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Effects of Practical Instructional Guide and Teaching Naked Technique on Students' Achievement, Interest and Retention in Electronics Engineering Technology in Polytechnics in Rivers State

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Abstract - *Background: Skills to job performance are the hallmark of Practical Instructional Guide (PIG) and Teaching Naked Techniques (TNT). Purpose: This research study is focused on effects of Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) on students' achievement, interest and retention in electronics engineering technology in Polytechnics in Rivers State. Method: (1) Adoption of quasi-experimental research design where the researcher randomly assigned intact classes to groups. (2)Population for the study is 232 Electronics Engineering Technology students in the Polytechnics comprising ND II students of 2019/2020 academic session from two State owned Polytechnics in Rivers State namely: Captain ElechiAmadi Polytechnic, Rumuola in Obi-Akpor Local Government Area of Rivers State with 122 students and Ken SaroWiwa Polytechnic, Bori in Bori Local Government Area with 110 students. (3) No sampling because the population can be managed by the researcher. (4) Instruments for data collection were TNT and PIG lesson plans, Achievement Test (PIG & TNT) of 20 objective test questions, developed practical assessment guide of 35 items and an interest inventory of 20 questions which was content and face validated by three experts from the Department of Industrial Technical Education (Electrical/Electronics Technology option), University of Nigeria, Nsukka. (5) Reliability of the instrument was tested using cronbach alpha which has an overall value of 0.79. (6) Mean and standard deviation were used to answer research questions and ANOVA was used to test the formulated hypothesis by applying IBM SPSS version 20. Result: The results of this research support the propositions of instructional theories in the application of two practical instructional techniques with the selection of an appropriate delivery medium of instruction promotes learning. The ANOVA shows that there is no significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier and amplifier construction. Summary: From the study, it was observed that students learn better in practical when two practical instruction strategies are employed during teaching and learning process.*

Keywords *– Practical Instructional Guide; Teaching Naked Technique; Students' Achievement, Interest; Retention; Electronics Engineering Technology; and Polytechnics Education.*

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1. Research Background

Students' active participation in lessons, general attitude to studies, performance in examinations and eventual application of knowledge or skills to a job performance are the hallmark of Practical Instructional Guide (PIG) and Teaching Naked Techniques (TNT). Practical instructional guide is a self-tutored guide that provides information (like pictures and steps involved) about instructional format (American Technical Publisher, 2015). The use of practical instructional guide as 'hands on' activity in learning supports the development of practical skills, and help to shape students' understanding of concepts and phenomena through guiding and engaging students, helping them to develop important skills, understand the process of practical investigation, and develop their understanding of practical concepts in producing electronic articles (Etiubon and Udoh, 2017) leading to students' achievement, interest and retention that is also in consonance with Teaching Naked Technique (Okoro and Ekpo, 2016). It also, provides a practical blueprint towards understanding the theory, concepts, and strategies for analyzing learner needs; designing and implementing

systematic instruction; and conducting assessment in learning environments. Practical instructional guide emphasizes the iterative nature of design throughout the design and development process (Larson, 2013).

In addition, Teaching Naked Technique (TNT) supports the facilitation, simulation and recovery phases of the learners. Teaching Naked Technique (TNT) is a video practical guide of proven quick ideas for improving classes and essential information for designing anything from one lesson or a group of lessons to an entire course (Bowen, 2017). It helps higher education faculty in designing more effective and engaging classrooms by exposing the students to the material outside the class and placing the burden of learning on the learner, ensuring student's preparation, and freeing up class time for active engagement with the material for more effective learning and retention as well as bringing better learning to the classroom in form of practical guide (Bowen, 2006). Examining discipline-specific, and preparing for each class and presenting learning ideas step by step for better students' achievement in electronic engineering technology courses (Bowen, 2017).

Students' achievement in electronic engineering technology courses can be increased and improved upon by employing guided instruction and technology of videos showing how practical works are carried out(Bowen, 2017).

