

THE DIFFICULT AREAS IN THE TEACHING AND LEARNING OF BASIC ELECTRONICS IN GOVERNMENT TECHNICAL COLLEGES IN ENUGU STATE.

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Abstract

The study of Basic Electronics in the Technical Colleges helps to give the students a basic understanding of solid state, vacuum and gas - filled devices as well as integrated circuits. The possession of these desirable attitudes and ideas would help the students develop the satisfaction and confidence that would enable them perform efficiently in the labour market. The purpose of this study was to identify the difficult areas in the teaching and learning of Basic Electronics in Technical Colleges. All seven teachers and 100 Final year students in the Government Technical College in Enugu State were studied. Questionnaire was used to collect data. Two research questions and two null hypotheses guided the study. Mean was used to answer the research questions while t-test statistics was used to test the hypotheses. It was found that eight areas were difficult to teach and learn. Four factors were identified as contributors to the difficulty of the areas identified. There were implications of the study and recommendations.

Introduction

The aim of teaching is to influence learners to make those desirable changes in their behaviour that contribute to better living. Olaitan and Agusiobo (1981) defined teaching as an attempt to bring about desirable changes in human learning abilities and behaviour. They also pointed out that the changes may take the following forms:

1. an increased store of useful information and understanding of basic principles in the subject matter;
2. Acquisition of skills -the physical competencies required to perform certain activities efficiently; and;
3. Possession of the desirable attitudes and ideals such as developing satisfaction about learning outcomes or achievements obtained through process of sharing meaning.

Okoro (1994) noted that a programme once established needs to be evaluated from time to time to ensure that the objectives for which it is established are being attained. Basic Electronics are core subjects taught in the Electrical/Electronics Department of Government Technical Colleges. Basic Electronics helps to create technical awareness to technical students in the Department of Electrical/Electronics. Basic Electronics exposes students with the basic principles which would enable them appreciate other concepts in electronics technology. The study of Basic Electronics in the Technical Colleges helps to give the students a basic understanding of solid state, vacuum, and gas - filled devices as well as integrated circuits. The emphasis is on the electrical characteristics of each device. Basic Electronics helps the students to develop a foundation of understanding of graphical representations as well as the device parameters.

The study of Basic Electronics gives the students the background of direct-current and alternating-currents fundamentals. The subject also exposes to the students some mathematical backgrounds like algebra, simultaneous equations and right-triangle trigonometry. Some basic procedures for making simple laboratory measurements are also taught and learnt.

Poor foundation in any course of study usually creates vocational guidance problems to students. This normally results to the students not being able to ascertain their level of interest and aptitude for a particular programme of study. Okorie (1988) pointed out that the influx of endless and growing number of young people to the labour market is compounded by illiteracy, inadequate training, under employment, and unemployment, rural-urban migration and other dismal conditions.

The young people need to be equipped with adequate skills or new skills to prepare them for the labour market. To be equipped adequately in any programme pre-supposes that all the contents of the subject/programme should be adequately taught by the teacher and learnt by the students. This study therefore identified the difficult areas in the teaching and learning of Basic Electronics as perceived by

Electronics teachers and students. The study also identified the factors contributing to the difficulty. The study is designed to answer the following questions:

1. what are the difficult areas in the teaching and learning of Basic Electronics?
2. What are the factors which are contributing to the difficulty of the areas identified by the teachers and the students?

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

H₀₁: significant difference does not exist in the mean ratings of teachers and students on the difficult areas; H₀₂: there is no significant difference in the mean ratings of teachers and students with respect to factors contributing to the difficulty of the areas identified.

Research Method

Design Of The Study

The design of the study is a survey research. A survey research is one in which the group of people or items are studied by collecting and analysing data from only a few people or items considered to be representative of the entire group. (Nworgu, 1991).

Population

The population for the study consisted of the seven teachers and 100 students of Electronics Technology Department in the two Government Technical Colleges (G. T. C.) in Enugu State - (G. T. C., Enugu and G. T. C. Nsukka).

Instrumentation

The instrument for data collection was the questionnaire which has a four point rating scale of Very Difficult, (VD), Difficult (D); Easy (E) and Very Easy (VE); and Strongly Agree (SA), Agree (A); Disagree (D) and Strongly Disagree (SD). Section A of the questionnaire identified difficult areas in the teaching and learning of Basic Electronics while Section B sought for the factors contributing to the difficulty of the areas identified.

Data Administration

The researcher administered 107 copies of the questionnaire by hand to the respondents and collected same thereby achieving 100 per cent return rate.

Validity Of The Instrument

Two experts in the Electricity/Electronics Technology Department and two experts in the measurement and evaluation in Technology/Vocational Education, ESUT validated the instrument in terms of fact and content validities.

Reliability Of The Instrument

A test-retest method of ensuring the reliability of the instrument was adopted. The scores were correlated using the Pearson Correlation Coefficient which thereafter gave 0.89 coefficient of reliability.

