

STRATEGIES FOR ASSESSING STUDENTS' PERFORMANCE IN ELECTRICAL INSTALLATION AND MAINTENANCE WORKS TRADE IN TECHNICAL COLLEGES IN ADAMAWA STATE, NIGERIA

BY

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Abstract

The purpose of this study was to assess teachers' perception of strategies considered effective for assessing students while delivering both theoretical and practical components of electrical installation and maintenance works (EIM) trade in technical colleges in Adamawa State, Nigeria. The study guided by three research questions and three null hypotheses was conducted in three technical colleges in Adamawa State using descriptive survey research design. The population of the study was 42 teachers which comprised of 17 administrators (principals) and 25 technical teachers of EIM trade in technical colleges in Adamawa State. The entire population was used because it was manageable as such there was no sample and sampling technique. A 32 item structured questionnaire named: Strategies Considered Effective for Assessing Students of Electrical Installation and Maintenance Works Trade Questionnaire (SEASEIMQ) developed, validated by three experts from department of Electrical Technology Education Modibbo Adama University of Technology Yola. The instrument was trial tested on 10 respondents from Federal Science and Technical College Jalingo, Taraba State and reliability coefficient of 0.70 was obtained from the instrument using Cronbach Alpha reliability method. Data collected for the study was analysed using Microsoft Excel. Mean statistics was used to answer the three research questions while z-test of difference between two means was used to test the three null hypotheses at 0.05 level of significance. Findings of the study revealed among others that individualised assignments, home works, individualised project and use of standardized tests were considered effective for assessing theoretical components of EIM trade in technical colleges in Adamawa State. It was concluded that assignments, projects, and process and product rating of students using checklists/rating scales are the most effective strategies for assessing students while delivering both theoretical and practical components of EIM trade in technical colleges in Adamawa State. Hence, EIM teachers should adhere to these strategies for effective delivery of electrical installation and maintenance works trade components in technical colleges in Adamawa State.

Keywords: Assessment, Strategies, Effective, Delivery, Electrical Installation

Introduction

Feedback is an important aspect of learning in education. Feedback can be in the form of advice, criticism or information about how good or useful a given task was carried out especially from students (Hornby, 2006). A learner cannot be said to have learnt until there is a process of assessing whether the skill has been acquired or not. Learning outcomes include the cognitive, the affective and the psychomotor, but most often the cognitive aspects are assessed (Olaitan, and

Ali, 2000). Many activities in science and technology involve application of manual dexterity and therefore call for assessment of practical skills acquisition to ensure that learning has taken place (Mager, 1997). In the same vein, Ningi (2001) postulated that, assessment of teaching and learning processes in technical and vocational education is still conducted using traditional way without injecting new approaches by teachers which is actually depriving the students from learning the right skills needed for self-employment.

Theoretical and practical components of electrical installation and maintenance works trade (IEM) are usually difficult to assess because they are not paper and pencil test. The best method to assess these components is by observation. The teacher makes a rating scale, which includes attitudes like cooperation with fellow students, observation of safety precautions, obedience to instructions, and selection and care of hand tools (Shehu, 2007). Shehu further explained that in psychomotor domain, learning objectives should be based on muscular or muscle skills, manipulation of materials and neuromuscular coordination. In a sense, the psychomotor domain lends itself readily to acquisition of practical skills which needs a unique measuring or assessment instrument.

Assessment aspect in education and vocational and technology education have all been ascribed to a number of instruments to be used for assessing information about students' acquisition of practical skills (Yalams 2001, Okoro 2002, Shehu 2007, Moses, 2009 and Moses, Medugu, Mohammed and Wafudu 2017). Rating scales resemble the checklist but are used when finer discrimination is needed. Instead of just indicating the presence or absence of a trait, a rating scale enables the assessor to indicate the status or quality of what has being rated (Moses, Medugu, Mohammed and Wafudu 2017). The rating scale provides systematic procedure for obtaining, recording and reporting the observer's judgement. The rating scale may be filled out while the observation is being made or immediately after the observations are made (Okoro, 2002). There are several types of scaling used in typical rating technique among which includes: numerical, graphical, cooperative, paired comparison ranking rating scale.