However, guided instruction, simple and new technologies can greatly increase students' engagement outside the classroom, prepare them for real discussions through providing content and assessment before class time and freeing the students from the need to "cover" the content in the classroom in other to achieve. Students' Achievement is the learning outcomes of the student which include: knowledge, skills and ideas acquired and retained through a course of study within and outside the classroom situations (Dunlosky, Rawson, Marsh, Nathan and Daniel, 2013). Students' achievement connotes performance in school subjects as symbolized by a score or mark on an achievement test (Adebayo, and Jimoh, 2015). Students learn best when they are interested, actively involved and appropriately challenged by their work. Teachers with good instructional strategies challenge students to work at higher intellectual level which helps to increase achievement scores, improves transfer, interest, and retention of learning (Li and Lam, 2017 and Oguz-Unver and Yurumezoglu, 2013).

Interest is an important factor in learning. It is viewed as the feeling that an individual has when the individual wants to know or learn more about courses such as electronics engineering technology (Hassan, 2016). Obodo (2014) contended that interest is the attraction which forces or compels a child to respond to a particular stimulus. In other words, a child develops interest if a particular stimulus (e.g. instructional strategy or school courses) is attractive, arousing and stimulating. This means that, interest is that internal state that influences the individual's personal actions and its related tasks (Hassan, 2016). Interest is an important variable in learning electronics engineering technology (Bayraktar, 2014). When students' interest in a course is low, they tend not to focus on the learning packages presented before them. But on the contrary when interest in a course is high, the students tend to retain much of the information or knowledge received resulting to retention.

Retention is a preservative factor of the mind (Cyril, 2016). The mind acquires the materials of knowledge through sensation and perception. These materials are preserved in the form of images for knowledge to develop and whenever a stimulating situation occurs, retained images are revived or reproduced to make memorization possible (Chianson, Kurumeh and Obida, 2011). According to Efe (2015) meaningful learning occurs when learners comprehend concepts and are able to connect them with previous knowledge by applying it to answering questions and resolving problems, and reflecting on their own learning and making adjustments accordingly to foster deeper learning. Deeper learning is the key strategy through which students find meaning and understanding from course materials and experiences resulting to interest and retention.

In addition, the level of retention is determined by the type of material used and the objectives of the lesson. Therefore, teachers major duty in any instructional setting is to determine the extent to which the objectives of the curriculum is been achieved. In order to do this, the teacher needs to measure the learners' degree of achievement in practical skills, attitudes, abilities, creativity, understanding, and knowledge in psycho productive skills. Psycho-productive skill is one of the three major educational domains contained in Polytechnic curricula objectives. The psychomotor objectives of the curriculum are activity-based and place emphasis on the measurement of processes and products (Okeme, 2015). As a result, developing psychomotor skills requires practice measured in terms of speed, precision, distance, procedures, or techniques in executing simple to more complex tasks. Samson and Godwin (2013) posited that the psychomotor aspect of electronics engineering technology content is meant to achieve adequate development in skills which can make the recipient employable through imitation (the learner goes through a period of trial and error to perform an act), manipulation (the learner continues to practice to attain some level of proficiency), precision (the learner continues to practice to attain the competency required), articulation (the learner attains higher level of competency to solve problems), and naturalization (the learner reaches a stage where response is automatic).

Acquiring practical skills in electronics engineering technology is a major part of Polytechnic education, which needed to be handled or taught properly; otherwise other related courses will be affected negatively. Practical skills may be either in the area of process evaluation or product evaluation (Essien, Akpan and Obot, 2015). Process assessment requires attentive and consistent teacher observation and rating of students' practical project; while product or outcome assessment involves the teacher objectively judging the quality of the finished product. This

implies that performance test using practical instructional guide and teaching naked technique involves assessing how students are working as well as the completed task (Moses, Medugu, Mohammed and Wafudu, 2017). Assessment without valid and reliable criteria could be subjective and bound to injustice or lack of acceptance. Learner's achievement in any educational programme is ascertained when the learner shows knowledge, skills, attitudes, ability, and intelligence acquired in the course of the study (Bukar, 2012).

