

Full Length Research Paper

Instructional strategies and students' academic performance in electrical installation in technical colleges in Akwa Ibom State: Instructional skills for structuring appropriate learning experiences for students

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The study investigated the effects of instructional strategies on students' academic performance in Electrical Installation in Technical Colleges in Akwa Ibom State. Instructional skills are the most specific category of teaching behaviours. A non-equivalent control group quasi experimental design was adopted for the study. Four intact classes from four technical colleges were selected to give a sample size of 231. Electrical installation achievement test (EIAT) was used to generate data for the study. The instrument was validated by three experts in the Faculty of Education, University of Uyo and the reliability coefficient of the instrument was .88. Mean and analysis of covariance were used for data analysis. The findings of the study revealed that there were significant differences between academic performance of students in Electrical Installation taught with discussion and lecture strategies; demonstration and inquiry strategies. It was recommended among others that variety of instructional strategies should be employed to enhance teaching and learning.

Key words: Instructional strategies, demonstration, inquiry, discovery, skills acquisition.

INTRODUCTION

Technical Education is designed to give training and impart the necessary skills to individuals who shall be self-reliant economically. Electrical Installation is an aspect of Technical Education. Trainees completing Electrical Installation Programme in Technical Colleges are expected to secure employment either at the end of the whole course or after completing one or more modules of employable skill. It is expected as well that

they should be able to set up their own business and become self-employed and be able to employ others (FRN, 2004). To fully achieve the foregoing objectives, effective teaching of Electrical Installation could help to furnish the students with saleable skills and competencies to enhance their development of self-reliant initiatives.

Research findings by Jacobs (1994) have shown that students' academic performance is declining dramatically

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such as teachers' factors, students' due to many factors variables and school or environmental factors. Among the school related factors are physical environment, curriculum and teaching methods employed by the teacher in communicating learning experience to the learners (Okoye, 1996). Most students who graduate from technical colleges lack the skills and competencies needed to enable them become self-employed and reliant. The poor performance of students in Electrical Installation may be attributed to poor instructional strategies and skills. These teaching problems have led to frantic search for appropriate instructional strategies that would best be used to achieve the aims of Electrical Installation teaching, thereby improving learning and skills acquisition.

Instructional strategies are decisions about organizing people, materials and ideas to provide learning (Nwachukon, 2005). Weston and Cranton (1986) viewed instructional strategies as both the teaching method and the materials used in the process of teaching. Instructional strategies determine the approach a teacher may take to achieve learning objectives. Some of these instructional strategies include demonstration, discussion, inquiry and lecture among others. According to Saskatchewan Education (2002), Instructional skills are the most specific category of teaching behaviours. They are necessary for procedural purposes and for structuring appropriate learning experiences for students. These include such techniques as questioning, discussion, directing giving, explaining and demonstrating. Hence, students learn by doing, making writing designing, creating and solving (Davis, 1993).

Demonstration is the most widely used instructional method for the acquisition of practical skills as it involves verbal and practical illustrations of a given procedure. This method is seen to be highly effective because it involves active participation of the students (Ogwo AND Orangu, 2006). Research findings by Ugwuanyi (1998) on the effects of instructional approaches on students' academic performances indicated that students taught with demonstration performed significantly better than those taught with inquiry method. Inquiry is a technique which involves students in questioning to explore an area of study. It is a process student engages in to investigate and explain problems. Students collect and test data logically in order to discover why things happen the way they do. It is a student oriented strategy which requires active participation in questioning events and in putting several factors together (conceptualizing) to explore hypothesis or theory (Saskatchewan Education, 2009). According to Obodo (1997), it is a method where the teacher could ask leading questions to guide the students to discover concepts. Ncharam (2005) studied the effects of inquiry and lecture methods on students' performance in chemistry and observed the performance in favour of guided inquiry approach.

Discussion strategy is when two or more people interact verbally with each other. It could be used deliberately in

teaching and learning situation, but some times it occurs spontaneously as a teacher uses one method of teaching or another. Discussion could be considered as a technique within a method (Umoren, 2001). Discussion strategy affords every member of the class opportunity to articulate his views on a particular issue and learning discovered in the process tends to last longer than when learning is imposed on the students (Etuk et al., 2004). In true discussion, Udofia (1999) maintained that the teacher's contributions are very minimal and are made only when necessary. Lecture method involves a verbal presentation of ideas, concepts, generalizations and facts. The practice in this method is that of spoon-feeding the learners with information or facts. The students remain passive and receive information from their teacher (Umoren, 2001).