Ranking is a type of scaling used in typical rating technique. In this technique the raters, rather than assigning a numerical value to each student with regard to the characteristic, ranks a given set of individuals from high to low on the characteristic being rated. Although ranking simplify tasks for assessor, the ranking method becomes very cumbersome when large number of students or characteristics are to be ranked. In addition, the serial position of trait(s), the characteristic(s) or behaviour(s) to be ranked affects the ranking such that those traits appearing early tend to be ranked higher. In this regard, Wagner and Hoover (1994) asserted that in trying to rank too many trait and/or persons would make the task cumbersome that the validity and reliability of the assessment could be affected.

Teachers are pertinent to the delivery of instruction in any institution and teachers' perception of strategies considered effective for assessing students of electrical installation and maintenance works in technical colleges. It is therefore clear that fundamental assessment tools used during the delivery of both theoretical and practical components of electrical installation and maintenance works (EIM) trade in technical colleges in Adamawa State are rarely incorporated hence, making the learning of these components difficult to assess as well as creating a gap which the present study intends to fill. Specifically, the study sought to determine:

1. Instructional strategies mostly adopted by teachers in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State.
2. Strategies used in assessing students' performance in theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State.

3. Strategies used in assessing students' performance in practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State

Research Questions

The following research questions were formulated to guide the study:

1. What are the instructional strategies mostly adopted in teaching electrical installation and maintenance work trade in technical colleges in Adamawa State?
2. What are the strategies used in assessing students' performance in theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State?
3. What are the strategies used in assessing students' performance in practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H₀₁: There is no significant difference between the mean response of teachers and administrators on instructional strategies mostly adopted in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State.

H₀₂: There is no significant difference between the mean response of teachers and administrators on strategies used in assessing students' performance in theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State.

H₀₃: There is no significant difference between the mean response of teachers and administrators on strategies used in assessing students' performance in practical components of electrical installation and

maintenance works trade in technical colleges in Adamawa State.

Methodology

The study adopted descriptive survey research design, descriptive survey is used in a situation where questionnaire is use to determine opinions, preferences, attitudes or feeling and perceptions of people about an issue. The population of the study was 42teachers, which comprised of 17 school administrators (principals) and 25 EIM trade teachers in the three technical colleges in Adamawa State, Nigeria. The entire population was used for the study hence, there was no sampling. A structured questionnaire named: Strategies Considered Effective for Assessing Students of Electrical Installation and Maintenance Works Trade Questionnaire (SEASEIMQ) developed by the researchers, was used for data collection. The SEASEIMQ was divided into four sections. Section A was designed to solicit demographic information about the respondents, while, section B was concerned with the instructional strategies mostly adopted by teachers in teaching electrical installation and maintenance works trade components in technical colleges in Adamawa State. Section C of the instrument dealt with perceptions of teachers and school administrators on the strategies considered effective for assessing the theoretical components of the electrical installation and maintenance works trade in technical colleges Adamawa State. Section D was to find out response of teachers and school administrators on the strategies for assessing practical components of EIM trade in technical colleges in Adamawa State. The 32-item structured questionnaire (SEASEIMQ) was validated by three experts from the Department of Electrical Technology Education, Modibbo Adama University of Technology, Yola. The validated instrument

was trial tested on 10 respondents from Federal Science and Technical College Jalingo, Taraba State. The reliability of the instrument was found to be 0.70 using Cronbach Alpha reliability method. The researchers with the help of three research assistants administered and collected data for

the study. Data collected for the study was analysed using Microsoft Excel and mean statistic was used to answer the three research questions while the z-test was used to test the three null hypotheses at 0.05 level of significance.

Results

Research Question One

What are teachers' perceptions on instructional strategies mostly adopted in teaching electrical installation and maintenance work trade in technical colleges in Adamawa State?

