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# EFFECT OF SIMULATION USING MATLAB ON ACHIEVEMENT OF ELECTRONIC TECHNOLOGY EDUCATION STUDENTS IN NIGERIAN UNIVERSITIES

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**Abstract**

This study determined the effects of simulations using MATLAB on achievement and gender of electronic technology education students in tertiary institutions in Nigeria. Two Research questions and hypotheses guided the study. A pre-test, post-test, non-equivalent control group, quasi-experimental research design was adopted. A total of 254 students were involved in the study. Electronic Technology Education Achievement Test (ETEAT) was used for data collection. The instrument was face validation by five experts. The ETEAT was trial-tested to determine its psychometric indices and reliability coefficient. The reliability coefficient of the ETEAT obtained was 0.78 using Pearson Product Moment Correlation Coefficient. Mean was used to answer the research questions; while ANCOVA was employed to test the hypotheses. The study revealed that MATLAB is more effective than the traditional teaching method on students' achievement in Electronic Technology in favour of male students. There was a significant difference between the mean achievement scores of students taught Electronic Technology using MATLAB and those taught with traditional method. Consequently, the researcher recommended that workshops, seminars and conferences should be organized by Ministry of Education and administrators of universities to enlighten electronic Technology Lecturers and improve their knowledge and skills on the use of MATLAB for improving students' achievement in Electronic Technology Education.

**Keywords:** Electronic technology, Simulation, MATLAB, Academic Achievement, Education

## INTRODUCTION

Rapid development of modern society cannot be separated from the development of electronic technology. The world has entered into an age where modern industry finds application of electronic technology indispensable. Growth and development in the field of electronic industries have created a strong demand for employees who are well trained. Electronic Technology workers are prepared in various levels of the education system, both formal and informal, including the college of education, polytechnic, and universities. Electronic technology education programme prepares students for occupations as Technologist, Technicians and Electronic Technology teachers (Orji, 2015; Orji and Ogbuanya, 2020).

In the university system, electronic technology education exists under the technical and vocational education programme and it is geared towards training teachers in those skills necessary for effective teaching of technical personnel. Dalabu and Audu (2006) observed that Nigeria has been making series of desperate efforts to keep pace with other developed nations of the world through her emphasis on science, technology and mathematics education among others. Okoro (2004) noted that the quality of any vocational education program is determined by the extent to which students are able to acquire the skills knowledge and values that are required in the work place. The realization of the objectives of Electronic Technology education programme in tertiary institutions -which include producing qualified teachers that can impact required skills and knowledge for improved performance in electronic technology courses at secondary schools and technical colleges- depend on a number of factors. These include the availability of equipment, tools and materials, an adequate supply of qualified technical education teachers, and the method of teaching employed in the electronic technology programme. At present, electronic technology students are taught with the traditional teaching method- which is mostly the lecture and demonstration method.

Traditional classroom teaching and instruction has its strengths and limitations. A lot of times, in electronics technology education, the subject presented are abstract. In traditional method of teaching, students are left to their imaginations. Henning (1998) observed that in traditional classroom teaching, for the most part, the content presented in the classroom is disconnected from its real-world context. Knowledge conveyed in the classroom tends to be situated in the context of the classroom and the school rather than the context in which the knowledge was created. The author noted that this contextual dichotomy has been shown to negatively impact the learning process, adversely effecting learner motivation in particular. Duffy and Cunningham (1996) also observed the extremely limited inclusion of real-world learning experiences in the traditional classroom setting and that real-world learning situated in real-world contexts has been shown to have positive impacts on learning and learner motivation.

Traditional methods of teaching have been in use in Nigeria and other parts of the world tour decades. However, the consequence of the use of traditional methods in teaching vocational subjects such as electronic technology education in universities is that students are unable to retain their learning and apply it in new situations (Orji and Ogbuanya, 2018; Bakare and Orji, 2019; Zhang, et, al. 2020; Olelewe et, al 2021).

Ogbuanya and Usoro (2009) also stated that electronic technology graduates do not have the full knowledge of what they claim to have studied most of them find it difficult to put into practice what they have learnt. Ogbuanya and Usoro noted that at graduation most of the students are deficient of employability skills and work place skills. In another study, Osuala (2004), observed that technical education always has a problem of supply and demand of qualified teachers which is a prime factor in the quality of instruction. Osuala further stressed the fact that teacher quality factor is reflected in the productivity and occupational adjustment of those who have completed a training programme in the technical colleges. In another study, Goshwe (2006) noted that dearth of instructional materials, machines and equipment, limitations of the existing methods of instruction have also been identified as been part of the factors responsible for poor performance in technical colleges. This situation is an indication that the national objective of the self-reliance has not been achieved. It is therefore needful to introduce among other things tools that will enhance learning and make subject matter more relevant to the emerging industry.

