

DIFFERENTIAL EFFECTIVENESS OF THREE EVALUATION MODELS ON INTEGRATED SCIENCE STUDENTS' ACHIEVEMENTS IN JUNIOR SECONDARY SCHOOLS IN EKITI STATE

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Abstract

This study examined the differential effectiveness of three evaluation models on integrated science students' achievement in Junior Secondary Schools in Ekiti States. The study sample consisted of 320 male and female students, which were randomly selected from 5, Junior Secondary Schools in Ekiti State by using multistage sampling technique. Descriptive statistics viz: mean and standard deviation as well as inferential statistics viz: analyses of covariance and turkeys USD comparison test were used to analyze relevant data, finding however showed that students that were evaluated with "EIPOL" model performed best among all groups involved in the study. Also, gender had no significant effect on the posttest scores of students evaluated by using the three models. It was also discovered that students' antecedent is a significant factor in the evaluation of their academic achievement, resultantly. Educational evaluators should be conscious of the fact that the evaluation of the Nigeria Junior Secondary Integrated Science students' achievement should attend not only to outcomes, but antecedents' condition, and to process or transaction. The use of EIPOL model should be intensified, while the conventional methods of assessment is discouraged.

Introduction

Due to rapid increment and development in experience in various forms of curricula, people wanted to know how useful and the impact of the various curriculum on human endeavors, people wanted to know the social values of what is taught in classroom to the society. Are the contents of our courses relevant to the modern technological age? The glamour for public acceptability in education then arose, in response to the glamour; it became imperative to evaluate all facets of our educational system. This however led to a unique emergence of educational evaluation in the late 50s, and it continues to make use of those tools and ideas rooted in psychometrics and statistics in its operations in the field of Education (Oladunni, 1096; Alonge, 2004).

Theoretical Framework

The ATO" Model: The word "ATO" represents the initials of the models components. Stakes (1967) analysis "ATO" under three components, these are:

A - for antecedents: these are the prevailing conditions prior to the introduction of a program e.g. existing program before the introduction of the new one.

T - for transaction: This is the implementation stage where the various inputs interact e.g. interaction of **human and material resources** input.

O- for outcome: These are the observable or measurable outputs as results of stages 1 and 2 above. E.g. learning outcomes, program efficiency, etc.

The CIPP model: This is Scufflebean's (1971), approximation of Stakes "ATO" model. The four phrases of the model which are represented by "CIPP" are Context, Input, Process and Product.

C - for context: Existing Human and Material Resources, Administrative Structures, Political Socio-economic and Cultural situations before the introduction of the program.

I- for input: Qualitative and Quantitative measures of Human Material Resources Inputs and Financial Input.

P - process: Implementation Procedures and Processes.

P - for product: Effect and impacts of the program on education, social or political life of the people The "EIPOL" model. This was proposed by Dave (1979). "EIPOL" stands for environment, input, process, outcomes (immediate) and long-range outcomes.

E- for environment: This appraise the environmental setting of the programmed, e.g. Historical and Current situation.

I - for input: Appraisal of Material and Non-materials input.

P - for process: Appraisal of implementation processes e.g. management and pedagogical processes.

O - for immediate outcomes: Appraisal of learning outcomes, e.g. SSCE result, JSCE result in integrated science.

L - for long range outcome: Long time effects on Education, socio economic developments, etc, E.g JSSCE results in integrated science in predicting SSCE results and SSCE results in predicting degree results, etc.

The Problem

In view of the fact that integrated science is a relatively new concept in science teaching in Nigeria, Bajah (1983). Most researches on the subject are on the effects of school and home environmental variables on students' performance in integrated science, Ogunniyi (1986). Bolarinwa (1995) and Hugbusi (2004).

Literature review however, revealed that, not much work had been done on the evaluation of integrated science as a new program as well as students' achievement in the subject in the various strata of the Nigerian Educational system with and or without evaluation models.

However, in view of the importance of integrated science to the nations scientific and technological development, couple with its compulsory status in the JSSC'E curriculum as clearly stated in National Policy on Educational (1991), researches on evaluation should continue to seek for methods and variables which would continue to improve students mastery of the subject as well as their academic achievement in the subject.

Resultantly therefore, this study examined the differential effectiveness of three evaluation modes on integrated science students achievement in junior secondary schools in Ekiti State.

