installation and maintenance work syllabus. The EIAT was used for pretest and also used for the posttest in the experimental phase of this study. The researcher involved two (2) research assistants from the selected schools to help in the data collection process. One teacher was selected from each of the two colleges in order to help the researcher to administer the test. One research assistants was trained on the use of Blended Learning instruction while the other one was informed on how to carry out the teaching using the convention style. The data obtained was analyzed using mean and t-test. Mean was used to analyze the research questions while t-test was used to test the research hypotheses at 0.05 alpha level of significance. This is because only two groups were compared in each and every occasion. The Statistical Package for Social Sciences (SPSS) was used in computing the data.

### RESULT AND DISCUSSION

The results of the study are presented in Tables 1 to 6 below. Table 1 showed the socio-demographic variables



**Table 1:** Different in Pre-test Mean Achievement Scores of Students in the Experimental and Control Groups

Group		N	Mean	Std. Deviation
Pre-Test	Experimental	51	14.10	3.19
	Control	47	16.67	3.88

Source: Field Survey (2019)

The result presented in Table 1 shows that there were 51 students in the experimental group and 47 students in the control group and that the experimental group had a pre-test mean achievement score of 14.10 and Standard Deviation of 3.19. The control group on the other hand had a pre-test mean achievement score of

16.67 and Standard Deviation of 3.88. Thus, these showed that the mean achievement scores of the students of both group is almost the same with a slightly little difference between the means of the two groups. Thus, the significance level was tasted with hypothesis related to the research question.

**Table 2:** Different in Pre-test and Post-test Mean Achievement Scores of Students in the Experimental Groups

Group	Test	N	Mean	Std. Deviation
Experimental	Pre-test	51	14.10	3.19
	Post-test	51	37.62	9.18

Source: Field Survey (2019)

The result in Table 2 revealed that there were 51 students in the Experimental group taught Electrical installation using Blended learning. The pre-test mean achievement scores of the experimental group are 14.10, while the standard deviation is 3.19. However, in the post-test, the

group had a mean achievement scores of 37.62 while the standard deviation is 9.18, after the treatment (BL), it is clear that the BL students had a higher achievement in the post-test than in the pre-test. Thus, the significance level was tasted with hypothesis related to the research question.

**Table 3:** Different in Post-test Mean Achievement Scores of Students in Experimental and Control Groups.

Group		N	Mean	Std. Deviation
Post-test	Experimental	51	37.62	9.18
	Control	47	22.44	5.68

Source: Field Survey (2019)

The result presented in Table 3 shows that there were 51 students in the experimental group and 47 students in the control group, that is the experimental group had a post-test mean achievement score of 37.62 and Standard Deviation of 9.18, while, the control group on the other hand had a post-test mean achievement scores of 22.44 and Standard Deviation of 5.64. Thus, with the post- test mean achievement

scores of 37.62 and 22.44 of the experimental (BL) and control (Conventional method) group respectively shows that the students of winding of electrical machines were taught using BL had a higher mean achievement scores than the students who were taught electrical installation using Conventional method. Thus, the significance level was tasted with hypothesis related to the research question.

**Table 4:** Test of Significance Difference in Pre-test Mean Achievement Scores of the Students in the Experimental and Control Groups.

	Group	N	Df	Mean	SD	P value	Decision
Pre-Test	Experimental	51	97	14.10	3.19	0.381	Accept $H_{01}$
	Control	47		16.67	3.88		

Source: Field Survey (2019)



The data on table 4 showed the results of independent sample t-test used for testing difference between the pre-test mean achievement scores of the students of Electrical installation in the experimental and control group. The data from the table revealed that the mean achievement scores of both the experimental and a control group is 14.10 and 16.67 with a standard deviation of 3.19 and 3.88 respectively. With a degree of freedom 97 and the P value is 0.381. This shows that there is a slightly little difference

in the pre-test achievement of the two groups. The P value is greater than the 0.05 level of significance; it implies that no significance difference exists between the pre-test mean achievement scores of the students in the experimental and control groups. Therefore, the null hypothesis which stated that there is no significant difference between pre-test mean achievement scores of the students in Electrical installation in the experimental and control groups is hereby accepted.

**Table 5:** Test of Significance Difference in Pre-test And Post-test Mean Achievement Scores of the Students in the Experimental Group

	Group	N	Df	Mean	SD	P value	Decision
Experimental	Pre-test	51	101	14.10	3.19	0.000	Reject H <sub>02</sub>
	Post-test	51		37.62	9.18		

**Source:** Field Survey (2019)

The table 5 showed the analysis of paired sample t-test used for testing difference between the pre-test and post-test mean achievement scores of the students of Electrical installation in the experimental group. The data from the table revealed that the pre-test mean achievement scores was 14.10 with a standard deviation of 3.19, after the treatment (BL) the post-test mean achievement scores was 37.62 with a standard deviation of 9.18. The degree of freedom 101 and the P value of 0.000. This shows that significant difference exists between the pre-test

and post-test mean achievement scores of the experimental group. Since P value is less than the 0.05 level of significance, it implies that significant difference exists between the pre-test and post-test mean achievement scores of Electrical installation students in the experimental group. Therefore, the null hypothesis which stated that there is no significant difference between pre-test and post-test mean achievement scores of the students of Electrical installation in the experimental group is hereby rejected.