Improving learning ordinarily involves change in method and means of instrument delivery. To enhance learning, İşman, et, al (2002); Orji et, al (2021); Omeje et. al (2019), Olelewe, et, at (2020) suggested that the use of technology in education will provide students with a more suitable environment to learn. serves to create interest and a learning centered-atmosphere, and helps increase the students' motivation. Moreover, Mustafa (2011) opined that the use of computers may provide significant contributions in physics and related courses, including electronics.

Using technological equipment in order to aid learning has started becoming a common method in the educational sectors around the world, including Nigeria. It is worthy of note that technology is a field that is very dynamic. It is therefore essential to have personnel that adapt to the dynamic work condition. Ahmet and Ahmet (2008) revealed that one of the main aims of the technology education is to bring up people who can keep up with the science age which changes and grows up at any moment and can benefit from the latest technological inventions in every field and to teach the necessity of the science in all technological inventions and developments. Gonen, Harskamp and Suhre (2006) in their study established that the use of computers in education is due to its positive effect to increase the attention and curiosity of students, and the helps it provides in the conceptual learning, is spreading widely. In addition, most of the knowledge related to natural

phenomenon is now available in the computer environment. When teachers use computers as a teaching tool, it gives them the ability to show the physical phenomenon in a way that students can visualize in a three-dimensional form. Also, since industries make use of computerize equipment for quality control and efficiency among others, the use of computers in teaching will be an added advantage for acquiring employable skills. It is therefore inevitable to use new technologies such as; the internet, video or teleconferencing, mobile phones, IPADs, IPODs, Interactive TV, satellite broadcast, Audio and Video, Slides, CDs, computers to solve problems in education (Okereke, et, at 2019).

The development of technology from day to day is providing better alternatives to the ways and means by which teaching and learning was previously carried out. Traditionally, in electronic technology, forming large models of systems have been via a mathematical model derived from related circuit theory, which attempts to find analytical solutions to problems and thereby enable the prediction of the behavior of the system from a set of parameters and initial conditions. It is important to note that with new technologies such as the use of computer aided designs and software packages, learning nowadays can be facilitated through different methods other than the traditional teaching and learning method. Software-supported educational products are some of the innovative technologies designed to be used in the computer-based and computer supported teaching practices. Such technologies can be used as complementary materials for doing calculations, and preparing simple models and simulations. It can also be used as a teaching material in the teaching of a part of a subject or the whole subject. Teaching software is capable of reducing the problems encountered in education (Ahmet and Ahmet, 2008).

The potential for success of technology-based instruction usage for learning is primarily due to its ability to integrate various types of media (such as sound, video, graphics, text, among others) and delivered in various forms (such as collaboration, interactive, simulation, among others). Majority of computer-based teaching tool possess the ability to show the physical phenomenon in a way that students can visualize in a three-dimensional form. With advances in technology, software- supported educational products designed to be used in the computer-based and computer supported teaching practices can use algorithms from purely mathematical models, combine simulations with reality or actual events, such as generating input responses, to simulate test subjects that are no longer present. Whereas the missing test subjects are being modeled simulated,

the system they use could be the actual equipment, revealing performance limits or defects in long-term use by these simulated users.

A simulation is a situation in which a particular set of condition is created artificially in order to study or experience something that could exist. In electrical technology, circuit simulation is a technique that can be used to predict the behavior of a real circuit using a computer program. According to Rozenblart (2003), it is a computer program predicting the behaviour of a: real circuit. It replaces real components with idealized electrical models which allows measurements of internal currents, voltages and power that in many cases are virtually impossible to do any other way. Educational simulations are based on an internal model of a real-world system or phenomena in which some elements have been simplified or omitted in order to facilitate learning. With such, students will have the chance to manipulate parameters and components as the case may be, while observing the consequent output. Hart (1993) pointed out that simulation may be used, in place of laboratory experiment, especially during the student's initial study of electronic circuits, or it can be used as a design tool in preparation for laboratory work. The author stressed further that, observing voltage and current from simulation accomplishes some of the same objectives as those of laboratory experience. Winn and Snyder, (1996); Duffy and Cunningham (1996) opined that the purpose of using simulation in education is to motivate the learner to engage in problem solving, hypothesis testing, experiential learning, schema construction, and development of mental models.

