INSTRUCTIONAL STRATEGIES AND STUDENTS’ ACADEMIC PERFORMANCE IN ELECTRICAL INSTALLATION IN TECHNICAL COLLEGES IN AKWA IBOM STATE

By

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Abstract

The study determined the effects of instructional strategies on students’ academic performance in Electrical Installation in Technical Colleges in Akwa Ibom State. A non-equivalent control group quasi experimental design was adopted for the study. Three intact classes from three Technical Colleges were selected to give a sample size of 211. Electrical Installation Achievement Test (EIAT) developed by the researcher 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. Data obtained were analysed using mean and analysis of covariance. The findings of the study revealed that there were significant differences between academic performance of students in Electrical Installation taught with demonstration and lecture strategies; and inquiry and lecture strategies. It was recommended among others that Electrical Installation teachers should be well trained by government on the selection and utilization of instructional strategies and materials.

The acquisition of both manipulative and intellectual skills which will enable an individual to become a self-reliant and useful member of the society is one of the basic requirements of Technical Education. Okoro (1993) and Kazeem (2006) opined that Technical Education is that aspect of education which utilises scientific knowledge in the acquisition of practical and applied skills for solving technical problems. Okoro (1993) further maintained that the primary purpose of Technical Education is to prepare persons for gainful employment in a recognised occupation.

Electrical Installation is an aspect of Technical Education. It is one of the courses offered in Technical Colleges to provide students with necessary skills to be self-reliant economically. 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 fore stated objectives, effective teaching of Electrical Installation would help to produce people who can be self-reliant and thus reduce unemployment in the country by opening up self-employment ventures. The teaching and learning of Electrical Installation should 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 persistently on the decline due to many factors such as teacher factors, student 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). The poor performance of students in Electrical Installation may be attributed to poor instructional strategies. These teaching problems have led to very vigorous search for appropriate instructional strategies that would best be used to achieve the aims of Electrical Installation teaching, thereby improving achievement and skills acquisition.

Instructional strategies are decisions about organising people, materials and ideas to provide learning (Nwachukwu, 2005). Instructional strategies encompass both decisions about instructional goals and the means of achieving those goals with particular students. Weston and Cranton (1986) viewed instructional strategy as both the teaching method and the materials used in the process of teaching. Some of these instructional strategies include demonstration, inquiry, and lecture among others.

Demonstration teaching strategy links explanation with practice. It is a method of teaching concepts, principles or real things by combining explanation with handling or manipulation of real things, equipment or materials. Ogwo and Oranu (2006) affirmed that demonstration strategy 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. Research findings by Bayim (2004) on instructional strategies for the teaching of integrated science in tertiary institutions revealed that the performance of students taught with demonstration method was better than those students taught with lecture method. Besides, research findings by Udom (2008) on the effects of teaching strategies on students’ skill acquisition showed that there was a significant difference between the effects of demonstration and lecture instructional strategies on students’ skill acquisition in goat husbandry.
Inquiry is a process in which learners use scientific means to investigate and arrive at generalizations (Ikpe, 2005). Inquiry approach results in appropriate cognitive and affective learning simultaneously (Ugwuanyi 1998). Ugwuanyi stated further that the inquiry is a successful experience that reinforces appropriate attitude and value. Inquiry learning provides opportunities for students to experience and acquire processes through which they can gather information about the world (Saskatchewan Education, 2009). Ugwuanyi (1998) obtained a significantly better performance from students taught with guided inquiry approach than those taught with expository approach. Omwirhiren (2002) carried out an investigation on the effect of guided discovery and lecture methods on the achievement of students in senior secondary school examination in chemistry. The study found out that the guided discovery method was effective in enhancing the achievement of students than the lecture method. Also, Ncharam (2005) studying the effects of inquiry and lecture methods on students’ performance in chemistry observed a performance in favour of guided inquiry approach.