Electronics Engineering Technology is one of the major options or special areas offered in Nigerian Polytechnics under the Department of Engineering Technology. According to Ogbu (2015) electronics engineering technology is a field of study that provides both theoretical and hands-on knowledge of current electronic devices and circuits. To carry out the construction these electronic devices and circuits, there is need to synergize technical institutions and industries through making practical work a well-established part of Polytechnics by employing practical instructional guide and teaching naked technique in teaching practical courses. Studies carried out by Abolarin (2017) shows that after many years of teaching electronics at the Polytechnics, there was lack of interest from the students and low long-term retention was observed in the second year students of the Electronic Engineering Technology in Polytechnic which he attributed to instructors using one practical method with rhetoric method (demonstration and lecture methods), storytelling with project method and the use of other passive learning instruction (lecture method) as against the use of two practical methods of instruction (PIG and TNT).

The course was perceived to be difficult and abstract (the students could not connect theory to practical life). This feedback prompted the search for a way to make the course user friendly with Polytechnics curriculum covering practical skill content up to 60% (National Board for Technical Education, 2004) which is to promote the production of skilled technical and professional personnel for the development and sustenance of the National Economy. However, it is within this premise that this research work sort to determine effects of practical instructional guide and Teaching Naked Technique (TNT) on students' achievement interest and retention in electronics engineering technology in Polytechnics in Rivers State.

2. Statement of the Problem

The success of any teaching and learning process which invariably influences students' achievement depends on the effectiveness and quality of the teacher which is often expressed in the teacher's knowledge of the subject matter and instructional strategies adopted. Ekperi (2018) reiterated that students cannot perform beyond the quality of their teachers and instructional strategies adopted, because Electronics Engineering Technology in Polytechnic Education is designed to cover more of practical than theory. Polytechnic education is practical oriented education which makes it unique in its content and approach thereby demanding special attention. Unfortunately, while Polytechnic education has continued to drive many countries, Nigeria is not paying much attention to this aspect of education. Consequently, the half-baked roadside mechanics cause more harm to vehicles when contracted. The shabby performance of Nigeria's house builders (masons/bricklayers) is no longer news. For that, individuals with important projects now use competent technicians from neighboring countries. Not to mention the harm poorly trained technicians have caused in the power sector because these technicians cannot assemble electronic components to produce an electronic article talk less of carrying minor repairs on electronic gadgets (Uwaifo, 2010), These poor statuses of skilled professionals are pointer to the fact that traditional instructional strategies such as: lecture, debate, discussion, recitation, and contract strategies of teaching electronics engineering technology in Polytechnics rarely produce skilled professionals that employers are in search of in the present world of work. These instructional strategies seem inadequate to address the challenges students face during practical works at their workplaces. Hence, many graduates are seen roaming the streets without job because their training is inadequate for societal needs (Oviawe, Ezeji and Uwameiye, 2015). However, in spite of research findings on the effectiveness of practical instructional guide and Teaching Naked Technique (TNT) in other subject areas, studies are not found for Electronics Engineering Technology in Nigerian Polytechnics. Therefore, it is within this premise that the research work tends to find out effects of practical instructional guide and Teaching Naked Technique (TNT) on students' achievement, interest and retention in electronics engineering technology in Polytechnics in Rivers State. Specifically, the study will determine the effect of:

1. Mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier construction; and

3. Research Questions

The following research questions were formulated to guide the study.

1. What are the mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier construction?
2. What are the mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction?

4. Hypotheses

The following hypotheses will be tested at 0.05 level of significance:

Ho_1: There is no significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifiers' construction.

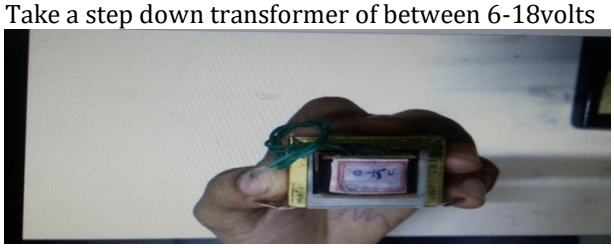
Ho_2: There is no significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction.