Electronics simulation software like **Mat**rix Laboratory (MATLAB) engages the user by integrating them into the learning experience. This kind of interactions actively engages learners to analyze, synthesize, organize, and evaluate content and result in learners constructing their own knowledge. Markov (2006) also observed that the use of circuit simulation software provides change in teacher's role from that of dispenser of information and adviser to that of facilitator and modeler. This provides technology-rich environment to motivate interest and enhance achievement of electronic learners. Xenophontos (1999) noted that MATLAB a high-level computer language and interactive environment for numerical computation, technical data analysis, programming, simulation and visualization, can be a valuable tool for teaching courses in technology. With MATLAB, data can be analyzed, algorithms developed, and models and applications created. It has language, tools and built-in mathematical functions which enable the exploration of multiple approaches to reach solutions

faster than with spreadsheets or traditional programming languages. According to Houcque (2005), the software can be used for a range of applications, including signal processing and communications, image and video processing, control systems, test and measurement computations among others. Using this package instead of the traditional electronic experiments can save time, save money and material, and enhance students' information, literacy and creative thinking skills.

SIMULINK is software imbedded in MATLAB- in particular, provides a block diagram tool for modeling and simulating dynamical systems, including signal processing, controls, communications, and other complex systems. The products of SIMULINK are used in a broad range of industries, including automotive, space technology, electronics, environmental, telecommunication, computer peripherals, finance and medical. SIMULINK also has a large collection of tool boxes for variety of applications. A tool box consists of functions that can be used to perform some computations in the toolbox domain. It can therefore be an invaluable tool for improving students' achievement in electronic technology courses. Instrument of lesson delivery is of great importance in achievement as observed by Lowman (2006) who stated that the methods and tools employed by a teacher to teach the lesson could influence students' learning interest as well as academic achievement.

Academic achievement denotes knowledge and skills attained by students in school or institution subjects or course designed by a score obtained in an achievement test. According to Olaitan, Ali, Eyo and Sowande (2000), academic achievement is always denoted by a score which represent the amount of learning acquired, knowledge gained or skills and competencies in the subjects. Achievement according to Anene (2005) also refers to a measure of the student's academic standing in relation to those of other students of his age. In other words, academic achievement usually denoted with scores is the learning outcomes of students which include knowledge and skills in a course of study such as electronic technology.

Students' achievement can be influenced by their gender. There are gender differences in learning in Science, Math, Engineering and Technology. Hanke (1991) in a gender study of computer science majors at Carnegie-Mellon University found that, overall, male students come equipped with much better computer skills than female students. This places male students with a considerable advantage in the classroom and could impact the confidence of female students. Osafehinti (1998) in a study aimed at finding out possible sex related differences in performance and attitude towards mathematics revealed that girls had lower achievement in

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mathematics and show greater hatred for the subject than their male counterparts. The boys showed greater interest and performed better in mathematics. Dambe (2000) showed that there was a significant difference in the number of male and female enrolled into mathematics and technical courses. Similarly, Uwameiye and Osunde (2005) reported that there is gender bias in college of Education (Technical) enrolment pattern in favour of the traditionally male dominated areas as computer studies, accountancy, and engineering programmes while courses such as secretarial studies and Home Economics are tagged feminine. Another study conducted by Kerlinger (1979) showed a pattern of achievement result in technical courses which indicated that girls were more successful than boys in Belgium, Thailand. Finland and Hungary but least so in France, Nigeria, Israel and Netherlands. Ogwo (1996) conducted a study on the effects of meta-learning instructional strategies on students' achievement in metal work technology and reported that male students had slightly higher mean scores than the females, which was not considered significant. The inconclusive nature of research findings on gender and achievement in technology makes it imperative to find out in the study of the new software; MATLAB and SIMULINK will bridge the gap.

It is hoped that the use of MA TLAB may help ease some of the difficulties students of electronics face due to the abstract nature of the subject and, complex mathematical models involved. The package can be used in creating a virtual lab or workshop to help students appreciate practical operations of phenomena they otherwise would have imagined. Various studies (Ahmet & Ahmet, 2008; Traynor, 2003; Aksin, 2006) have associated improved learning performance with the use of computer assisted systems and the claim that the quality of learning can be significantly enhanced when ICT is integrated with teaching motivated the need to embark on this study

**Statement of the Problem**

Development of modern society is highly linked to developments in electronic technology. Market economies have promoted the development of knowledge-based industries and enhance professional competition. The community is becoming increasingly demanding of professionals requiring them to not only have a solid theoretical foundation but also have a strong ability in practice.

