EFFECTS OF TWO TEACHING INSTRUCTIONAL TECHNIQUES ON ACADEMIC ACHIEVEMENT OF BASIC TECHNOLOGY STUDENTS IN OGUN STATE GOVERNMENT SCIENCE AND TECHNICAL COLLEGES

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Abstract
This study was carried out to determine the effects of two teaching instructional techniques (Lecture method and Guided Discovery Instructional Technique) on academic achievement of Basic Technology students in Ogun State Government Science and Technical Colleges (GSTCs). The study adopted quasi-experimental research design. Three research questions and three null hypotheses guided the study. All the GSTCs in Ogun State were the population for the study. Basic Technology Achievement Test (BTAT) was the only instrument used for the study. BTAT is a standardized test which contained 30 multiple choice questions. Each question had one correct answer and three distracters. The reliability coefficient of the BTAT was found to be 0.82 using Kuder-Richardson 20 formular. Mean, standard deviation and t-test were used for data analysis. The result of this study indicated a significant difference between the pre-test and post-test achievement scores of students taught with Guided Discovery Instructional Technique (GDIT) for hypothesis 1, no significant difference between the pre-test and post-test achievement scores of students taught with Conventional Instructional Technique (CIT) for hypothesis 2 and a significant difference between the post-test achievement scores of students taught with GDIT and post-test achievement scores of students taught with CIT for hypothesis 3. Based on this finding, the study recommended among others the adoption of better teaching techniques like GDIT to improve students' academic achievement in Basic Technology.

Keywords: *Teaching, Instructional Techniques, GSTC, CIT, GDIT, Basic Technology, Academic Achievement*

Introduction

Teaching and learning play important role in the school setting, one cannot be done without the other, this implies that both are done simultaneously. Teaching implies that a teacher who is a product of both nature and nurture impart knowledge to the learners. Carbone, Conway and Farr (2009) viewed teaching as a specialized form of bidirectional communication in which the students are active (and interactive) participants in the process of exposition. Most obviously, teaching is the communication of the facts, ideas, skills, and techniques particular to a discipline. Less obviously, teaching is the act of communicating the comprehensibility of the subject matter, demonstrating a mastery that reassures the students that they too can understand and master the material.

Instructional techniques represent all the approaches employed by a teacher in mediating instructions to his/her or group of learners. Instructional techniques according to Ogwo and Oranu (2006) are used by all teachers to present skills, knowledge and appreciations to the learners in the classroom and to engage learners in the tasks involved. Roegge, Wentlin, and Bragg (1999) cited in Shodehinde (2013) noted that the traditional approach of passing instructions in schools must be replaced with techniques which allow students to learn needed skill in the context within which the skill are used in the real world.

The Conventional Instructional Technique (CIT) which is mono-directional is widely used in schools today. Specifically, the lecture method which centers on the traditional viewpoint that the teacher is an embodiment of knowledge and it is the responsibility of the teacher to dish out or disseminate knowledge to the learners who are supposedly ignorant and blank. This technique affords the teacher to do most of the talking alone, and the students are abandoned as passive

listeners. Abdullahi (1998) cited in Oviave (2010) and supported by Uwameiye and Aduwa-Ogiegbaen, (2006) faulted this method in that students are always afraid to ask questions and express their opinions. This situation in the opinion of Abdullahi is in contrast with modern teaching which requires less talk on the part of the teacher and more activities on the part of the students. For this reason Nwachukwu (2006) averred that good teaching always provides for a two-way communication between the teacher and the student. Ogwo (1996) cited in Lemo (2014) identified the weaknesses of CIT especially the lecture method such as; it is one way communication affair which is autocratic and encourages students passivity; it encourages rote learning; it is inappropriate for teaching and encouraging students to think for themselves among others.