Skills in the selection and utilization of appropriate instructional strategies are required by the teacher for effective teaching. There is no one best approach to instruction. Teaching effectively demands that the teacher must possess some basic ability to organize, co-ordinate and utilize personal qualities, objectives and competency in lesson preparation, presentation and evaluation. Besides, he must be able to motivate the learners, make students active participants in learning, use appropriate strategies and facilities to enhance effectiveness in instructions. Some researchers recommended eclectic method (combination of strategies). Teachers are also expected to implement a variety of instructional strategies in order to meet the objectives of the programme as well as to address individual student interest and needs (Saskatchewan Education, 2009). In view of the above stated problems of teaching and learning electrical installation, this study became necessary to determine the effects of instructional strategies on students' academic performance in Electrical Installation in Technical Colleges in Akwa Ibom State and thus make appropriate recommendations on better instructional strategies and skills for teaching Electrical Installation.

Statement of the problem

Instructions in Electrical Installation lack proper approaches in most cases. When the students cannot easily follow the instructions, the lessons become boring and engender negative attitude and low interest to the students towards the course being taught. This eventually results in low academic performance by the students. It was noted that difference in the performance of students has been attributed to teachers' methods or techniques of lesson presentation (Udom, 2008). Onyejiaku (1994) observed that whenever any individual is determined to succeed and is properly guided using effective strategy, the student in most cases performs excellently. Against the background of inappropriate instructional strategies being used in teaching Electrical Installation which results

in low achievement by the students, what instructional strategies need be employed to improve learning outcomes in Electrical Installation in Technical Colleges in Akwa Ibom State?

Purpose of the study

The purpose of the study was to determine the instructional strategies needed to be employed to improve learning outcomes in Electrical Installation in Technical Colleges in Akwa Ibom State. Specifically, the study intended to determine the difference between the effects of:

- 1) Discussion and lecture strategies on the academic performance of students in Electrical Installation.
- 2) Demonstration and inquiry strategies on the academic performance of students in Electrical Installation.

Significance of the study

The study will be beneficial to the teachers in that they will be able to select appropriate instructional strategies and materials to suit different lessons for effective teaching of Electrical Installation in Technical Colleges in Akwa Ibom State. The teachers and the students will realize that the understanding of lessons in Electrical Installation can be highly improved through demonstrations and class activities rather than the talk and chalk approach. Also, they will be aware of the fact that students' learning is enhanced if they are properly guided to discover facts and principles by themselves rather than supplying them with everything by the teacher. The teacher and the students will notice that active participation of students in class discussion promoter learning better than when it is imposed on them.

Research Questions

- 1) What differences exist between the effects of discussion and lecture strategies on the academic performance of students in Electrical Installation?
- 2) What differences exist between the effects of demonstration and inquiry strategies on the academic performance of students in Electrical Installation?

Hypotheses

Ho₁: There is no significant difference between the effects of discussion and lecture strategies on the academic performance of students in Electrical Installation.

Ho₂: There is no significant difference between the effects

of demonstration and inquiry strategies on the academic performance of students in Electrical Installation.

METHODOLOGY

Research design

The research design was a non-equivalent control group quasi-experimental design. The quasi-experimental design was appropriate since the study was carried out using intact classes and besides, the independent variable was manipulated. The structure of the design is presented as follows:

Group 1: O₁ X_a O₂ (E)

Group 2: O₃ X_b O₄ (C)

X_a = experimental treatment condition;

X_b = control treatment condition;

O₁ = Pre-test score of the experimental condition;

O₃ = Pre-test score of the control condition;

O₂ = Post-test score of the experimental condition; and

O₄ = Post-test score of the control condition.

Demonstration, inquiry and discussion strategies were used for experimental group while lecture method was used for control group.

Area of the study

The area of the study covered all the six Technical Colleges in Akwa Ibom State.

Population of the study

The population of the study consisted of 559 Senior Technical one (ST1) students offering Electrical Installation in all the six Technical Colleges in Akwa Ibom State.

Sample and sampling technique

A total sample size of 231 students was obtained from four intact classes of students offering Electrical Installation in the Four Technical Colleges selected for the study. The four Technical Colleges used for the study were randomly selected out of six and randomly assigned to treatment (instructional strategies). The number of students for the four Technical Colleges selected for the study was 36, 76, 20 and 99 respectively.