The following null hypothesis were generated and tested in this at $P=0.05$ level of significance. There is no significant difference between the academic achievement of integrated science students evaluated by using "ATO" "CIPP" and "ELPOL" models.

There is no significant difference between the academic achievement of male and female integrated science students evaluated by using the "ATO", "CIPP" and "ELPOL" models.

Method and Procedure

The design used in this study was a non- randomized control group 3x2x1 pretext post text experimental design.

The study sample consisted of 320 (160 male and 160 female) students, who were randomly selected from 5 junior secondary school in Ado Ekiti Local Government area of Ekiti State by using multistage random sampling techniques. Generally, there were three experimental groups, groups E1, E2 and E3 respectively, whose academic achievement were evaluated by using the ATO, "CIPP" and ELPOC models respectively and one control group.

All the experimental groups as well as the control group received the normal lessons on the topics in the JSS 1 11 integrated science syllabus for a period of two months (during the year 2006). Teaching practice exercise of college of education Ikere-Ekiti Students. The major treatments given to the subject however, were those each group was evaluated separately according to the "modus - Operandi" of the peculiar evaluation model used for them aside the control group.

All groups were taught and evaluated by the same teacher for two months it was only the evaluation models used for each group that were different. The control group was however evaluated by using the ordinary conventional methods.

The face, content and construct, validity of the research instrument were ascertained by giving them to expert in test and measurement (specifically program and curriculum evaluators) for critical appraisal. Scrutiny and comments.

The corrected versions were incorporated in the research instrument. The reliability indices of the instruments were obtained by using the test - retest method, for group in which the evaluation involved three stages of the ATO model the reliability indices of the three instruments used were 0.17, 0.69 and 0.74. Further more, stages of evaluation in group (b), consequently, the reliability indices of the instruments used for evaluation in the five stages of "ELPOL" model used for groups were 0.70, 0.75, 0.67, 0.69 and 0.72 respectively and last for "EIPOL" model which has five stages the reliability indices of the instruments use during each stage is 0.68, 0.73, 0.70, 0.74 and 0.71. According to Alonge (1989) and Macintosh (1974), these indices are good enough for this kind of study

Since intact groups in the classrooms were involved in the study, analyses of covariance was used to statistically equate the subject, groups were also compared using the students' t-test for independent data, while turkeys USD post hoc comparison was carried out on the data in order to determine the comparative nature of the effect of each of the models. Lastly, the strength of effects by the sources of between - group variability was also determination

Results and Discussion

The data generated in this study were analyzed accordingly and presented as shown in stables below:

Table 1: Descriptive Statistics of Pre-Test and Post Scores of All Groups in Integrated Science

Group	N	Pre-Test	Post-Test		
		XL	SD	XO	SD
E1	80	2.63	0.80	5.92	1.32
E2	80	2.41	0.72	6.38	1.20
E3	80	2.86	0.62	7.50	1.35
Control	80	2.09	0.66	3.65	1.02
Total	320				

Table I, showed the performance of groups of students evaluated by using the A TO, CIPP and ELPOL models as well as the control group in integrated science.

Table II: Analysis of Covariance of Post-Test Mean Scores of all Groups in Integrated Science Using Pre-Test Scores as Covariates

Source	Sun of square	DF	Mean Squares	Fc	Sig of F
Covariates	621.33	1	621.33	32.33	0.001
Main effect	1480.21	2	1320.30	68.69	0.0001
Explained	2101.54	3	982.10	51.10	0.0001
Residual	1480.21	313	19.22		
Total	3581.7	319	23.51		

The analyses in Table II, showed the testing procedures for hypothesis one.

Table III: The Strength of the Effects Of ATO, CIPP and ELPOL Model on Students Achievement In Integrated Science

Source	Sum of Square Total	Sum of Square	~Ett?	% of Strength
Covariates	621.33	3581.75	0.07	7.00
Main effect	1480.21	3581.75	0.44	44.00
Explained	2101.54	3881.75	0.49	49.00

The analyses in Table III, also showed the testing procedures for hypothesis one.

Table IV: Turkey USD Comparison test Between Group Means in Integrated Science Achievement

Null Hypothesis	Absolute Difference Between Sample means	Value of CD	Null Hypothesis	
			Tested	Rejected
X1=X2	9.62	4.91	YES	
X1=X3	9.08	4.91	YES	
X2=X3	8.72	4.91	YES	
X1=XC	5.00	4.91	YES	
X3=XC	2.44	4.91		

The analyses in Table IV, showed the testing procedures for hypothesis one.