Lecture is a traditional method of teaching which is referred to as the “talk and chalk”. Lecture method involves a verbal presentation of ideas, concepts, generalisations and facts. The practice in this method is that of spoon-feeding the learners with information or facts. The students as learners remain passive and receive information from their teacher (Umoren, 2001). Ekpo (1998) opined that lecture method of teaching should be deemphasised if students are to be properly taught.

Effective teaching requires that the teacher must be skillful in the selection and utilisation of appropriate instructional strategies. There is no one best approach to instruction. Teaching effectively demands that the teacher must possess some basic ability to organise, co-ordinate and utilise personal qualities, objectives and competency in lesson preparation, presentation and evaluation. In addition, he must be able to motivate the learners, use appropriate strategies and facilities in and around the class to promote and enhance efficiency and effectiveness in instructions. Some researchers recommend eclectic method (combination of strategies). Competent and experienced teachers are needed to teach Electrical Installation as a subject in Technical Colleges. In view of the problem of selection and utilisation of instructional strategies for effective teaching of Electrical Installation in Technical Colleges, this study became necessary. It is expected to fill the gap of determining 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 strategies for teaching Electrical Installation.

**Statement of the Problem**

Most students graduate from Technical Colleges without acquiring the required manipulative and theoretical competencies needed to enable them become self-
employed and self-reliant especially in Electrical Installation (Mbang, 2008). These students inability to have understood most of the theories and principles of Electrical Installation lead to their poor achievement at the end of the programme in school. The widespread low level performances in Electrical Installation in Technical Colleges have largely been attributed to teaching problem (Adeniyi, 1988).

If instruction in Electrical Installation is well articulated and delivered, the students’ understanding and performances will become enhanced. Against the background of inappropriate instructional strategies being used in teaching Electrical Installation which results in low achievement by 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) Demonstration and lecture strategies on the academic performance of students in Electrical Installation.

2) Inquiry and lecture strategies on the academic performance of students in Electrical Installation.

**Significance of the Study**

The study will be of benefit to the teachers, students and the general public. The teachers will be able to select appropriate instructional strategies and materials to suit different lessons for effective teaching of Electrical Installation in Technical colleges. They will realise the need to modify their instructional strategies for teaching of various theories and practices of Electrical Installation which will consequently equip the students with technical knowledge and skills that will enable them serve as useful members of the general public.

**Research Questions**

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

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

**Hypotheses**

$H_0$: There is no significant difference between the effects of demonstration and lecture strategies on the academic performance of students in Electrical Installation.
Ho$_2$: There is no significant difference between the effects of inquiry and lecture strategies on the academic performance of students in Electrical Installation.

Methods

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: $O_a X_1 O_b (E)$
Group 2: $O_c X_2 O_d (C)$

$X_1$ = experimental treatment condition
$X_2$ = control treatment condition
$O_a$ = Pre-test score of the experimental condition
$O_c$ = Pre-test score of the control condition
$O_b$ = Post-test score of the experimental condition; and
$O_d$ = Post-test score of the control condition.

Demonstration and inquiry 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 211 students was obtained from three intact classes of students offering Electrical Installation in the three Technical Colleges selected for the study. The three 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 three Technical Colleges selected for the study was 36, 76 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.
Validation and Reliability of the Instrument

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.

Data Collection Technique

The instrument (EIAT) was administered on 211 students in the three intact classes as pre-test. After three weeks of treatment, the EIAT was re-administered as post-test on the same students of Electrical Installation in their respective intact classes.

Scoring of the Instrument

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 the 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 demonstration and lecture strategies on the academic performance of students in Electrical Installation?

