# ASSESSMENT OF THE ADEQUACY AND UTILIZATION OF INTRODUCTORY TECHNOLOGY EQUIPMENT IN URBAN AND RURAL SECONDARY SCHOOLS IN DELTA STATE OF NIGERIA.

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## ABSTTRACT

This study was designed to determine the adequacy and utilization of introductory technology equipment in Urban and Rural Secondary Schools in Delta State of Nigeria. The target population for the study consisted of all the principals and introductory technology teachers in Delta State Secondary Schools. Questionnaire was used for data collection. Percentage, mean and chi-square were used for data analysis. The hypothesis was tested at 0.05 level of significance. The findings revealed among other things that there is inadequate introductory technology equipment, the available equipment for teaching introductory technology subject are not utilized in schools and there is significant difference in the performance of the students. Suggestions were made on the supply, installation and utilization of the equipment in the schools.

## INTRODUCTION

The training of youths in schools aims at equipping them with useful skills and at improving their knowledge in their desired areas of study at the end of training (Asun, 1983). Introducory Technology is one of the pre-vocational subjects in the Junior Secondary School Curriculum in Nigeria that can provide the youth with such training. The subject normally starts in the first year of the Junior Secondary School course. The Introductory Technology subject which comprises of area like Woodwork, Metal Work, Technical Drawing, Electricity/Electronics and Auto Mechanics is taught in the Urban and Rural Secondary Schools in Delta State.

The Federal Ministry of Education prepared the Curriculum which is solely for the teaching of the subject. While the award of certificate at the Junior Secondary School level in Delta State is usually carried out by the Delta State Ministry of Education. Examination is usually taken as the end of three years training in Junior Secondary School.

Ohuche (1988) stated that the issue of criteria to be met for the award of certificate after training, has often proved difficult to deal with. Problems arise in relation to whether the individual should be assessed against a given standard or in relation to those who compete with him. If assessment is against a standard, the approach to determination of the standard poses yet a more serious problem. Thus, the assessor makes decisions and chooses from alternative or options. An important aspect of assessment is that it involves decision making.

In view of the importance of Introductory Technology in scientific and technological advancement of any nation and its usefulness in nearly all fields of human endeavour, the state of adequate equipment in our secondary schools has been a source of concern to various people and government at various times. The Federal Ministry of Education, Science and Technology in 1995 decided to enhance the performance of students in the secondary schools by equipping the schools with qualified teachers and adequate equipment.

Aromolaran (1985) states that one of the problems in our system of education in Nigeria is lack of materials and equipment. To achieve the sub-goals of equipping students to live effectively in the age of science and technology, the practice of starving the schools of equipment and fund need to change (Nwana, 1983).

This study was therefore designed to assess the adequacy and utilization of introductory technology equipment in Urban and Rurual Secondary Schools in Delta State.

## RESEARCH QUESTIONS

**This research answered the following questions:**

(a) **How adequate are Introductory Technology equipment in terms of number** required for training introductory technology subject in the Urban and Rural Secondary Schools in Delta State?

(b) How effective are the available Introductory Technology equipment utilized in teaching the subject in the Urban and Rural Secondary Schools in Delta State?

## HYPOTHESIS

There is no significant difference in the mean performance of Urban and Rural Junior Secondary School students with adequate Introductory Technology equipment.

## METHODOLOGY

### POLULATION

The area of study was Delta State of Nigeria, and the population consisted of all principals and Introductory Technology teachers. Based on records available in the Ministry of Education as at 1996/97 school year the number of principal was 115 and 120 Introductory Technology teachers.

The researcher obtained proportional sample that represented the schools and staff of the chosen school. The sample of the study was selected using the stratified random sample design for the schools. The proportional procedure was carried out by dividing the schools into strata of Urban and Rural Schools. Then random sampling was carried out on each urban and rural stratum to select the sample of the schools. In this way 30 schools, 15 representing the Urban and 15 representing the Rural schools were drawn proportionally from the population. Also 60 Introductory Technology teachers, 2 teachers from each of the 30 schools and 30 principals, one principal in each of the 30 schools were randomly selected. In all, 30 secondary schools and 90 staff were involved in the study

## INSTRUMENT OF THE STUDY

The instrument used in this research was a questionnaire. It was made up of structured items and developed through extensive literature review based on the research questions. The questionnaire were in three sections. Section 1, have items relating to school location of respondents, while section A and B have items designed to elicit information for answering the research questions. The questionnaire seek information at bringing out answers on the adequacy of available equipment and the utilization of introductory technology equipment in secondary schools in Delta State.