5 .Rectifier (AC/DC Converter)

Every electrical and electronic device that is used in our day-to-day life will require a power supply. Rectifiers have many uses, but are often found serving as components of DC power supplies and high-voltage direct current power transmission systems. Rectification may serve in roles other than to generate direct current for use as a source of power. Many applications of rectifiers, such as power supplies for radio, television and computer equipment, require a steady constant DC current (as would be produced by a battery). In these applications the output of the rectifier is smoothed by an electronic filter (usually a capacitor) to produce a steady direct current. The primary application of rectifiers is to derive DC power from an AC supply (AC to DC converter). Virtually all electronic devices require DC, so rectifiers are used inside the power supplies of virtually all electronic equipment (Cartwright and Kaminsky, 2017).

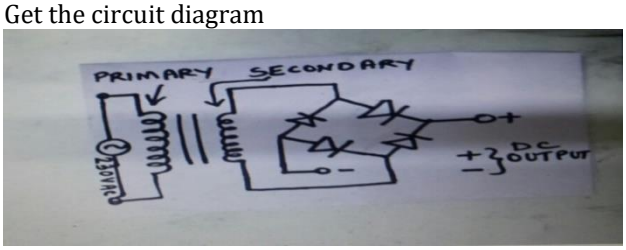
Rectifiers can be built up from 4 discrete rectifying diodes, rather than using a rectifier bridge package. The diodes will be marked to show a positive (cathode) end and a negative (anode) end. Connect the 4 diodes into a loop. Connect the cathode of diode 1 to the cathode of diode 2. Connect the anode of diode 2 to the cathode of diode 3. Connect the anode of diode 3 to the anode of diode 4. Connect the cathode of diode 4 to the anode of diode 1.Steps involved in a full wave rectifier according to Electronic Hub (2015) are:

- Gather the tools required such as soldering iron of 25/35 watts, wire stripper, and multimeter.
- Take a step down transformer of between 6-18volts



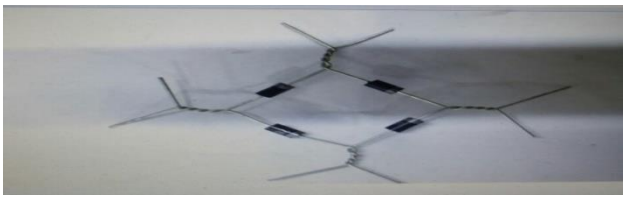
- Take 4 pieces of 1N4007 rectifier diodes

- Get the circuit diagram

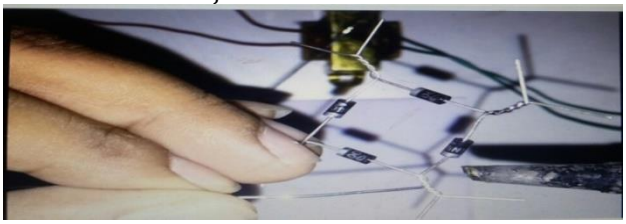


- Arrange the diodes in this manner, the silver ring side terminal is the cathode and the other side is the anode.

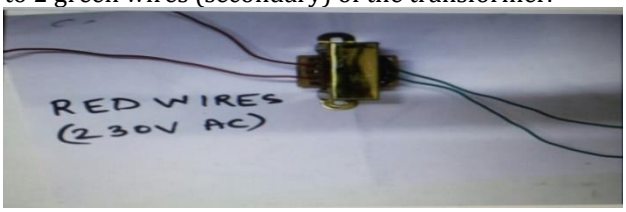
- Twist the leads of the diodes to make a temporary connection



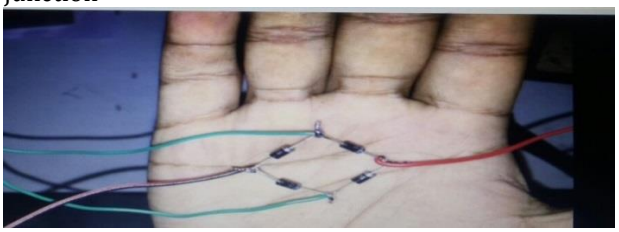
- Solder all the four junctions of the diodes



- Connect each to the anode and cathode of the diodes to 2 green wires (secondary) of the transformer.