Table 1

<table>
<thead>
<tr>
<th>Instructional strategy</th>
<th>N</th>
<th>Pre-test X</th>
<th>Post-test X</th>
<th>Mean gain X</th>
<th>Post-test difference X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration</td>
<td>36</td>
<td>5.61</td>
<td>21.19</td>
<td>15.58</td>
<td>7.42</td>
</tr>
<tr>
<td>Lecture</td>
<td>99</td>
<td>6.17</td>
<td>13.77</td>
<td>7.60</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows that the mean gain score of demonstration strategy (15.58) is greater than the mean gain score of lecture strategy (7.60). Besides, the post-test mean score of
demonstration strategy (21.19) is greater than that of lecture strategy (13.77) with a difference of 7.42. It could be stated that demonstration strategy has greater effects in promoting students academic performance in Electrical Installation than lecture strategy.

Research Question 2
What differences exist between the effects of inquiry and lecture strategies on the academic performance of students in Electrical Installation?

Table 2
Mean Analysis of the Difference between the Effects of Inquiry and Lecture Strategies on the Academic Performance of Students

<table>
<thead>
<tr>
<th>Instructional strategy</th>
<th>N</th>
<th>Pre-test X</th>
<th>Post-test X</th>
<th>Mean gain X</th>
<th>Post-test difference X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry</td>
<td>76</td>
<td>5.68</td>
<td>18.00</td>
<td>12.32</td>
<td>4.23</td>
</tr>
<tr>
<td>Lecture</td>
<td>99</td>
<td>6.17</td>
<td>13.77</td>
<td>7.60</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 indicates that the mean gain score of inquiry strategy (12.32) is greater than the mean gain score of lecture strategy (7.60). Also, the post-test mean score of inquiry strategy (18.00) is greater than that of lecture strategy (13.77), making a difference of 4.23. It stands to reason that inquiry strategy has greater effects in enhancing students’ academic performance than lecture strategy in Electrical Installation.

Hypothesis 1
There is no significant difference between the effects of demonstration and lecture strategies on academic performance of students in Electrical Installation.

Table 3
One-way Analysis of Covariance (ANCOVA) of Difference between the Effects of Demonstration and Lecture Strategies on Academic Performance of Students

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>Df</th>
<th>MS</th>
<th>F-cal</th>
<th>F-crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test (covariates)</td>
<td>26.863</td>
<td>1</td>
<td>26.863</td>
<td>2.539</td>
<td></td>
</tr>
<tr>
<td>Main effects (instructional strategies)</td>
<td>1482.217</td>
<td>1</td>
<td>482.217</td>
<td>140.109*</td>
<td>3.92</td>
</tr>
<tr>
<td>Between group</td>
<td>2154.764</td>
<td>1</td>
<td>2154.764</td>
<td>293.683*</td>
<td></td>
</tr>
<tr>
<td>Within group (error)</td>
<td>1396.433</td>
<td>132</td>
<td>10.579</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = Significant at p < .05 alpha level
Table 3 shows that the calculated F (140.109) is greater than the critical F (3.92) at df of 1 and 132 and .05 level of significance. Therefore, the null hypothesis that there is no significant difference between the effects of demonstration and lecture 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 lecture strategies on academic performance of students in Electrical Installation.

**Hypothesis 2**
There is no significant difference between the effects of inquiry and lecture strategies on the academic performance of students in Electrical Installation.

Table 4
One-way Analysis of Variance (ANCOVA) of Difference between the Effects of Inquiry and Lecture Strategies on the Academic Performance of Students

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>Df</th>
<th>MS</th>
<th>F-cal</th>
<th>F-crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test (covariates)</td>
<td>5.075</td>
<td>1</td>
<td>5.075</td>
<td>.636</td>
<td></td>
</tr>
<tr>
<td>Main effects (instructional strategies)</td>
<td>767.890</td>
<td>1</td>
<td>767.890</td>
<td>96.225*</td>
<td>3.89</td>
</tr>
<tr>
<td>Between group</td>
<td>1947.627</td>
<td>1</td>
<td>1947.627</td>
<td>244.060*</td>
<td></td>
</tr>
<tr>
<td>Within group (error)</td>
<td>1372.580</td>
<td>172</td>
<td>7.980</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = Significant at p < .05 alpha level

Table 4 reveals that the F-calculated (96.225) is greater than F-critical (3.89) at df of 1 and 172 and .05 level of significance. Therefore, the null hypothesis that there is no significant difference between the effects of inquiry and lecture strategies on the academic performance of students in Electrical Installation is rejected. Hence, there is a significant difference between the effects of inquiry and lecture strategies on the academic performance of students in Electrical Installation.