Table 1: Mean Response of Teachers and School Administrators on Instructional Strategies Mostly Adopted by Teachers for Teaching EIM Trade in Technical Colleges in Adamawa State

S/No	Items	$N_A = 17, N_T = 25, N_R = 42$			I_A	I_T	I_G	SD	Remarks
1.	Demonstration	3.82	3.96	4.00	0.41				Mostly Adopted
2.	Discussion	3.88	3.68	3.85	0.44				Mostly Adopted
3.	Project	3.29	2.56	2.92	0.23				Adopted
4.	Field-Trip	3.12	2.56	2.90	0.20				Adopted
5.	Enquiry	3.00	3.28	3.24	0.21				Adopted
6.	Discovery	2.76	2.68	2.78	0.19				Adopted
7.	Close Circuit Television	2.53	2.68	2.68	0.18				Adopted
8.	Problem Solving	3.59	3.36	3.53	0.36				Mostly Adopted
9.	Practice and Drill	3.47	3.36	3.48	0.40				Adopted
10.	Assignment	3.71	3.56	3.70	0.38				Mostly Adopted
11.	Lecture	2.76	3.52	3.30	0.27				Adopted
12.	Expository	3.12	3.04	3.14	0.26				Adopted
Grand Mean:				3.29					Adopted

Key: I_A = Mean response of administrators, I_T = Mean response of teachers, I_G = Grand mean, SD = Standard Deviation, N_A = Number of Administrators, N_T = Number of teachers, N_R = Number of Respondents

Table 1 showed that administrators viewed four items as mostly adopted and eight items as adopted. Teachers on their part perceived four items mostly adopted and eight items adopted. Looking at the grand mean of respondents, four items (1, 2, 3 and 10) were seen as mostly adopted. The remaining eight items were perceived as adopted.

Research Question Two

What are the strategies used in assessing students' performance in theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State?

Administrators and teachers both agreed that four items (Demonstration Discussion, Problem Solving and Assignment strategies) are mostly adopted instructional strategies by teachers in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State.

S/No	Items	N _A = 17,	N _T = 25,	N _R = 42	$\bar{X}_A$, SD	$\bar{X}_T$, SD	$\bar{X}_R$, SD	Remarks
13.	Giving different assignment to each student at the lessons	3.76	4.00	4.00	0.41	0.41	0.41	HE
14.	Allowing students to participate in assignment	3.71	4.08	4.03	0.40	0.40	0.40	HE
15.	Giving project work to students every week	3.71	3.24	3.51	0.25	0.25	0.25	HE
16.	Giving oral examinations to students at the of every lesson	3.24	3.00	3.17	0.18	0.18	0.18	ME
17.	Measuring students' ability with standardize test every week	4.06	3.36	3.63	0.32	0.32	0.32	HE
18.	Administering written examination to students every four weeks	3.41	3.88	3.90	0.37	0.37	0.37	HE
19.	Using practical work to evaluate students achievement in the class	4.29	4.08	4.17	0.47	0.47	0.47	HE
20.	Interviewing and rating each student on the topic of the lesson	3.41	3.12	3.31	0.29	0.29	0.29	ME
21.	Giving home work to students every week	4.29	3.92	4.16	0.41	0.41	0.41	HE
22.	Giving different test to each student weekly	2.59	2.96	2.88	0.17	0.17	0.17	ME
23.	Grand Mean				3.68	3.68	3.68	ME

Table 2 showed that school administrators and technical teachers agreed on 7 items (13, 14, 15, 17, 18, 19 and 21) as highly effective strategies for assessing students' theoretical skills in electrical installation and maintenance works trade in technical colleges in Adamawa State. The grand mean of the two respondents (3.68) indicated that the

Research Question Three

What are the strategies used in assessing students' performance in practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State?