Therefore, in search for a more productive instructional technique with utmost consideration on the student, Guided Discovery Instructional Technique (GDIT) comes to mind. GDIT is a student centered approach which increases the degree of students' interest, confidence, innovativeness, problem solving ability, creativity and consequently improves their performance in both theory and practice. Yalams and Fatokun (2007) cited in Umunadi (2009) posited that GDIT is a resource based learning which is an innovation that reverses the usual role of the teacher from that in which he is the main authority and source of all knowledge to one in which he acts simply as a guide to the students to enable him/her to make use of other sources of information. Mosston and Ashworth, (2002) averred that the intention of the GDIT is for teachers to formulate the underlying structure and content of their lessons in a manner that forces students to discover the answers to a range of problems for themselves. Within this particular methodology it is the role of the teacher to guide and facilitate student learning in order to allow student discovery as well as promote ongoing experimentation and participation.

Fakorede and Lemo (2015) observed that the value of instruction depends to a large extent on the quality of the teacher, as teachers are life-wire of a sound educational process. For teaching to be effective, novelty in the method of instruction adopted by the teacher must come to play. Olakotan, (2011) avowed that effective teaching implies that the intended outcome of the teacher's teaching is brought about and the favourable impression on the student is overtly felt. Adunfe (2008) submitted that effective teaching involves hard work and commitment on the part of the teacher. Therefore effective teaching and learning should take-off with some ability to create resources, to turn existing resources to new uses and to make the best out of nothing. For learning to occur, teaching must be effective, this can be achieved by designing environments that are conducive so that changes in behaviour (motor, cognitive and affective) of students are accomplished efficiently. Similarly, Adunfe further reiterated that this must be done in a manner that enables the students to enjoy the learning experience and to learn the activity or subject matter being taught.

It is then envisaged that if students are well taught via adequate and effective instructional techniques, their achievement academically would in no doubt be encouraging.

Academic achievement according to Olaitan and Nwoke (1999) cited in Fakorede (2010) refers to knowledge and skills attained by a student in school subjects, designated by a score obtain in an achievement test. Accordingly, an achievement test is an instrument administered to an individual to elicit certain desires and expected responses, as demanded in the instrument, performance on which the individual is assigned a score representing his achievement. Olaitan and Nwoke noted that academic achievement is always denoted by a score, which represent the amount of learning acquired, knowledge gained or skills and competencies developed in the school subject.

Artherton (2003) noted that academic achievement hinged on several factors such as: teaching method, intelligence, background, organization, opportunity, motivation, instructional procedures, teaching aids, interest of the learner, and other environmental variable. Others

include learner's mental ability, his goals and purposes, his identification with learning, his maturation, and methods of guidance, availability of facilities and methods of testing.

So, in societies like Nigeria where standardized test of different kinds exist, the academic achievement of students is represented by the individual's response to standardized scholastic achievement tests; and the level of response given to such tests can help in determining success. This scholastic achievement test should embrace the students' general school performance in various school subjects particularly in Basic Technology which the present study addresses.

Basic technology is an integration of components of woodwork, metalwork, basic electronics, applied electricity, water flow technology, airflow technology, food preservation, automobile mechanics, technical drawing, physics, rubber technology, chemistry, plastics, building technology, and ceramics. It is a subject that introduces students at the Junior Secondary schools in Nigeria to the basic rudiment of technology. The objectives of teaching Basic Technology subject in Nigerian schools according to Federal Government of Nigeria (FGN, 2014) include:

- To provide pre-vocational orientation for further training in technology,
- To provide basic technology literacy for everyday living and
- To stimulate creativity

It should be borne in mind that Government Science and Technical College is a product of the National Master Plan on Technical and Vocational Education for the decade 2001 – 2010 (Jimoh, Dawodu, Adegoke and Komolafe, 2005). On this account, Federal and State technical colleges were renamed as Federal Science and Technical Colleges (FSTC) for federal government owned technical colleges and Government Science and Technical Colleges (GSTC) for state owned technical colleges. With this development, Federal Ministry of Education (FME, n.d) recommended that technical colleges should be converted to a 6 years programme, admitting students like secondary schools for junior secondary such that the orientation and attitude of students are moulded early in favour of Vocational and Technical Education. It was as a result of this conversion that Basic Technology becomes inevitable for students in GSTC in their first three years.

Since researchers of various degrees have faulted conventional mode of instruction based on poor academic achievement and other noteworthy reasons, it then becomes imperative for this study to determine effects of two teaching instructional techniques (Lecture method and Guided Discovery Instructional Technique) on academic achievement of Basic Technology students in Ogun State GSTCs.