Due 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
Multiple Comparison (Scheffe) Analysis of Performance of Students exposed to Demonstration, Inquiry and Lecture Instructional Strategies

<table>
<thead>
<tr>
<th>(I) Teaching Methods</th>
<th>(J) Teaching method</th>
<th>Mean difference (I – J)</th>
<th>Std error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration</td>
<td>Lecture</td>
<td>7.4268*</td>
<td>.58306</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Inquiry</td>
<td>3.1944*</td>
<td>.60613</td>
<td>.000</td>
</tr>
</tbody>
</table>
Table 5 shows the comparison of one instructional strategy to other two 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 and inquiry strategies. 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 and lecture strategies, the performance of students exposed to inquiry strategy is better than those students taught with lecture, but less than those taught with demonstration which indicates negative value. The multiple (Scheffe) Comparison Analysis indicates that performance of students in Electrical Installation is highly observed in demonstration group, followed by students taught with inquiry 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 demonstration and lecture strategies on students’ academic performance in Electrical Installation.
2. There is a significant difference between the effects of inquiry and lecture strategies on students’ academic performance in Electrical Installation.
3. Demonstration strategy has the most significant effect on students’ academic performance in Electrical Installation, followed by inquiry strategy and the least performance is seen in lecture group.

**Discussion**

Results of the data analysis include that there is a significant difference between the effects of demonstration and lecture strategies on students’ academic performance in Electrical Installation. In support of this findings, Bayim (2004) and Udom (2008) in their related studies on the effects of instructional strategies on the teaching of Integrated Science and students’ skill acquisition respectively, observed that the performances of students taught with demonstration method were better than those students taught with lecture method.

The findings of this study revealed that there is a significant difference between the effects of inquiry and lecture strategies on students’ academic performance in Electrical Installation. The findings of the study is backed up by the works of Ncharam
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(2005) and Ugwuanyi (2008) who studied the effect of inquiry and lecture methods on students’ performance observed students performance in favour of guided inquiry approach.

Educational Implications of the Findings

The implication of the findings to education is that different instructional strategies are best suited to various teaching and learning situations. This means that there is no single instructional strategy which can be employed by the teacher to teach all the contents of Electrical Installation curriculum effectively. In addition, certain topics which can be taught effectively with inquiry strategy may not be handled very well with demonstration strategy and vice-versa.

Also, the educational implication of the findings is that students learn best when the right or appropriate instructional strategy is used in the teaching and learning situations. It also implies that good teaching demands the competency of a teacher in the selection and utilisation of the instructional strategies to achieve the desired goals.

Conclusions

Instructional strategies differ significantly in their effects on academic performance of students in Electrical Installation. Effective teaching and learning of Electrical Installation are based on the ability of the teachers to select and use the most appropriate instructional strategies. The performances of the students are also higher when they are exposed to activities during class instructions.

Recommendations

1) The Electrical Installation teachers should be properly trained by government through workshops and seminars on the selection and utilisation of instructional strategies and materials.

2) The curriculum developers, while modifying the curriculum of work in Technical Colleges, should specify instructional strategies that will best be used for teaching different content areas.

3) Teachers should make efforts to ensure that students are properly exposed to practical activities through demonstration in order to facilitate easy understanding of lessons and skills acquisition.

4) The eclectic method of teaching which involves the combination of two or more instructional strategies should be adopted in lesson delivery by teachers of Electrical Installation to enhance effectiveness in teaching and learning.
References