Technical education through which electronics is taught at tertiary level supposed to equip recipients with practical and applied skills as well as basic scientific knowledge. Practical realisation of the theory is the

highest requirement for qualified personnel. Meanwhile teacher education supposed to encourage the spirit of enquiry and creativity, provide teachers with intellectual and professional background adequate for their assignment. They shall be regularly exposed to innovations in their profession and made adaptable to changing situations. University graduates of technical education are supposed to train technical college students to acquire skills to secure employment or be self-employed and employers of labour after graduation. Unfortunately, over the years, technical education institutions have been producing youths in their thousands that are not adequately empowered to contribute meaningfully to national development as such are not employable. The present situation of unemployment and poor work performance among technical and vocational education graduates in the country is an indication that the national objective of self-reliance has not yet been achieved. Various factors have been identified as being responsible for the low skill and poor performance of electronic graduates in particular. Inadequate supply of qualified teachers, dearth of facility and instructional materials, limitations of the existing methods of instruction among others have been identified as being part of the factors responsible for poor performance. The conventional methods of instruction like the lecture method. discussion method is no longer sufficient due to the rapid technological changes that demand shift in means of instrument delivery. Hence, the need to try other novel methods that can probably enhance students' achievement in electronic technology education.

**Research Questions**

The following research questions will be answered in the study:

1. What is the difference between the mean posttest scores of students taught electronic technology using MA TLAB and those taught with conventional methods?
2. What is the influence of gender on achievement of students when taught Electronic Technology using MA TLAB and conventional methods?

**Hypotheses**

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

$Ho_1$: There is no significant difference in the achievement scores of students taught electronic technology using MA TLAB and those taught using the traditional method.

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$Ho_1$: There is no significant difference in the achievement of male and female students in electronic technology.

**METHODOLOGY**

A quasi-experimental design was used for this study. Specifically, the pretest, posttest, nonequivalent control group design was adopted for this study (Gall, Gall, and Borg, 2007). This design is considered suitable for the study because intact classes non-randomized groups were studied. The study was conducted in Federal University of Technology (FUT), Minna and Kaduna Polytechnic (an affiliate of FUT Minna). The two tertiary institutions offer electronic technology education at degree level. These institutions are suitable for study because they have relevant equipment needed for the study, and they also share a common curriculum. The population for this study consists of all 254-year III students of electrical and electronic technology education comprising of 136 students from Federal University of Technology, Minna and 118 from Kaduna Polytechnic Kaduna. Students.

The instrument for data collection in this study is the Electronic Achievement Test (EAT). The test items were developed based on Year III Electronic Technology Education (Circuit Theory) course outline. It consists of 30 multiple choice test items with four options. The same questions were used as pretest and posttest items. The items were generated in line with the specific learning outcome of year III students. The achievement test was subjected to face validation by five experts, two from the Department of Industrial and Technology Education, FUT Minna, three from Department of Industrial Technical Education, University of Nigeria Nsukka. These experts reviewed the instruments and made suggestions. The content validation was carried out by checking that the instrument were in consonance with the topics and face validation involved checking the items of the instrument for logical sequence. Table of specification was also prepared for the test items. The construction of the test blue print was based on Electronic Technology curriculum and course specifications of the University that offered electronic technology education. Test re-test reliability technique was used to ascertain the reliability coefficient. The reliability coefficient of the ETEAT obtained was 0.78 using Pearson Product Moment Correlation Coefficient.

A one-week intensive training programme was organized for the teachers that used the MATLAB lesson plans. The teachers were given detailed explanation on the use of MATLAB instructional techniques and the other research expectation. The training exercise was based on the purpose of the study, the topic to be taught, the use of the lesson plans, the use of electronic technology instrument and general conduct of the study.