Purpose of the Study

The purpose of this study was to determine the effects of two teaching instructional techniques (Lecture method and Guided Discovery Instructional Technique) on academic achievement of Basic Technology students in Ogun State GSTCs.

Research Questions

1. What is the difference in the mean pre-test and posttest academic achievement of students taught with GDIT?
2. What is the difference in the mean pre-test and posttest academic achievement of students taught with lecture method?
3. What is the difference in the mean posttest academic achievement of students taught with GDIT and posttest academic achievement of students taught with lecture method?

Hypotheses

1. There is no significant difference between the pre-test and posttest academic achievement of students taught with GDIT
2. There is no significant difference between the pre-test and posttest academic achievement of students taught with lecture method
3. There is no significant difference between the posttest academic achievement of students taught with GDIT and posttest academic achievement of students taught with lecture method

Methodology

The study employed quasi-experimental design. Specifically, the pretest, posttest, non-equivalent control group design was adopted for this study. According to Gall, Gall and Borg (2007), quasi–experimental design can be used when it is not possible for the researcher to randomly sample the subject and assign them to treatment groups without disrupting the academic programmes of the schools involved in the study.

Group	**Pretest**	**Treatment**	**Posttest**
Experiment	0_1	X	0_2
Control	0_1	-X	0_2

Where 0_1 = Pretest for both control and experimental group
0_2 = Posttest for both control and experimental group
X = Treatment given to the experimental group (GDIT)
-X = No treatment given to the control group (CIT)
____ = Non-randomization

The population for the study consist all the GSTCs in Ogun State. There are seven GSTCs in Ogun State.

Simple random sampling was adopted and used to select two GSTCs (GSTC Ijebu-Igbo and GSTC Ijebu-Ode) using the table of random digits. However, the selected GSTCs were randomly assigned to control and experimental groups in their respective intact classes. In all 192 J.S 2 Basic Technology students were selected. GSTC Ijebu-Igbo was assigned to control group while GSTC Ijebu-Ode was assigned to experimental group.

Basic Technology Achievement Test (BTAT) was the only instrument used for data collection. BTAT is a standardized test which contains 30 multiple choice items. The reliability coefficient of the BTAT was determined to be 0.82 using Kuder-Richardson 20 formular. The chosen topics were taught using GDIT for the experimental group while lecture method was used for the control group.

The Two groups (experimental & Control) were subjected to a Pre-test and Post-test. Experimental conditions such as experimental bias and teachers' variability were controlled as regular Basic Technology teachers in GSTC taught the students while the researcher prepared all teaching instruments and trained the participating teachers as well.

The scores obtained from the pre-test and post-tests were analyzed using mean and standard deviation to answer the research questions while t-test statistic was used to test the hypothesis at 0.05 level of significance.

Results

The results were analyzed and presented based on the raised research questions and formulated hypotheses.

Research Question 1

What is the difference in the mean pre-test and posttest academic achievement of students taught with GDIT?

Hypothesis 1
There is no significant difference between the pre-test academic achievement of students and posttest academic achievement of students taught with GDIT

Table 1: Mean, standard deviation and t-test scores of pre-test and posttest academic achievement of students taught with GDIT

Experimental	N	Mean	Mean Diff.	SD	df	t-cal	t-Crit
Pre-test	97	38.26	22.55	9.33	192	13.90	1.96
Posttest	97	55.81		8.27			

P < 0.05, Critical = 1.96

The data presented in Table 1 indicated a significant difference between the pre-test and post-test experimental group taught with GDIT, in favour of the post test. This shows that the calculated t-value of 13.90 for experimental group pre-test, post-test mean achievement scores is significant at 0.05 probability level because the calculated t-value is greater than the t-table value(t-critical) of 1.96 at 0.05 level of significance. Therefore, the hypothesis of no significant difference was rejected.

Research Question 2
What is the difference in the mean pre-test and posttest academic achievement of students taught with lecture method?