In Sections A and B repondents answerd the questionnaire on a five-point Likert-type scale of Not Available, Barely available, Moderately Available, High Available and Very Highly Available representing 5 4 3 2 and 1 repectively. The documented examination results of Junior Secondary School (JSS III) students in Urban and Rural schools were also used at bringing out answers to hypothesis formulated.

The instrument was validated by research professionals and four experts in the field of industrial technical education from the Department of Vocational Teacher Education, University of Nigeria, Nsukka and three experts from Delta State University, Abraka.

The reliability of the instrument was established using a test retest reliability procedure. The Pearson's Product-Moment Correlation Coefficient was employed to correlate the scores. A Coefficient of internal consistency ($r = 0.53$) was computed and the result confirmed the questionnaire item appropriate for the study

## DATA COLLECTION TECHNIQUE.

An introductory letter indicating the purpose of the study was attached to each copy of the questionnaire The researcher personally administered and collected the questionnaire. The researcher employed the help of experts in the field of Industrial Technical Education especially Introductory Technology teachers to help administer the questionnaire in distant locations. Such teachers on behalf of the researcher distributed, collected and returned the completed questionnaire copies to the researcher.

## DATA ANALYSIS TECHNIQUE

The raw scores obtained from the responses in each questionnaire items was computed and tabulated into frequency tables. In analysing the data that was collected the researcher used the percentage, mena, standard Deviation and the chi-square $X2$ tests statistic. While the percentage and mean was used to assess the adequacy of introductory Technology equipment and utilization of the equipment in schools raised in the research questions Then the chi-square test statistics was used to test statistically the hypothesis formulated for the study.

$$X^2 = \frac{\Sigma(0-e)}{e}$$

0 = observed frequency

e = Expected or theoretical ftrequency

$\Sigma$ = sum of

## FINDINGS

The findings of this study are presented in Table 1 through IV.

Table 1 data are on the adequacy of Introductory Technology Equipment.

***Table 1***

***Adeuqacy of Introductory Technology Equipment***

| | Ranking of Item | Area of Introductory Technology | Urban School N = 42 | | Rural School | | Grand Mean N = 44 | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | $\bar{X}_u$ | $SD_u$ | $\bar{X}_R$ | $SD_R$ | | |
| 1. | Wood work | 2.70 | 0.14 | | 2.16 | 0.33 | 2.43 | Inadequate |
| 2. | Technical Drawing | 2.24 | 0.26 | | 2.32 | 0.28 | 2.28 | Inadequate |
| 3. | Metal Work | 2.18 | 0.31 | | 2.02 | 0.28 | 2.10 | Inadequate |
| 4. | Electrical/ Electronics | 1.96 | 0.122 | | 1.81 | 0.22 | 1.89 | Inadequate |
| 5. | General workshops | 1.88 | 0.08 | | 1.61 | 0.17 | 1.75 | Inadequate |

Data presented in table 1 shows that Woodwork equipment received the mean score of 2.70 (Urban and 2.16 (Rural). Technical Drawing equipment received the mean of 2.24 (Urban) and 2.32 (Rural) Metal work equipment

received the mean ($X_u$ = 2.18) Urban and mean ($X_R$ = 2.02) Rural. Electrity/Electronics received the mean of (1.96) Urban and (1.81) Rural. Then the general workshops received the mean ($X_u$ = 1.88) Urban and mean $X_R$ = 1.61) Rural. The ranking column showed the woodwork equipment items as having the highest grand mean rating of (X = 2.43) followed closely by Technical Drawing equipment items with rating of (X = 2.28) then followed by the Metal workshops equipment item with writing of (X = 2.10) while Electricity/Electronics received the rating of (X = 1.89) and General workshop equipment received the lowest grade mean rating of (X = 1.75). As shown in the table 1, none of the items has up to a grand mean rating of X 3.50 adequacy. The remarks above are based on ranking of grand mean and cut-off point of 3.50 on the five-pointscale.