- Solder a piece of red wire to the cathode-cathode junction of the diode and black wire to anode-anode junction



- Place the components on a zero PCB

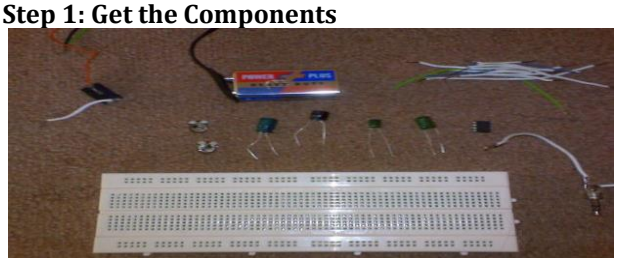
- Test with multimeter

6. Mini Amplifier

Nowadays, amplifiers are very useful in human life, especially in entertainment field and educational field. To make good use of amplifiers, good-qualified amplifiers are necessary. The term amplifier is very generic. Amplifiers are electronic devices that boost or strengthen an input signal, in other words, they provide amplification (Oti and Ahanonu, 2015). The nature of the signal could be of any type such as voltage, current or power of a circuit. In general, the purpose of an amplifier is to take an input signal and increase its amplitude.

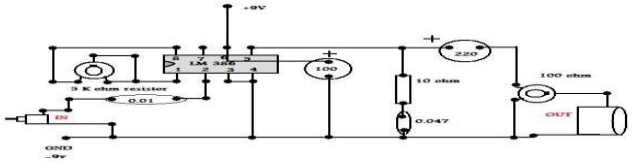
Amplifiers get the necessary energy for amplification of input signals from the alternating current wall outlet to which they are plugged into. However, in the real world no amplifier is 100% efficient, so some of the energy from the wall outlet is wasted. The vast majority of energy wasted by an amplifier shows up in the form of heat. Heat is one of the biggest enemies to electronic equipment, so it is important to ensure adequate air flow around equipment. Many amplifiers have a number of features to help monitor the status of the amplifier and also to protect speakers in the event of an overload condition. Some features include power meters, clipping indicators, thermal overload shutdown, over current protection, etc. Features vary from manufacturer to manufacturer. In addition, there are many variations in how protection circuits are implemented and how much "safety margin" they allow (Robert, 2013). Amplifiers are generally specified as highly efficient due to the fact that these amplifiers conduct only during the presence of an input signal and thus only the input signals are actually boosted. According to Electronic Hub (2015); steps involved in the construction of a mini amplifier are:

Step 1: Get the Components

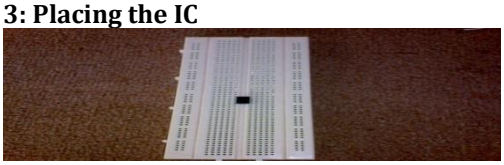


The following components will be needed:LM 386 semiconductor (IC), 100 micro Farad capacitor, 220 micro Farad capacitor, 10 ohm resistor, 5 kilo ohm variable resistor, 100 ohm variable resistor, 0.01 capacitor, 0.047 capacitor, Wires, 9V Battery and clip, 3.5mm stereo jack male and female, and Project board.

Step 2: Circuit Diagram

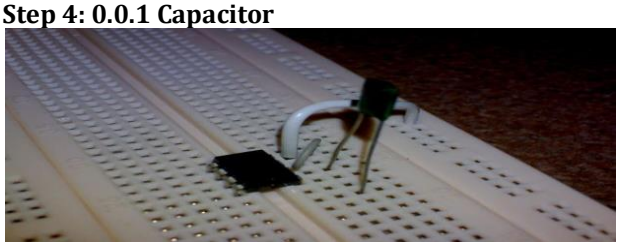


Step 3: Placing the IC



- Place the LM 386 in the project board as show in the image.
- If you pick the IC in front of you (so you can read what is written on it) then the lower left pin is 1 and the pin number increase anticlockwise.
- Take a wire and join the 3rd pin to 4th pin (GND pin).