Instrument for data collection

The researcher-developed instrument titled, "Electrical Installation Achievement Test (EIAT) was used for both pre-test and post-test to collect data for the study. It comprised 30 questions based on the concept of testing and earthing. The instrument was validated by three experts in the Faculty of Education, University of Uyo, Uyo – Akwa Ibom State: One expert in the Department of Vocational Education, one in the Department of Educational Technology and the other from the Department of Measurement and Evaluation. The reliability coefficient of the instrument stood at .88 which was determined using Kuder-Richardson Formula – 21.

Table 1. Mean analysis of the differences between the effects of discussion and lecture strategies on the academic performance of students

Instructional strategy	N	Pre-test \bar{X}	Post-test \bar{X}	Mean gain \bar{X}	Post-test difference
Discussion	20	5.75	17.00	11.25	3.23
Lecture	99	6.17	13.77	7.60	

Table 2. Mean analysis of the differences between the effects of demonstration and inquiry strategies on the academic performance students

Instructional strategy	N	Pre-test \bar{X}	Post-test \bar{X}	Mean gain \bar{X}	Post-test difference \bar{X}
Demonstration	36	5.61	21.19	15.58	3.19
Inquiry	76	5.68	18.00	12.32	

1) EIAT, a 30-item pre-test to give 30 points was used to determine the performance of the students before the treatment.

2) Also EIAT, a 30-item post-test to give 30 points was used to determine the performance of the students after the treatment.

Method of data analysis/decision rule

Mean was used to answer research questions, while Analysis of covariance (ANCOVA) was used to test hypotheses. If the calculated F was greater than the critical F at .05 alpha level, the null hypothesis was rejected but if the calculated F was less than the critical F, the null hypothesis was upheld.

RESULTS

Research question 1

What differences exist between the effects of discussion and lecture strategies on the academic performance of students in Electrical Installation? Table 1 shows that the mean gain score of discussion strategy (11.25) is greater than the mean gain score of lecture strategy (7.60). The post-test mean score of discussion strategy (17.00) is also greater than that of lecture strategy (13.77) with a difference of 3.23. The result indicates that discussion strategy has greater effect in facilitating students' academic performance in Electrical Installation than lecture strategy.

Research question 2

What differences exist between the effects of demonstration and inquiry strategies on the academic performance of students in Electrical Installation? Table 2

indicates that the mean gain score of demonstration strategy (15.58) is greater than that of inquiry strategy (12.32). In addition, the post-test mean score of demonstration strategy (21.19) is greater than the post-test mean score of inquiry strategy (18.00), making a difference of 3.19. The result reveals that demonstration strategy has greater effects of promoting the academic performance of students in Electrical Installation than inquiry strategy.

Hypothesis 1

There is no significant difference between the effects of discussion and lecture strategies on the academic performance of students in Electrical Installation. Table 3 reveals that the calculated F(20.628) is greater than the critical F(3.07) at df of 2 and 116; and .05 level of significance. Therefore, the null hypothesis that there is no significant difference between the effects of discussion and lecture strategies on academic performance of students in Electrical Installation is rejected. Hence, there is a significant difference between the effects of discussion and lecture strategies on the academic performance of students in Electrical Installation.

Hypothesis 2

There is no significant difference between the effects of demonstration and inquiry strategies on the academic performance of students in Electrical Installation. Table 4 shows that the calculated F (28.832) is greater than the critical F (3.07) at df of 2 and 109, and .05 level of significance. Therefore, the null hypothesis that there is

Table 3. One-way analysis of covariance (AWCOVA) of difference between the effects of discussion and lecture strategies on the academic performance of students

Source of variation	SS	df	MS	F-cal	F-crit
Pre-test (covariates)	5.215	1	5.215	.603	
Main effects (instructional Strategies)	178.352	1	178.352	20.638*	3.07
Between group	179.054	2	89.527	10.360*	
Within group (error)	1002.442	116	8.642		

* = Significant at .05 alpha level

Table 4. One-way analysis of variance (ANCOVA) difference between the effects of demonstration and inquiry strategy on the academic performance of students

Source of variation	SS	df	MS	F-cal	F-crit
Pre-test (Covariates)	64.707	1	64.707	7.309*	
Main effects (instructional Strategies)	255.237	1	255.237	28.832*	3.07
Between group	313.987	2	156.994	17.734*	
Within group (error)	964.932	109	8.853		