**Table 2**

**Extent of Utilization of Introductory Technology Equipment**

| Item S/No. | Area of Introductory Technology | School Location | Not Used % | Barely Used % | Modera-tely Used % | Highly Used % | Very Highly % |
|---|---|---|---|---|---|---|---|
| 1. | Technical Drawing | Urban | 9.09 | 31.60 | 46.10 | 8.66 | 4.55 |
| | | Rural | 19.53 | 28.82 | 36.16 | 5.79 | 9.70 |
| 2. | Metal Works | Urban | 23.74 | 32.76 | 29.94 | 11.54 | 2.02 |
| | | Rural | 44.34 | 36.67 | 15.60 | 2.00 | 1.40 |
| 3. | Woodworks | Urban | 14.29 | 29.63 | 33.56 | 12.02 | 10.51 |
| | | Rural | 32.94 | 36.69 | 25.57 | 3.72 | 2.02 |
| 4. | Electricity/ Electronics | Urban | 25.43 | 37.23 | 33.12 | 4.00 | 0.11 |
| | | Rural | 38.01 | 38.33 | 17.56 | 3.82 | 2.27 |
| 5. | General Workshop | Urban | 35.71 | 34.66 | 23.02 | 5.29 | 1.32 |
| | | Rural | 49.24 | 41.41 | 5.05 | 2.53 | 1.77 |

Table 2 shows the extent of utilization of Introductory Technology Equipment. 9.09 percent and 19.53 percent of Urban and Rural respondents respectively agreed that technical drawing equipment are not used. (31.60%) Urban and (28.82%) Rural respondents agreed that technical drawing equipment are barely used. (46.0) percent of Urban and 36.16 percent of Rural) respondents agreed that technical drawing equipment are moderately used (8.66%) Urban and (5.79%) Rural respondents agreed that technical drawing equipment are highly used. 4.55 percent of Urban and 9.70 percent of Rural respondents agreed that technical drawing equipment are very highly used.

Metalworks shows that 23.74 percent of Urban and 44.34 percent of Rural respondents agreed that metalworks equipment are not used. (32.76%) Urban and (36.67%) Rural respondents agreed that metalwork equipment are barely used. 29.94 percent of Urban and 15.60 percent of Rural respondents agreed that metal work equipment are moderately used. 11.54 percent of Urban and 2.00 percent of rural respondents agreed that metal work equipment are highly used. (2.02%) urban and (1.40%) Rural respondents agreed that metal work equipment equip are very highly used.

Woodworks indicated that (14.29%) Urban and (32.94) Rural respondents agreed that woodwork equipment are not used. 29.63 percent of urban and 36.69 percent of Rural respondents agreed that woodwork equipment are barely used. (3.56%) Urban and (25.57%) Rural respondents agreed that woodwork equipment are moderately used. (Urban 12.02% and Rural 3.72%) respondents agreed that woodwork equipment are highly used (10.51) urban and (2.02%) rural respondents agreed that woodwork equipment are very highly used.

Electricity/Electronics shows that 25.43 percent of urban and 38.01 percent of rural respondents agreed that Electricity/Electronics equipment are not used. (37.23%) urban and (38.33%) Rural respondent agreed that Electricity/Electronics equipment are barely used. (33.12 percent urban and 17.56 percent of Rural) respondents agreed that Electricity/Electronics equipment are moderately used. (Urban 4.0% and Rural 3.82% respectively agreed that Electricity/Electronics equipment are highly used. Urban and (2.27) Rural respondent agreed that Electricity/Electronics are very highly used.