S/No	Items	N _A = 17,	N _T = 25,	N _R = 42	SD	Remarks
24.	Using checklist to assess students during practical	3.59	3.60	3.68	0.29	HE
25.	Using psycho-productive test to measure students' ability	3.41	3.32	3.44	0.30	HE
26.	Rating each student immediately after practical work	3.71	3.36	3.58	0.27	HE
27.	Giving project work to students every two weeks	3.24	3.32	3.36	0.23	ME
28.	Using rating scale to assess students after practical work	3.94	3.36	3.68	0.33	HE
29.	Awarding marks to students' practical achievement	4.41	3.44	3.92	0.45	HE
30.	Assessing students during practical using observation scale	4.24	3.68	3.99	0.37	HE

31.	Assessing students based on overall practical experience	4.12	3.48	3.82	0.35	ME
32.	Giving oral examination to students at the practical work	3.41	3.28	3.41	0.33	HE
33.	Measuring students' ability every four weeks	3.82	3.64	3.80	0.35	ME
34.	Grand Mean				3.67	HE

Key: $\bar{x}_A$ = Mean response of administrators, $\bar{x}_T$ = Mean response of teachers, $\bar{x}_G$ = Grand mean, $s_{\bar{x}}$ = Standard Deviation, N_A = Number of Administrators, N_T = Number of teachers, N_R = Number of Respondents, HE = Highly Effective, ME = Moderately Effective

Table 3 showed that the respondents agreed on seven (23, 25, 27, 28, 29, 30 and 32) items as highly effective strategies for assessing students' practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State. Similarly, three items, (24, 26 and 31) were seen to be moderately effective strategies.

Hypothesis One

There is no significant difference between the mean response of teachers and administrators on instructional strategies mostly adopted in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State.

Table 4: z-test Analysis of Responses of Teachers and School Administrators on Instructional Strategies Mostly Adopted in Teaching EIM Trade in Technical Colleges in Adamawa State

Category	$\bar{x}$	N	SD	z-Cal.	z-Crit.	Remark
Administrators	3.25	17	0.20	0.33	± 1.96	Accepted
Teachers	3.19	25	0.22			

Key: $\bar{x}$ = Mean, N = Number of respondents SD = Standard Deviation, z-Cal. = Calculated z-value, z-Crit. = Critical z-value

Data presented in Table 4 showed that the z-Cal. (0.33) was less than the z-Crit. (± 1.96) hence, the null hypothesis one was accepted implying that, there was no significant difference between the mean response of teachers and administrators on instructional strategies mostly adopted in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State.

Hypothesis Two

There is no significant difference between the mean response of teachers and administrators on strategies used in assessing students' performance in theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State

Table 5: z-test Analysis of Responses of Teachers and School Administrators on Strategies used in Assessing Theoretical Components of EIM Trade in Technical Colleges in Adamawa State

Category	$\bar{x}$	N	SD	z-Cal.	z-Crit.	Remark
Administrators	3.65	17	0.23	0.45	± 1.96	Accepted
Teachers	3.55	25	0.21			

Key: $\bar{x}$ = Mean, N= Number of respondents SD = Standard Deviation, z-Cal. = Calculated z-value, z-Crit. = Critical z-value

Data presented in Table 5 revealed that z-Cal.(0.45) was less than the z-Crit. (± 1.96); hence, the null hypothesis two was accepted meaning, there was no significant difference between the mean response of teachers and school administrators on strategies used in assessing theoretical components of electrical installation and maintenance works trade-in technical colleges in Adamawa State.

Hypothesis Three

There is no significant difference between the mean response of teachers and administrators on strategies used in assessing students' performance in practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State.

Table 6: z-test Analysis of Responses of Teachers and School Administrators on Strategies used in Assessing Theoretical Components of EIM Trade in Technical Colleges in Adamawa State

Category	$\bar{x}$	N	SD	z-Cal.	z-Crit.	Remark
Administrators	3.79	17	0.15	2.59	± 1.96	Rejected
Teachers	3.45	25	0.02			

Key: $\bar{x}$ = Mean, N= Number of respondents SD = Standard Deviation, z-Cal. = Calculated z-value, z-Crit. = Critical z-value

Data presented in Table 6 showed that z-Cal. (2.59) was greater than the Z-Crit. (± 1.96); hence, the null hypothesis three was rejected implying that there exist a significant difference between the mean response of teachers and school administrators on strategies used in assessing practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State

Findings of the Study

Based on the results obtained from the analyzed data, the following findings were made about teachers' perception on assessment strategies used in the delivery of electrical installation and maintenance works trade in technical colleges in Adamawa State.