* = Significant at .05 alpha level

Table 5. Multiple comparison (Scheffe) analysis of performance of students exposed to demonstration, discussion, inquiry and lecture instructional strategies

(I) Teaching method	(J) Teaching method	Mean difference (I-J)	Std error	Sig.
Demonstration	Lecture	7.4268*	.58306	.000
	Inquiry	3.1944*	.60613	.000
	Discussion	4.1944*	.83549	.000
Lecture	Demonstration	-7.4268	.58306	.000
	Inquiry	-4.2323*	.45689	.000
	Discussion	-3.2323*	.73444	.000
Inquiry	Demonstration	-3.1944*	.60613	.000
	Lecture	4.2323*	.45689	.000
	Discussion	1.0000	.75288	.623
Discussion	Demonstration	-4.1944*	.83549	.000
	Lecture	3.2323*	.73444	.000
	Inquiry	-1.0000	.75288	.623

no significant difference between the effects of demonstration and inquiry strategies on the academic performance of students in Electrical Installation is rejected. This implies that there is a significant difference between the effects of demonstration and inquiry strategies on the academic performance of students in Electrical Installation. Owing to the observed difference in effects of instructional strategies, multiple comparison (scheffe) analysis was considered to determine the order of effects of instructional strategies on the academic performance of students.

Table 5 shows the comparison of one instructional

strategy to other three instructional strategies. Comparing demonstration with other strategies, positive mean difference values are obtained, indicating that the performance of students when taught with demonstration supersedes their performances when they are exposed to lecture, inquiry and discussion. Also, the negative mean difference values obtained when compared lecture to other instructional strategies, implies that the performance of students is least observed in lecture than other strategies of instruction.

Comparing inquiry to demonstration, lecture and discussion strategies, the performance of students exposed

to inquiry strategy is better than those students taught with lecture and discussion but less than those taught with demonstration which is indicated with negative value. When comparing discussion to demonstration, lecture and inquiry strategies, students in the discussion class performed better than those in lecture group but less than students in demonstration and inquiry groups. The Multiple (Scheffe) Comparison Analysis indicates that the performance of students in Electrical Installation is highly observed in demonstration group, followed by students taught with inquiry strategy, discussion strategy and the least performance is seen in lecture group.

Findings of the study

Based on the data analyses, the findings of the study are as follows:

1. There is a significant difference between the effects of discussion and lecture instructional strategies on students' academic performance in Electrical Installation.
2. There is a significant difference between the effects of demonstration and inquiry instructional strategies on students' academic performance in Electrical Installation.
3. Demonstration strategy has the most significant effects on students' academic performance in Electrical Installation.

DISCUSSION

Result of data analyses revealed that there is a significant difference between the effects of discussion and lecture instructional strategies on students' academic performance in Electrical Installation. The findings of the study go in accordance with the work of Ekpo (1998) that lecture method was not better than other instructional methods and there was no reason to believe that teaching and learning could be handled properly with lecture method of instruction. The findings of the study are backed up with the works of Etuk et al., (2004); Saskatchewan Education (2009) that lectured contents are often rapidly forgotten. The findings of the study also indicated that there is a significant difference between the effects of demonstration and inquiry instructional strategies on students' academic performance in Electrical Installation. In support of the findings of the study, Ugwuanyi (1998) and Offiong (2007) in their related studies on the effects of instructional strategies on students' academic performances revealed higher performance in favour of students taught with demonstration than those taught with inquiry method.

Educational implications of the findings

The implication of the findings to education is that

students learn best when the right or appropriate instructional strategy is used in the teaching and learning situations. In addition, certain topics which can be taught effectively with discussion or inquiry strategy may not be handled very well with demonstration strategy and vice versa the students are motivated to learn when they are actively involved in class activities.

CONCLUSIONS

Based on the data analysed, findings and discussion made, it is concluded that instructional strategies differ significantly in their effects on academic performance of students in Electrical Installation. The learning outcomes of students' are enhanced when they are exposed to activities.

Recommendations

1. Due to varying degrees of performances observed in instructional strategies, variety of teaching (eclectic) methods and techniques should be used in lesson delivery to enhance effectiveness in teaching and learning Electrical Installation.
2. Teachers should ensure that students are well exposed to class activities such as questioning, discussing, practical work among others to boost their pace of learning and skills acquisition.
3. Arrangements should be made by Government to give 6 to 12 months training to the newly employed Electrical Installation Teachers on the selection and utilization of instructional facilities.

Conflict of Interests

The authors have not declared any conflict of interests.

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