Table V: Analysis of Covariance of Post Test Scores of Integrated Science Students Using Pretest Cores as Covariates on Sex and Antecedent

Source	Sum Of Squares	Df	Mean Squares	Fc	Sig Off
Covariates	625.31	1	625.31	25.61	0.0001
Main effects	2656.50	7	682.36	23.22	0.0001
EXPERT	1362.33	3	887.66	44.10	0.0001
ANTEC	948.26	3	407.09	18.92	0.0001
SEX	38.66	1	49.11	1.02	0.162
2-WAY	383.09	27	33.87	1.28	0.118
EXPERT ANTEC	204.55	6	52.22	1.78	0.655
EXPERT SEX:	25.50	3	11.24	0.23	0.0001
RESIDUAL	5761.22	286	21.93		
TOTAL	9563.73	316	43.8		

The analysis in Table V, showed the results in of the analysis of covariance of posttest scores of integrated science students using the pretest score as covariance

Discussions

The result from Table I showed that the pretest mean scores (M1=2.63, M2=2.41, M3 =7.50, MC =33.65) in all groups are much lower than the post - test mean.scores (M1=5.92, M2=6.38 M3.65), using the posttest means scores as criterion. The results showed that the group evaluated with EIPOL model (E3) performed best among all other groups including the control group integrated science.

A critical examination of their stand and deviations (S1=1.3 S2=1 .20, S3=1.35, SC'=I .02) also showed that the control has the least variability. From the analyses in table 1, it sneaks observed that the use of ELPOL model preview the best learning outcome integrated science.

Furthermore, the analysis in Table I I showed a one way analyzed of covariance of the post test mean scores of all groups in integrated science using pretest scores as covariance from the tables, on FC=68.69 is highly significant, P>0.05 and hence the null hypothesis one is rejected.

Furthermore, table I I 1 revealed the strength of the effects of the ATO, CIPP" and performance in integrated science, indexed by eat square of 49%. This however, implies that 49%. 01 the variability is associated with the use ATO, CIPP" and ELPOL models in the evaluation of integrated science students achievement. This however is a very strong effect.

To determine where the differences in means lied, the Turkey's USD comparison test also indicated that the post test mean scores of the group evaluated with the EIPOL model is significantly greater than that of the control group in integrated science.

Furthermore, the analysis in Table V showed the results in of the analysis of "ATO" and "CIPP" model are significantly greater than that of the control groups in integrated science.

The main effects of types of evaluation model used on sex alone produced an FC of 1.02 which is not significant at $p < 0.05$, and hence between the post test scores of integrated science.

Also from Table V the main effects of type of evaluation model used on students antecedents alone produced an FC of 18.92, which is significant at $p > 0.05$ level of significance. It can hence be deduced that student's antecedent is a significant factor in the evaluation of their academic achievement.

Recommendations and Conclusion

Based on the finding of this study the following recommendation were made:

- 1) Educational evaluators and educational planners should be conscious of the fact that the evaluation of the Nigerian junior Secondary Integrated Science Student Achievement should attend not only to outcomes, but also to inputs or antecedents condition and to process or transaction.
- 2) Efforts should be intensified on the use of (EIPOL) model since it is best in evaluating students achievement in schools, this may largely be due to the fact that it has the broad scope and the largest evaluation parameters among other model used in this study.
- 3) The use of (EIPOL) model for evaluation must be a part of a comprehensive plan of an interpreted science instruction.
- 4) Curriculum planners integrated science textbook writers and interpreted science teachers and instructors should consider it necessary to adequately calculate the use of "EIPOL" model in the fetching and learning of interpreted science at all level of Nigeria's educational strata.
- 5) The use of one single junior secondary school examination for the assessment of Jss3 students should henceforth be discontinued and hence be replaced with the "EIPOL" model.
- 6) Conclusively, finding of this study however, showed that, students that were evaluated with the evaluation models performed significantly better than those that were evaluated by using the conventional method is (the control group). Findings also showed that, the experimental group (3), (E3) evaluated with the use of "EIPOL" model performed best among all group involved in the study. Finding further showed that, there was no significant differences between the posttest mean scores of male and female student evaluation of their academic achievement.

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