Step 4: 0.0.1 Capacitor



- Join the one pin of 0.01 capacitor with the 2nd pin of IC.
- The other pin of the capacitor should be joined with the INPUT.

Step 5: GAIN Controller

- Now join the 1st pin of IC with the A pin of the 5 k ohm variable resistor.
- Join the A pin of this variable resistor with the C pin.
- Lastly join the 8th pin of IC with the B of this variable resistor. This becomes the GAIN

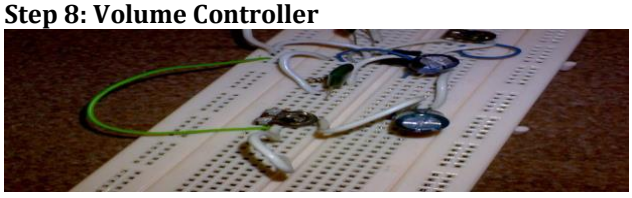
Step 6: 100 Micro Farad Capacitor

- Join the +ve side of the 100 micro Farad capacitor with 6th pin of the IC.
- The -ve of this capacitor should be joined with GND pin (4th pin of IC).

Step 7: 10 Ohm Resistor &0.047 Capacitor

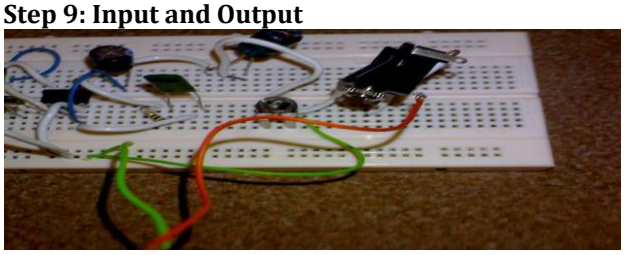
- Join the 5th pin of IC with one side of 10 ohm resistor; the other side of the resistor should be joined with the one pin of 0.047 capacitor.
- The second pin of the capacitor should be joined with the GND pin (4th pin of IC).

Step 8: Volume Controller



- Now again join the 5th pin of the IC with the +ve side of 220 micro farad, the -ve side of the pin should be attached with the A of the 100 ohm variable resistor.
- The B pin of the variable resistor should be connected to the GND pin (4th pin of IC), which becomes the Volume controller.

Step 9: Input and Output



- Join the +ve pin of the 3.5mm stereo jack female with the C of the 100 ohm variable resistor. And the GND of the female jack should be attached with the GND of the IC (4th pin of IC).
- Join the +ve of the 3.5 mm stereo jack male with the other side of the 0.01 capacitor and join the GND of the male jack with the GND of the IC

Step 10: Testing

- Lastly join the +Ve of 9V battery with the 6th pin of IC and -Ve of the battery with the pin of IC.
- Join the male jack with your mp3 player or musical instrument and female with the speakers.
- Now adjust the Volume and Gain to get the best and loudest possible sound.