1. Instructional strategies mostly adopted in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State include demonstration, discussion, problem solving and assignment.
2. Strategies used in assessing theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State include: individualised assignments, home works, individualised project and standardized tests.
3. Strategies used in assessing practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State include: use of check list, interviewing, process and product rating, using rating scales or

- observation and awarding marks to students based on their achievement in practical works.
4. There was no significant difference between the mean responses of teachers and school administrators on instructional strategies mostly adopted by teachers in teaching electrical installation and maintenance works trade in technical colleges in Adamawa State
 5. There was no significant difference between the mean responses of teachers and school administrators on strategies used in assessing theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State
 6. There was significant difference between the mean responses of teachers and school administrators on strategies used in assessing practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State

Discussion

The findings of this study were discussed based on the pattern of the research questions and hypothesis. The findings related to research question one indicated that demonstration, discussion, problem solving and assignment are strategies/methods mostly adopted by teachers in teaching electrical installation and maintenance works trade (EIM) trade in technical colleges in Adamawa State. This finding is in agreement with the findings of Okoro (1999) who reported that instructional strategies such as lecture, demonstration, project, experiment, assignment, discussion and field trip are appropriate for teaching vocational and technical education courses. In addition to findings of Okoro (1999), this study revealed that problem solving method was accepted by

the respondents echoing findings of Dar, Shao and Ming (2006) that students benefit more when varieties of teaching methods are applied within a lesson thereby enhancing their academic performance (Ajayi and Lee, 2006).

Strategies used in assessing theoretical components of electrical installation and maintenance works trade in technical colleges in Adamawa State include: individualised assignments, home works, individualised project and use of standardized tests. The assessment strategies accepted by the respondents include: giving different assignment to each student at the end of every lesson, allowing students to participate in assignment process, giving project work to students every week, measuring students' ability with standardized test every week, administering written examinations to students every four weeks, using practical work to evaluate students' achievement in the class, and giving home work to students every week. The findings in this section were in agreement with that of Okoro (2002) who opined that performance test should be used in assessing learning objectives in the psychomotor domain. Involving students on a task and rating them as they work is the best strategy for assessing psychomotor skills. (Moses, Medugu, Mohammed and Wafudu 2017)

The study also found out that there was no significant difference between the mean responses of teachers and school administrators on instructional and theoretical assessment strategies mostly adopted in teaching EIM trade in technical colleges in Adamawa State. These findings in the first place agreed with the work of Faremi (2014) whose study found out that no significant difference existed between teaching strategies

adopted by science teachers and trade teachers in technical colleges during curriculum implementation. Secondly the findings also implied that relevant assessment strategies identified to evaluate the theoretical activities of students in EIM trade in technical colleges are highly effective and in agreement with the findings of Odo, Adenle, and Okwori (2012) who found out that teachers use various strategies to evaluate students' outcome.

Strategies used in assessing practical components of electrical installation and maintenance works trade in technical colleges in Adamawa State include: using checklist to assess students during practical, interviewing and rating each students immediately after practical in the work, using rating scale, awarding marks to students based on their achievement in practical works, assessing students during practical using relevant tools such as rating scale and observations, assessing students based on their practical experience and measuring students ability every four weeks. The findings were in agreement with that of Shehu (2007) who found out that in psychomotor domain, learning objectives which emphasize muscular or motor skills, manipulation of materials and neuromuscular coordination which lend themselves readily to acquisition of practical skill, needs a unique measuring or assessment instrument such as observation schedules and rating scales. However, the study also found out that, there exists a significant difference between the mean responses of teachers and school administrators on strategies used in assessing practical components of EIM trade in technical colleges in Adamawa State which is in agreement with the work of Odo, Adenle, and Okwori (2012) that trade teachers vary in

their use of various strategies while assessing students' outcome.