General workshop show that (35.71)%) urban and (49.24%) Rural respondents agreed that general workshop equipment are not used. 34.66 percent of Urban and 41.41% percent of Rural respondent agreed that general workshop equipment are barely used. 23.02 percent and 5.05 percent of Urban and Rural respondents agreed that general Workshop equipment or Urban and Rural respondents agreed that general Workshop equipment are very highly used.

***Table 3: Utilization of Introductory technology Equipment***

| Ranking of Item | Area of Introductory Technology | Urban Schools N = 42 | | Rural Schools N = 44 | | Grand Mean | Remarks |
|---|---|---|---|---|---|---|---|
| | | $X_u$ | $SD_u$ | $X_R$ | $SD_R$ | | |
| 1. | Technical Drawing | 2.65 | 0.25 | 2.57 | 0.31 | 2.61 | Not Utili |
| 2. | Woodwork | 2.76 | 0.43 | 2.06 | 0.28 | 2.41 | .. |
| 3. | Electricity/ Electronics | 2.25 | 0.21 | 1.94 | 0.71 | 2.10 | .. |
| 4. | Metalwork | 2.35 | 0.36 | 1.82 | 0.16 | 2.09 | .. |
| 5. | General Workshop | 2.25 | 0.32 | 1.66 | 0.14 | 1.96 | .. |

The data presented in table 3 above shows that Technical Drawing attracted the mean of 2.65 (Urban) and 2.57 (Rural) Woodwork equipment received the mean score of 2.76 (Urban) and 2.06 (Rural). Electricity/Electronics received (X = 2.25) Urban and (X = 1.94) rural. Metal work equipment received 2.35 and 1.82 mean of urban and Rural respectively. General Workshop equipment received the mean of Urban and Rural respectively general Workshop equipment received the mean of (X = 2.25) in urban and the (X = 1.66) in rural

The ranking column showed that the Technical Drawing equipment items as having the highest grand mean rating of (X = 2.61) followed closely by woodwork equipment items rating of (X = 2.41) then followed by the Electricity/Electronics equipment items with rating of (X = 2.10) while metal work equipment items received the

rating of (X = 2.09) and general workshop equipment items received the lowest grand mean rating (X = 1.96). As clearly shown on the table 3, none of the equipment items has up to a grand mean rating of X = 3.50 on the rating scale. The remarks above are based on ranking of grand mean and cut-off point of 3.50 on a five point scale.

**Table 4:**

**Chi-square Analysis of Grades obtained by JSS III Studnets in Urban schools with Introductory Technology Equipment and JSS III**

Students in Rural Schools with such Equipment:

| School Location | Grades obtained in Junior School certificate Examination Result | | | | | Degree of Freedom | Result | Discussion |
|---|---|---|---|---|---|---|---|---|
| | No. of students with Dstinction (A) | No. of Students with credit C | No. of Students with Passes | No. of Students Failure | Total Number | 3df at 0.05 | | |
| Urban | 9.87 | 42.2 | 127.67 | 115.47 | | | X - cnt = 7.82 X = cal = 8.39 | $X^2$ cal $X^2$ cnt Reject No |
| | (7.46) | (36) | (130.72) | (121.04) | 295.21 | | | |
| Rural | 0.2 | 6.4 | 48.8 | 47.93 | | | | |
| | (2.61) | (12.60) | (45.75) | (42.36) | 103.33 | | | |
| Total | 10.07 | 48.6 | 176.47 | 163.4 | 398.54 | | | |

The figure in brackets indicated expected frequencies while figures above them are observed frequencies

Degree of freedom Df = 3

(X2 cal = 8.39) > (X2 crit./0.05 = 7.82)

Decision Ho is rejected because the calculated X - value is greater than the tabulated X2 - value at 0.05 level of significance. This means that the calculated X - value falls in the rejection region. We therefore reject the Null hypothesis that there is no significant differences in the mean performance of Urban and Rural Junior Secondary school students with adequate introductory technology equipment.