After the training of the teachers, a pre-test was given to the students before teaching begins. The teachers that used the conventional lesson plans were also briefed on the use of the lesson plans. Two instructional approaches were used for the study. MATLAB was used for teaching the experimental group while conventional lesson plan was used for the control group. Both groups completed a pretest before receiving the treatment under the same condition. After the pretest, the control group commence learning the material through the conventional classroom instruction, while MATLAB was used for the experimental group in each class meeting. Each group will receive an equal amount of instruction time. The duration of the study was six weeks. Experimental treatment was conducted for five weeks. The test items were reshuffled after the pre-test so that the pretest does not affect the posttest scores or interfere with the experimental treatment. The regular electronic technology teachers administered the pretest on their students in the two groups. After the pretest, treatment was administered to the subjects by their regular teachers also. At the end of the five weeks intensive teaching, posttest was administered to both the experimental and control groups. The posttest was administered, supervised, and graded by the teachers that taught the groups using the scoring guides developed by the researcher. The scores of the experimental and control groups in both pretest and posttest were recorded and compared to check if there is a difference in the achievement mean gain of the groups.

The data collected from the administration of pretest and posttest. was analyzed using mean to answer the research questions. The hypotheses formulated for the study was tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). Decision on answering the research questions was based on the mean gain score. If the mean gain score of the experimental group is greater than the mean gain score of the control group, it means that the treatment has effect. For the hypothesis, if the probability value (*p*), for the group obtained after data analysis was less than 0.05 alpha value at which it is being tested, it means that there is a significant effect of the treatment.

**Result**

Table 1: *Mean of Pre-test and Post-test Scores of Experimental and Control Groups in the Academic Achievement Test*

| Group | N | Pre-test | Post-test | Mean Gain |
|---|---|---|---|---|
| | | Mean | Mean | |
| MATLAB | 132 | 4.95 | 22.75 | 17.80 |
| LECTURE METHOD | 122 | 5.1 | 12.07 | 6.96 |

The data presented in Table 1 show that the MATLAB group had a mean score of 4.95 in the pre-test and a mean score of 22.75 in the post-test making a pretext, post-test mean gain in experimental group to be 17.80. The traditional group had a mean score of 5.11 in the pre-test and a post-test mean of 12.07 with a pre-test, post-test mean gain of 6.96. With this result, the students taught Electronic Technology using MATLAB with Simulink performed better in the achievement test than the students taught with traditional method. Hence, the use of MATLAB with Simulink is more effective than the traditional teaching method on students' achievement in Electronic Technology.

Table 2: *Mean of Pre-test and Post-test of Male and Female Students Taught* Electronic Technology *in the Achievement Test*

| | | MATLAB | | | | TRADITIONAL METHOD | | |
|---|---|---|---|---|---|---|---|---|
| Gender | N | Pre-test | Post-test | Mean Gain | N | Pre-test | Post-test | Mean Gain |
| | | Mean | Mean | | | Mean | Mean | |
| Male | 108 | 5.03 | 22.89 | 17.86 | 98 | 5.20 | 12.03 | 6.83 |
| Female | 24 | 4.71 | 22.13 | 17.42 | 24 | 4.75 | 12.25 | 7.50 |

Table 2 shows that male students taught Electronic Technology using MATLAB with Simulink had a mean score of 5.03 in the pre-test and a mean score of 22.89 in the post-test making a pre-test, post-test mean gain to be 17.86. Female students taught Electronic Technology using MATLAB with Simulink had a mean score of 4.71 in the pre-test and a post-test mean of 22.13 with a pre-test, post-test mean gain of 17.42. Male students taught with traditional method had a mean score of 5.20 in the pre-test and a mean score of 12.03 in the post-test making a pre-test, post-test mean gain in the male students taught with traditional method to be 6.83. Meanwhile, female students taught Electronic Technology with traditional method had a mean score of 4.75 in the pre-test and a post-test mean of 12.25 with a pre-test, post-test mean gain of 7.50. With these results male students taught Electronic Technology had higher mean gain scores than female students in the achievement test. Thus, there is an effect attributable to gender on the achievement of students taught Electronic Technology.

**Table 3**: *Summary of Analysis of Covariance (ANCOVA) for Test of Significance between the Mean Scores of Experimental and Control groups in the Achievement Test, Effects of Gender and Interaction Effect of Treatments*

| **Source** | **Type III Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
|---|---|---|---|---|---|
| Corrected model | 7277.727a | 4 | 1819.432 | 264.318 | .000 |
| Intercept | 3122.258 | 1 | 3122.258 | 453.586 | .000 |
| Pretest | 38.710 | 1 | 38.710 | 5.624 | .018 |
| **Group** | 4205.842 | 1 | 4205.842 | 611.004 | **.000** |

| | | | | | |
|---|---|---|---|---|---|
| **Gender** | .761 | 1 | .761 | .111 | **.740** |
| **Treatment * Gender** | 10.294 | 1 | 10.294 | 1.495 | **.223** |
| Error | 1713.990 | 249 | 6.883 | | |
| Total | 87868.000 | | 254 | | |
| Corrected total | 8991.717 | | 253 | | |