7. Research Method

The study adopted a quasi-experimental research design. Therefore, intact or pre-existing groups are used. The researcher randomly assigned intact classes to groups. The study was carried out in the two Polytechnics that offer Electronics Engineering Technology in Rivers State Nigeria. These include: Ken Sarowiwa Polytechnic, Bori in Bori Local Government Area, and Captain Elechi Amadi Polytechnic, Rumuola in Obi-Akpor Local Government Area of Rivers State. The population for the study is 232Electronics Engineering Technology students comprising ND II students of 2019/2020 academic session. There was no sampling because the population can be managed by the researcher. The instruments for data collection were TNT and PIG lesson plans, Achievement Test (PIG & TNT) of 20 objective test questions covering the following areas: 10 objectives questions generated each from rectifiers and amplifier construction respectively. Developed practical assessment guide of 35items and an interest inventory of 20questions to evaluate the students' interest in the same areas. The interest inventory was administered to the students at the end of the entire lesson and the lecturers used the developed practical assessment guide in scoring the students. All were based on a five point Likert scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD)with the corresponding values of 5, 4, 3, 2, and 1 respectively. The content and face validity of the instruments by three experts from the Department of Industrial Technical Education (Electronic Technology option), University of Nigeria, Nsukka. The reliability of the instrument was established using the Cronbach Alpha (α) reliability coefficient. The Cronbach Alpha was used to test the internal consistency of the instrument. The Cronbach Alpha was used because the item scores take on a range of value. The instrument was administered on 41 ND II students of 2019/2020 academic session of Imo State Polytechnic Umuagwo after instructional delivery. The reliability of the scores obtained was tested using Cronbach alpha reliability estimate by applying software package for social sciences of version 20. 10 objectives questions generated from lessons on rectifiers, developed practical assessment guide of 35 items and an interest inventory of 20 questions is 0.85; and 10 objectives questions generated from amplifier, developed practical assessment guide of 35 items and an interest inventory of 20 questions is 0.72;. The reliability for the whole instrument is 0.79. the experimental procedure involve the researcher prepared two sets of lesson plans (five each on PIG and TNT) for teaching of the two Electronics Engineering Technology topics from Electronic/Telecommunication courses (Electronics 1, 11, and 111) selected for the study. Each contact lasted for 2 hours, which span for over a period of four weeks. One set of the lesson plans was prepared based on Teaching Naked Technique and was used by the course lecturer to teach experimental group A throughout all the stages of the treatment period. The other set of the lesson plans were prepared based on Practical Instructional Guide

used by the lecturer to teach experimental group B throughout all the stages of the treatment period. The researcher with the aid of regular lecturers assisted during the instructional delivery which lasted for four weeks. Data was collected over a four week period, through TNT and PIG. The mean scores and standard deviation were used to answer research questions generated from the 20 multiple choice questions, 20 interest inventory items and 35 developed practical assessment guide. ANOVA was used to test the formulated hypothesis at 0.05 level of significance by applying software package for social sciences of version 20.

8. Results

8.1 Research Question 1

What are the mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier construction? Data in relation to research question 1 is collated and presented in table 1.

Table 1. Mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier construction.

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
ASSESSMENT	35	2.88	4.57	142.70	4.0771	.40079
INTEREST	20	3.41	4.37	76.85	3.8425	.26762
RECTIFIERS	232	2.00	10.00	1579.00	6.8060	1.37742
Valid N (listwise)	20					

Source: (Field Survey, 2020)

Table 2. Mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
ASSESSMENT	35	2.88	4.57	142.70	4.0771	.40079
INTEREST	20	3.41	4.37	76.85	3.8425	.26762
AMPLIFIER	232	4.00	10.00	1740.00	7.5000	1.13961
Valid N (list wise)	20					

Source: (Field Survey, 2020)

Table 3. ANOVA Tests of mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifiers' construction

Variables	Sum of Squares	df	Mean Square	F	Sig.	Decision
Between Groups	352.815	2	176.408	112.560	.000	H_o Rejected
Within Groups	445.094	284	1.567			
Total	797.909	286				

Source: (Field Survey, 2020)

Table 4 ANOVA test of mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction

Variables	Sum of Squares	df	Mean Square	F	Sig.	Decision
Between Groups	547.884	2	273.942	253.566	.000	H_o Rejected
Within Groups	306.822	284	1.080			
Total	854.706	286				

Source: (Field Survey, 2020)

Data from Table 1, the mean scores for achievement, interest, and assessment are 6.81, 3.84 and 4.08 with their respective standard deviations of 1.38, 0.27, and 0.40 respectively for ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifier construction. This shows that the ND 11 students of electronics engineering technology in Polytechnics taught with this two instructional techniques performance was high.

8.2 Research Question 2

What are the mean achievement, interest and assessment scores of ND 11 students those taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction? Data in relation to research question 2 is collated and presented in Table 2.