Data Analysis

Mean (\bar{x}) was used to answer the research questions while t-test statistic was used to test the two hypotheses. A cut off point of 2.50 was computed from the means rating scale of VD and SA = 4 points. D and A = 3 points; Easy and Disagree = 2 points and Very Easy and Strongly Disagree = 1 point and it formed the decision rule, in other words, items with mean 2.50 and above were taken as very difficult/difficult and Strongly Agree/Agree with respect to the said phenomenon while other items with mean below 2.50 were taken as Very Easy/Easy and Strongly Disagree/Disagree with respect to the said phenomenon.

Results

Table 1

Mean ratings on the Difficult Areas in Teaching and Learning of Basic Electronics.

S/N	item	Students mean	Teachers mean	Grand Menu	Decision
i	Structure of matter and its relevance to electricity and electronics.	2.1	1.3	1.7	Easy
2	The construction of resistors inductors, and capacitors and their functions in simple circuits	1.8	1.5	1.65	Easy
3	Calculations involving resistances, capacitance and energy stored in capacitors.	2.2	!	1.6	Easy
4.	Difference between alternating current and direct current	2	1.3	1.65	Easy
5.	Principles of transformer, its construction and operation	1.5	2	1.75	Easy
6.	Principles of soldering and solder of various electrical and electronics components.	2	1.5	1.75	Easy
7.	Interpretation of electronics signs and symbols.	1.6	1	1.3	Easy
8.	Operation and frequency response of various classes of amplifiers; basic concepts and effects of positive feedback on amplifiers.	3.5	3.6	3.55	Difficult
9.	Functions and importance of carrier and modulation in radio transmitter and receiver.	1.8	1.5	1.65	Easy

S/N	Item	Students mean	teachers means	Grand Mean	Decision
10.	Methods of detecting AM/FM receiver limiter and the diagnoses of fault, repair, maintenance align, dismantle and re-assemble of a radio receiver.	3.2	3.4	3.3	
11.	Operation and use of various electronic equipment to clear faults in radio set.	3	3.5	3.25	Difficult
1 [^]	Difference between domestic communication receivers and various types used in radio and television reception.	3	1.8	2.4	Easy
13.	How picture and sound signals are processed in different stages of black and white television set.	2.1	1	1.55	Easv
14.	Description of principles of operation of (he various stages of a television set	1.3	1	1.15	Easy
15.	Diagnose and repair of faults in the tuners, intermediate set, cathode ray tube and synchronising stages.	3.5	3.8	3.65	Difficult
16.	Diagnose and repair of faults common to each stage of a colour television set.	3.9	3.4	3.65	Difficult
17.	Construction, operation, characteristics and application of various types of valves.	2.7	1.7	2.2	Easy
18,	Identification, construction and description of operation of power supply unit.	1.6	1,8	1.7	Easy
19.	Basic principles of design and application of various simple electronic circuits	2.5	3	2.75	Difficult
in	Various types of oscillation, construction of simple multi-vibrator circuits and logic circuits	3.5	3.4	3.45	Difficult
2.0.	Principles and purpose of modulation and demodulation in AM and FM radio set.	1.1	1.7	1.4	Easy
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22.	Description of basic working principle, interrelation of circuit symbols, application. installation and maintenance of different types of acoustics	3.5	3,4	3.45	Difficult

Table 2.

Mean Rating of Factors Contributing to the Difficulty of the Areas Identified.

S/N	Item	Students mean	Teachers mean	Grand mean	Decision
1.	The course content is not well organised	2.5	1.6	2.05	D
2.	The concepts involved are not clear	2.7	1.7	2.2	D
3.	Lack of materials for workshop practices and tests	3.7	3.7	3.7	A
4.	Inability to use the available materials and equipment by the teachers.	2.8	2	2.4	D
5.	Number of periods in the lime table allocated to the study of basic electronics is inadequate.	2.8	1.6	2.2	D
6.	Many students admitted into the school do not have technical background.	1.8	2.1	1.95	D
7.	Teachers lack motivation	2.9	2	2.45	D
8.	Students' needs and expectation are not being met	3.6	3.2	3.4	A
9.	The course content does not allow for creativity and originality on the part of students.	3.7	3.6	3.65	A
10.	Lack of qualified staff/instructors	1.6	1	1.3	D
11.	Too much ancillary subjects are imposed on the students to the detriment of their core courses.	2.9	1.7	2.3	D
12.	Lack of fund for proper workshop practices.	1.7	2.8	2.25	D
13.	Some of the topics and concepts are not relevant to the selected needs.	2.5	1.4	1.95	D
14.	There is too much of theory and very little of actual practice.	3.8	3.6	3.7	A

In Table 1, showed the means responses of the difficult areas in the teaching and learning of Basic Electronics while Table 2 presented the factors contributing to the difficulty of the areas identified as difficult. In Table 3 and 4 significant differences were not seen in the mean responses of teachers and students with respect to Difficult Areas identified and factors identified as contributing to the Difficulty of the Areas identified.