a. R Squared = .809 (Adjusted R Squared = .806)
b. Computed using alpha = .05

The data presented in Table 3 shows F-calculated values for mean scores of experimental and control groups in the achievement test and gender on students' achievement in Electronic Technology. The F-calculated value for Group is 611.004 with a significance of P at .000 which is less than .05. The null-hypothesis was therefore, rejected at .05 level of significance. This means that there is a significant difference in the achievement scores of those taught electronic technology using MATLAB and those taught using the traditional method. The F-calculated value for gender is .111 with a significance of F at .740 which is greater than .05. This result shows that there is no significant difference in the achievement of male and female students in electronic technology. The null-hypothesis is therefore accepted at .05 level of significance.

**Discussion**

The findings of the study revealed that the main effect of MATLAB with on students' achievement in Electronic Technology is higher than the main effect of Traditional method. At the same time, the main effect of MATLAB on students' achievement in Electronic Technology confirming that the difference between the main effect of MATLAB instructional technique and traditional method was statistically significant. The implication of this finding is that MATLAB technique (sound, video, graphics, collaboration, interactive, simulation) is more effective than traditional method in enhancing students' achievement in Electronic Technology. The findings that MATLAB instructional technique has positive effect on student's achievement is similar to the finding of Jimoyiannis and Komis (2001) who in their study found out that the adoption of Computer Simulation in the teaching of Florida physics students improved the student's achievement in physics than the students taught with traditional instructional method. A possible explanation for the effectiveness of the Computer Simulation instructional techniques is the students' active involvement in learning process using

simulation and interactive learning through frequent clarifying, probing and questioning as the students interacts in groups with the computer to predict the behaviour of the circuits.

The findings also revealed that male students had a higher mean score in the Electronic Technology achievement test than female students. At the same time, the main effects of gender (male and female) on students' achievement in Electronic Technology which confirmed that the difference between the achievement of male and female students in Electronic Technology was statistically significant favoring boys. The obvious implication of this finding is that there was an effect attributable to gender on achievement of students in Electronic Technology. This finding is similar to findings of several other studies that had been conducted on gender effects on achievement of male and female students in technology and other related fields. For instances, one of the important discoveries emerging from studies involving the effect of computer based instructional approach on academic achievement was the revelation of gender differences favouring boys. This also affirms Tabssum & Farooq (2011), Obinna (2012) and Mofeed (2005) that it has been documented that disparity exists between male and female students' performance in sciences and other related fields, and in some cases, boys had an edge over girls in academic achievement. Generally, boys were consistently found to perform better than girls on vocational and technical achievement tests suggesting that boys generally possess greater vocational and technical skills than girls. Male advantages in vocational and technical skills have been established in studies by Becker and Maunsaiyat (2004), where the trends of gender differences were found to be stable and consistent. Thus, in studies where differences in achievement were evident males typically had stronger vocational and technical skills than girls. The identified gender effect on achievement in Electronic Technology was responsible for the significant gender effect found on students' achievement in Electronic Technology. Thus, the superiority of male in vocational skills had responsible for their improved achievement in Electronic Technology

**Conclusion**

The need to find the best method to assist students in learning Electronic Technology and enhance their interest is paramount since interest is essential for achievement in Electronic Technology and engineering profession as a whole. The study therefore, set out to determine the MATLAB instructional technique on academic achievement of Electronic Technology students in Tertiary Institutions. The study adopted quasi-

experimental research design. Specifically, the study makes use of pre-test post-test non-equivalent control group design. This study has found out that MATLAB instructional technique is more effective in improving students' achievement in Electronic Technology than Traditional technique. Also, the study revealed that, there was an effect attributable to gender on students' achievement in Electronic Technology. It is hoped therefore, that if reflective inquiry instructional technique is taken into consideration in the teaching of Electronic Technology in Tertiary institutions, the students trained will graduate with Electronic Technology skills in graphic, and interactive skills which will make them adaptable to the present and envisaged changes in the electronics industries occasioned by technological advancement. Consequently, the students will be able to improve on their learning and pass their examinations with better grades, contribute their own quota to industrial development of this nation, and become employers of labour instead of hoping solely on paid employment. Based on the findings, it was recommended that Electronic Technology Lecturers should be trained on the use of MATLAB and the lecturers should always adopt the use of MATLAB instructional technique to teach Electronic Technology.

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