Conclusion

Based on the result of this study, it can be concluded that demonstration, discussion problem solving and assignments are mostly adopted in teaching EIM trade in technical colleges in Adamawa State. Individualised assignments, home works, individualised project and use of standardized tests are highly effective strategies for assessing theoretical components of EIM trade in technical colleges in Adamawa State. Whereas, assessing students' practical works using check list, interviewing and process and product rating of student practical work, assessing students during practical exercise using rating scale or observation and awarding marks to students based on their achievement in practical works are highly effective practical assessment strategies, there was no significant difference between the mean perception of teachers and administrators on instructional and theoretical assessment strategies mostly adopted by teachers during the delivery of electrical installation and maintenance works trade in technical colleges in Adamawa State.

Recommendations

The study, therefore recommended as follows:

1. Teachers of EIM trade should try as much as possible to adopt the highly effective instructional strategies identified in the study for more effective students' outcome
2. The identified highly effective assessment strategies should be adopted by EIM trade teachers in technical colleges in Adamawa State to ensure successful delivery of both theoretical and practical oriented components of the trade.

References

- Ajayi, L. and Lee, S. (2006). Perceptual difference between intern teachers and University supervisors on the exceptions and preferences for the fieldwork programme. *Education*, 126 (2), 259-274.
- Dar, C., Shao, T. and Ming, H. (2006). Development and Teaching Approaches of Technical and Vocational Education Curricula. 9th International Conference on Engineering Education. 23-28 July. San Juan, PR. Domain. New York.
- Faremi, Y.K. (2014). Assessment of teaching strategies adopted for effective implementation of science subjects and trade models curriculum in Nigerian technical colleges. *Journal of Educational and Social Research*. 4(6), 391-396
- Hornby, A.S. (2006). *Oxford Advanced Learner's Dictionary of Current English* (5th Ed.). London. University Press.
- Mager, R.F. (1997). *Preparing instructional objectives: A critical tool in the development of effective instruction*. Atlanta: The Centre for Effective Performance Inc.
- Menges, R.J. (1983). The new reporters. Students rate of instruction. in C.R. Pace (Ed.), *New Direction in Higher Education: Evaluating Learning and Teaching*. San Francisco: Jossey-Bass Publishers.
- Moses, D. (2009). Development and validation of a performance evaluation package for electrical installation measuring, marking and testing skills at the technical college level. *Multidisciplinary Journal of Academic Excellence (MULTIJAE)*. 1 (1). 170-177
- Moses, D., Medugu, J. D., Mohammed, A. and Wafudu, J. S. (2017). Development and Validation of an Instrument for Assessing Practical Skills in Domestic Installation Processes in Technical Colleges of Yobe State, Nigeria. *International Journal of Research in Engineering and Social Sciences*, 07(07), 17-23
- Ningi, I.M. (2001). Factors militating against effective teaching and learning of metal work in Bauchi, Gombe, Jigawa and Taraba States technical colleges. *An Unpublished M. Ed Thesis*, Department of Industrial Technical Education, Nsukka. University of Nigeria.
- Odo, M.I., Adenle, S.O. & Okworie, R.O. (2012). Enhancing mastery of practical skills in students of vocational and technical education through activity based instruction. *Journal of Technical Education and Training*, 4(2). 15-27. Retrieved on July, 2014 from <http://penerbit.uthm.edu.my/ojs/index.Php/JTET/article/view/580>.
- Okoro, O.M. (1999). *Principles and methods in vocational and technical education*. Nsukka: University Trust Publishers.
- Okoro, O.M. (2002). *Measurement and Evaluation in Education*. Uruwulobosi: Pacific Publishers.
- Olaitan, S.O and Ali, A. (1997). *The making of curriculum: theory and process*, Onitsha: Noble Graphic Press.
- Shehu, A. I. (2007). Conventional resource materials for teaching physics. 2nd annual Conference Proceedings, School of Science, Federal University of Technology, Mina-Nigeria.
- Wagner, E.E and Hoover, T.O. (1994). The influence of technical knowledge on position error in ranking. *Journal of Applied Psychology*, 59(3), 406-407 doi:10.1037/h0031648.
- Yalams, S.M. (2001). Development and Validation of Metalwork Process Evaluation Schemes. *Unpublished PhD Dissertation*. Department of Industrial Technical Education, Nsukka. University of Nigeria.