Data from Table 2, the mean scores for achievement, interest, and assessment are 7.5, 3.84 and 4.08 with their respective standard deviations of 1.14, 0.27, and 0.40 respectively for ND 11 students those taught with Practical

Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction. This shows that the ND 11 students of electronics engineering technology in Polytechnics taught with this two instructional techniques performance was high.

8.3 Hypothesis 1

There is no significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifiers' construction. The ANOVA test of this hypothesis 1 is presented in Table 3.

Table 3 shows that the significant level of 0.000 is less than the threshold value of 0.05, thus rejecting the null hypothesis. This indicates that there is significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifiers' construction.

8.4 Hypothesis 2

There is no significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on portable USB charger construction. The ANOVA test of this hypothesis 2 is presented in table 4.

From Table 4, it shows that the significant level of 0.000 is less than the threshold value of 0.05, thus rejecting the null hypothesis. This shows that there is significant difference in the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction.

9. Findings of the study

The findings of the study were:

1. The reliability for the whole instrument is 0.81. This value is high showing that the instrument is reliable for the study by using Cronbach alpha reliability estimate by applying software package for social sciences of version 20.
2. There is significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on rectifiers' construction.
3. There is significant difference between the mean achievement, interest and assessment scores of ND 11 students taught with Practical Instructional Guide (PIG) and those taught with Teaching Naked Technique (TNT) on amplifier construction.

10. Discussion of the Findings

The results shown in Table 1 and 3 are the descriptive and ANOVA statistics of students' achievement, interest, and assessment scores on rectifier construction. The results showed that there was linearity and significant difference on the mean, standard deviation and ANOVA scores on achievement (X=6.82 and Std=1.38), assessment (X=4.01 and Std=0.27), interest (3.84 and Std=0.4) and ANOVA (0.000) of ND 11 students taught with Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) on rectifier construction.

The results shown in Table 2 and 4 are the descriptive and ANOVA statistics of students' achievement, interest, and assessment scores on amplifier construction. The results showed that there was linearity and significant difference on the mean, standard deviation and ANOVA scores on achievement (X=7.5 and Std=1.14), assessment (X=4.01 and Std=0.27), interest (3.84 and Std=0.4) and ANOVA (0.000) of ND 11 students taught with Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) on amplifier construction.

These findings support the propositions of instructional theories in the application of two practical instructional techniques with an appropriate delivery medium of instruction promotes learning. This is in line with [20] indicated that students' exhibit a high level of interest in solving practical concepts through the application of practical instructional guide and teaching naked technique and have posited the use of technology as a gate way to students' inquiry-based scientific investigations. Instructional activities are presented either in linear or branching method which uses videos and graphs; create proficiency, and gives students a sense of control over learning. Fletcher (1990) supporting the states that people remember 20% of what they hear, 40% of what they see and hear and 75% of what they see, hear and do which enhances students' interaction with the learning environment and in turn help sustain students' interest in learning and consequently improve students' achievement, retention and interest of learning.

11. Conclusion and Suggestions

Regarding the instructional techniques employed, mean and standard deviation scores of the students taught with Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) in the achievement, interest and assessment shows that the respondents are in tune with the adoption of two practical instructional techniques in teaching electronics engineering technology courses in polytechnics in Rivers State. Results of the statistical analysis of ANOVA showed a significant difference in favour of the students taught with Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT). In conclusion, the combination two practical Instructional techniques have a significant positive effect on students' achievement, interest and retention in electronics engineering technology in Polytechnics in Rivers State. Thus Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) Instructional techniques are more effective in helping students to learn electronics engineering technology

courses than the lecture, debate, discussion, recitation, and contract techniques. The following suggestions were made at the end of the study.

1. Polytechnic lecturers should be encouraged to employ Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) Instructional techniques in delivering their lessons, since it enhances academic achievement, interest and retention of students.
2. Curriculum planners should include the use of Practical Instructional Guide (PIG) and Teaching Naked Technique (TNT) Instructional techniques in the electronics engineering technology curriculum considering its benefits in the teaching and learning of electronics engineering technology courses.

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