The calculated X values exceeds the critical X - value hence the rejection of the Null hyothesis and the alternative hypothesis was accepted. This implies that there is a significant difference in the mean performance of the urban and rural junior secondary school students with adequate Introdoctory Technology. This X2-test analysis reveals that there is a significant difference in the performance of urban school students with Introductroy Technology equipment and rural school students with such equipment. This further implies that the Urban located schools with Introductory Technology equipment performed better than their counterpart with such equipment

## DISCUSSION

Findings of this study are discussed in line with research questions and hypothesis. It was expressed by the principals and Introductory Technology teachers in both Urban and Rural schools that the required numbers of introductory technology equipment supplied by the government previously were inadequated and even at that there

are ever increasing numbers of students admitted each year into the Junior secondary Schools And led to more students using the limited numbers of available equipment and this contributed to over usage and damages of some equipment needed for the practical lesson as the Introductory Technology subject is made compulsorily offered in the junior secondary school certificate examination for the ever increasing number of students

The findings of the research question on how effective are the available Introductory Technology equipment utilized in teaching and subject in the Urban and Rural secondary schools revealed that the available Introductory Tehenology equipment for the teaching of the Introductory Technology subject are not utilized in the urban and Rural secondary schools

Another possible reason of the discrepancy in performance is that the students are exposed to extra-lesson during school period and after school hours. The respondents agreed that available introductory during teaching and execution was organised for Urban students to familiarise them with some of the equipment The implication of this is the discrepancy between the urban students and the Rural students performance.

In this way the hypothesis (H0) testing seeking to know whether there is a significant difference between the performance of the Urban school students with Introductory Technology equipment and the rural school with such equipment. The findings revealed that there is a significant difference in the performance of Urban and Rural Junior Secondary School students with adequate Introductory Technology equipment.

**Conclusions and Recommendation**

This study was designed to find out whether there is adequacy of Introductory Technology equipment and to ascertain whether the available Introductory Technology equipment are adequate and how effective are the equipment utilized in teaching the introductory technology subject in the Urban and Rural Secondary schools in Delta State It was as well as the purpose of this paper that the findings of the research shall be used to suggest the possible solution to the Delta State Government where the introductory technology equipment are not available, inadequate and where available they are not properly and effectively utilized in teaching introductory technology subject in Delta State.

The government places high premium oin this introductroy technology subject as a subject being capable of preparing the entire nation for the much desired self reliant and technologial development of the country But the poor implementation of the subject due to the inadequacy of the introductory technology equipment and the utilization of the equipment as deduced from the research findings is very unsatisfactory and appalling. it was discovered that there are schools where the equipment are not existing at all and there are some schools that the equipment are available ane even adequate but the equipment are not installed as a result the equipment are not utilized in teaching the students the practical aspects of the subject. it is therefore hoped that other researchers, the government in the state as well as educational bodies and planners will make effort to find out the necessary implementation problems of introductory technology programmes. The government should also resolve such problems, show enough interest and ways of providing a lasting solution to the inadequate introductory equipment, lack of introductory technology equipment and inadequate utilization of the introductory technology equipment. Also utilize the findings for the growth and progress of introductory technology subject.

Based on the results of this paper, the folfowing recommendations were made

1. The introductory technology equipment, machines and tools supplied should be properly installed with adequate provision of power supply to enable the equipment function as required by the capacity of the equipment and machines.

2. The Introductory Technology equipment, machines and tools should be supplied to the secondary schools in large numbers to cater for the ever growing population of the schools.
3. The Introductory Technology subject requires the services of a well trained and qualified introductory technology teachers to handle the complex and sophisticated machines, equipment and to handle the theoretical and practical aspect of the subject.
4. The government should seek the advice of the qualified trained introductroy technology teachers and technial experts that can help advice the appointed government representatives on the type of introductory technology equipment needed in the schools.
5. The government should post minimum of three introductory technology teachers to each of the secondary schools to enable them make use of the available introductory technology equipment for effective teaching and learning of the subject.
6. The government should be able to send inspectors from the Ministry of Education (Technical Division) to monitor the introductory technology equipment utilization in each school and to enforce the use of the equipment during the period of their visit in the school.
7. The government should endeavour to install all the introductory technology equipment supplied to each school by experts and the use of the introductory technology teacher to operate the equipment in the school workshop.

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