**Table 6:** Test of Significance Difference in Post-test Mean Achievement Scores of the Students in the Experimental and Control Groups

	Group	N	Df	Mean	SD	P value	Decision
Post-test	Experimental	51	97	37.62	9.18	0.038	Reject H <sub>03</sub>
	Control	47		22.44	5.64		

**Source:** Field Survey (2019)

The data on table 6 showed the results of independent sample t-test used for testing difference between the post-test mean achievement scores of the students of Electrical installation in the experimental and control groups. The data from the table revealed that the mean achievement scores of both the experimental and control groups are 37.62 and 22.44 with a standard deviation of 9.18 and 5.64 respectively. The degree of freedom 97 and the P value of

0.038. Since the P value is less than 0.05 level of significance, it implies that significant difference exists between the achievement scores of students of Electrical installation taught using BL(experimental group) against the students taught using traditional lecture method (control group). Therefore, the null hypothesis which stated that there is no significant difference between the post-test mean achievement scores



of the students of electrical installation experimental and control group is hereby rejected.

### SUMMARY OF FINDINGS

The results of this study come out with the following findings:

1. The pre-test mean achievement scores of students in both the experimental and control group is almost the same
2. The post-test mean achievement scores of the students is higher than the mean in pre-test scores in experimental group.
3. The post-test mean achievement scores of the students in the experimental is also higher than the scores of students in control group.

### DISCUSSION OF FINDINGS

In research question one, the pre-test mean achievement scores of the students of Electrical installation in the experimental and control groups was found to be 14.10 and 16.67 and the standard deviation was 3.20 and 3.88 respectively, the result showed that a slight difference exists between the pre-test mean achievement scores of the two groups. Furthermore, the null hypothesis one had been tested using independent sample t-test, the outcome of the analysis revealed that the degree of freedom 97 and the P value was found to be 0.381, from the information above the analysis of hypotheses one shows that no significant difference exists between the pre-test of the two groups, since the P value is greater than 0.05 level of significance, the null hypothesis was therefore accepted. The results of the present study showed that the pre-test mean score of the students in the experimental group was not significantly different from that of the students in the control group. This indicated that the two groups used in the study exhibited comparable characteristics.

In research question two, the pre-test and post-test mean achievement of BL (experimental) groups were found to be 14.10, and 37.62 the standard deviation was 3.20, 9.18 respectively, which showed that students taught Electrical installation using BL had a higher mean achievement scores in the post-test than in the pre-test. Moreover, the null hypothesis two had been tested using paired sample t-test, the result

of the analysis showed that the P value of 0.000. with degree of freedom 101 and hypotheses two which revealed that significant difference do exists between the pre-test and post-test of the experimental group, since the P value is less than 0.05 level of significance, therefore the null hypotheses was rejected.

In research question three; the experimental and control groups had a post-test mean achievement scores of 37.62 and 22.44 while the standard deviation was 9.18 and 5.64 respectively, this showed that the experimental group (BL) had a higher mean achievement scores in the post-test than the control group (conventional method). Furthermore, the null hypothesis had been tested using independent sample t-test, the outcome of the analysis revealed that, the P value of 0.000 with degree of freedom 97. Since the P value is less than 0.05 level of significance, it implies that significant difference exists between the achievement scores of Electrical installation students taught with BL (experimental group) against the students taught with conventional method (control group). Therefore, the null hypothesis is hereby rejected.

### RECOMMENDATIONS

1. Teachers with wider position and positive approach towards change as it is must for the success of any innovative idea or method blended learning process also need teachers that have a wider point of view and should be flexible, they should be ready to accept the changes and very innovative and dynamic.
2. Complete facilities like well-furnished computer lab, internet connection, provision for video chatting it is the compulsory factor of blended learning.
3. Blended learning largely depend on infrastructure, school should not only have good classrooms but should also have a well-furnished compute laboratories with sufficient number of computes to cater to all the students of one class and the internet facility, a Wi-Fi campus if possible.
4. Students have access to internet at their private computers- in addition to school having fully ICT friendly campus students should have basic hardware support to learn online and offline at their residence also. This



- requires a positive attitude and good investments schemes from the government.
5. Flexibility in the system- The system should be flexible, flexible time table, examinations system all this is very crucial for implementing blended learning.
  6. Fully aware and agreed Parents- the parents should be made well aware of this innovative approach to teaching so that they are ready for it and support their wards for the blended learning and can accept that this deviation from traditional teaching is beneficial for their children

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