Hypothesis 2
There is no significant difference between the pre-test academic achievement of students and posttest academic achievement of students taught with CIT

Table 2: Mean, standard deviation and t-test scores of pre-test and posttest academic achievement of students taught with CIT

Control	N	Mean	Mean Diff.	SD	df	t-cal	t-Crit
Pre-test	95	31.23	3.04	13.21	188	0.99	1.96
Posttest	95	34.27		11.58			

P < 0.05, Critical = 1.96

The data presented in Table 2 indicated no significant difference between the pre-test and post-test control group taught with CIT. This showed that the calculated t-value of 0.99 for control group pre-test, post-test mean achievement scores is not significant at 0.05 probability level because the calculated t-value is less than the t-table value(t-critical) of 1.96 at 0.05 level of significance.. Therefore, the hypothesis of no significant difference was upheld.

Research Question 3
What is the difference between the posttest academic achievement of students taught with GDIT and posttest academic achievement of students taught with lecture method?

Hypothesis 3
There is no significant difference between the posttest academic achievement of students taught with GDIT and posttest academic achievement of students taught with lecture method

Table 3: Mean, standard deviation and t-test scores of pre-test and posttest academic achievement of students taught with CIT and GDIT

	N	Mean	Mean Diff.	SD	df	t-cal	t-Crit
Experimental Posttest	97	55.81	21.54	8.27	190	14.81	1.96
Control Posttest	95	34.27		11.58			

P < 0.05, Critical = 1.96

The data presented in Table 3 indicated a significant difference between the post-test experimental group taught with GDIT and post-test control group taught with CIT, in favour of the post-test experimental group taught with GDIT. This shows that the calculated t-value of 14.81 for experimental group post-test, and control group post-test mean achievement scores is significant at 0.05 probability level because the calculated t-value is greater than the t-table value(t-critical) of 1.96 at 0.05 level of significance.. Therefore, the hypothesis of no significant difference was rejected.

Discussion of Findings

Tables 1, 2 and 3 showed the descriptive and inferential statistics of the study. The mean achievement scores are descriptive or representative scores of the group or variables they represent while the t-test provide premise for making inference or deductions on their relevant tested hypotheses.

Table 1 showed a significant difference between the academic achievement in the pretest and posttest of students taught with GDIT. This revealed the positive effects of different treatments given to the experimental group on the students mean achievement scores in the post-test achievement test. Although no treatment was given to the pre-test group before the test while treatment was given before the test in the case of the posttest. Table 2 showed no significant difference between the academic achievement in the pretest and posttest of students taught with CIT. This forms the basis while the hypothesis of no significant was upheld. This is also due to the fact that no treatment was given at both pre-test and post-test stages before the test were taken. Table 3 showed a significant difference between the post-test academic achievement of students taught with GDIT and the post-test academic achievement of students taught with CIT, in favour of GDIT, giving basis for rejecting the null hypothesis of no significant difference earlier formulated.

The findings of this study as revealed in the data analysis was corroborated by the propositions of Artherton (2003), Fakorede and Lemo (2015) who attributed academic achievement majorly to teaching methods, instructional procedures, and instructional materials among other variables. Nwachukwu (2006), Ogwo and Oranu (2006),Fatokun and Yalams (2007), and Owoso (2013) were also in agreement with the findings of this study. Their respective submissions which pointed to the fact GDIT increases the degree of students' interest, confidence, innovativeness, problem solving ability, creativity and consequently improves students' academic achievement are noteworthy corroborations to the findings of the study. Therefore, the findings of this study uphold the use of GDIT for teaching Basic Technology in Government Science and Technical Colleges.

Conclusion

From the foregoing, this study has equally affirmed that the effective organisation and presentation of learning materials to students have close ties with the various instructional techniques adopted by the teacher and the ability of the learner to assimilate. The various methods used by the teacher will determine the learning outcome of the students with corresponding satisfactory academic achievement.

Recommendations

Based on the findings of the study, the following recommendations are put forward:

(i) Teachers must be encouraged to adopt better teaching techniques like GDIT to improve students' academic achievement in Basic Technology.

(ii) Teachers must be encouraged to bring novelty into their methods of teaching aimed at improving students' academic achievement in Basic Technology.

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