Table 3

T-test Comparison of the Mean Ratings of the Teachers and Students on (he Difficult Areas identified.

S/N		X ₁	X ₂	S ₁	S ₂	t-cal	Decision
1.	Operation and frequency response of various classes of amplifiers, basic concepts and effects of positive feed back on amplifiers	3.5	3.6	0.73	0.67	0.125	Not Sig.
2.	Methods of detecting AM/FM receiver limiter and the diagnosis of faults, repairs, maintenance, align, dismantle and re-assemble of a radio receiver.	3.2	3.4	1.03	0.78	1.16	Not Sig.
3.	Operation and use of various electronic equipment to clear fault in radio set.	3	3.5	0.94	0.78	1.35	Not Sig.
4.	Diagnoses and repair of faults in the tuners. intermediate frequency amplifiers, video set. cathode ray tube and synchronising stages.	3.5	3.8	0.73	0.37	0.38	Not Sig.
5.	Diagnose and repair of faults common to each stage of a colour television set.	3.9	3.4	0.78	0.47	0.75	Not Sig.
6.	Basic principles of design and application of various simple electronic circuits.	2.5		0.94	0.72	1.25	Not Sig.
7.	Various types of oscillation, construction of simple multi-vibrator circuits and logic circuits.	3.5	3.4	0.70	0.66	0.12	Not Sig.
8.	Description of basic working principle. interpretation of circuit symbols, application, installation and maintenance of different types of accousties	3.5	3.4	0.78	0.67	0.12	Not Sig.

t-Table- 1.67; P< 0.05;.

Table 4

T-test comparison of the Mean Ratings of the Teachers and Students on the Factors Identified as Contributing to the Difficulty of the Areas Identified.

S/N	Items	X ₁	X ₂	S ₁	S ₂	t-cal	Decision
1.	Lack of materials for workshop practices and tests.	3.7	3.7	0.58	0.48	0.14	Not Sig.
2.	Students' needs and expectations are not being met.	3.6	3.2	0.67	0.76	0.7	Not Sig.
3.	The course content does not allow for creativity and originality on the part the part of the students.	3.7	3.6	0.6	0.53	0.28	Not Sig.
4.	There is too much of theory and very little of actual practice.	3.8	3.6	0.40	0.53	0.75	Not Sig.

T-table = 1.67; P < 0.05

Summary Of The Findings

The following findings were made:

1. Out of 22 topics presented in the Basic Electronics syllabus to be taught and learnt, eight topics were identified as being difficult to teach and learn. (See Table 1).
2. Four factors were identified as contributing to the difficulty of the identified areas. The factors included lack of materials for workshop practice, students' needs and expectations are not being met, course content does not allow for creativity and originality on the part of the students and too much of theory and very little of actual practice were given to students.
3. There was no significant difference between the mean ratings of the teachers and the students on the areas identified as being difficult to teach and learn.
4. There was no significant difference also between the mean ratings of the teachers and the students with respect to contributing factors to the difficulty of the areas identified.

Discussion

The study has revealed that only eight topics were identified to be difficult by the teachers and the students. The work also showed that there was no significant difference in the opinions of the teachers and the students with respect to the identified areas. The results of this study have provided added emphasis on the need for the teachers to know the subject and how to teach it, using examples that are relevant to the students experiences. Ezeji (1986) noted that students are more interested in teachers who not only know the subjects they teach, but also teach these subjects using appropriate methods and relevant examples.

The results of the study also showed that there was no significant difference in the mean ratings of the teachers and the students with respect to factors contributing to the difficulty of the areas identified. Some of the contributing factors included lack of materials for practices and too much theory and very

little of actual practice. This findings are in consonance with Uzoagulu and Oko-Isu (1997) where they noted that skill acquisition and competence were largely dependent upon workshop activities. They also stressed that the learner should continually carry out repetitive practical activities in order to possess skill in the trade. Repetition helps in habit formation for skill acquisition. Repetition can only be possible where training materials are made available for constant use by the teacher and the learner. Therefore lack of materials for practice has tremendous implications for technology development in the country.

Implication Of The Findings

Basic Electronics topics can be better taught and learned where majority of workshop facilities are made available. But where dearth of these facilities exist as this study highlighted, the implications are that:

1. Students would lose interest in Electronics programmes.
2. The teachers would have no alternative than to continue to teach theoretical aspect of the courses.
3. The students would have a lot of vocational guidance problems.

Recommendations

It is being recommended that necessary materials should be made available in the Technical Colleges so as to enable the teacher teach well so as to hold the learners' interests in Electronics programmes. Teachers should master the subjects they teach so as to enable the students have confidence in them. The teachers should also be more resourceful especially where the procurement of adequate traininu materials have not been realised. The teachers should emphasize actual practice than theory.

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