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RESEARCH ARTICLE

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Enhancing students' academic achievement in computer studies through the use of reinforcement strategy

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Abstract

The study investigated on academic achievement of secondary school computer studies students taught using reinforcement and those taught without reinforcement. The study was carried out in Nnewi North Local Government Area (NNLGA) of Anambra State, Nigeria. The study adopted pre-test post-test non-equivalent control group design. Two research questions and two null hypotheses guided the study. The study comprised of all senior secondary school II (SS2) students from Nnewi North Local Government Area (NNLGA) of Anambra State, numbering one thousand two hundred and ten (1,210). The sample size of the study was one hundred and thirty nine (139) computer studies students. Purposive sampling technique was used to select only two (2) public secondary schools out of eight (8) offering computer studies in external examination in NNLGA of Anambra State. The researchers made use of intact classes from the two groups. The validated instrument tagged "Computer Operations Achievement Test"(COPAT) was used for the data collection. Kuder Richardson Formula 20 (KR) reliability coefficient of 0.72 was established. Data collected were analyzed using mean, standard deviation and ANCOVA at 0.05 level of significance. The findings from the study revealed that reinforcement in form of praise, encouragement, motivation and hope was used as reinforcement strategy in classroom teaching. This made students taught computer operations as a topic in computer studies using reinforcement strategy (RS) performed significantly higher than the students taught computer operations as a topic in computer studies without using reinforcement strategy (RS). The study further revealed that there is no gender effect on computer studies students taught computer operation using RS. Based on the findings, the researchers recommended among others that teacher at all levels should adopt the use of reinforcement in instructional process since it helps to improve academic achievement of students in computer studies in both internal and external examination.

Keywords: Academic achievement, Computer studies, Reinforcement strategy

Introduction

There had been worldwide recognition of the importance of vocational, science and technology education (VSTE) in national development. This lead to its placement in Nigerian curriculum as necessary subject of study by students. Thus, its major objective is to produce responsible individual-citizens, intellectuals, professionals in divert fields of study (FRN, 2013). These citizens when taught effectively in any VSTE subjects would embrace hands-on activities, minds-on activities, relevant to the society and as well tackle economic, socio-political and religious challenges in Nigeria

(Okekeokosisi & Okigbo, 2021). Thus, Computer studies is one of the VSTE subjects incorporated in senior secondary school curriculum in Nigeria. The subject deals with the ways of representing objects and processes which include algorithmic processes, principles, hardware and software designs, applications and their impact on the society (Okekeokosisi, 2021). It involves the study of computer system, application analysis and processes that embrace solving problems of our everyday life (Anaehobi, Offiah & Okigbo, 2019). As a school subject, it equips individual learners towards skill development, self-reliant and for occupation in the field of work. Hence, the subject requires appropriate instructional strategy-technique for learners' achievement through reinforcement strategy. This can be attested by WAEC Chief examiners report on computer studies from 2016-2019 which states that the cause of students' average performance –achievement can be attributed to students' lack of knowledge of the subject matter, poor hand writing, spelling mistakes, lack of interest, non-commitment and poor methodology on the part of teachers. Poor method of teaching could be as a result of continuous use of conventional method of teaching in the classroom. Hence, the need for this study to advocate for a shift from teacher-centred method – conventional method to learner-centered methods that employ the use of reinforcement-motivation. The shift was to facilitate active learning process and sought higher academic achievement in what was learnt.

Instructional strategy-technique is one employed by the teacher to support the learner during learning process. Meador (2019) defined instructional strategy-technique as all approaches that a teacher may take to engage, stimulate and motivate learners actively in the learning process. Abdulrahim, Taiwo and Abimbola (2019) added that instructional strategy-technique deals with methods used in teaching and learning process which help to activate students' curiosity about a topic, engage students in learning and probe critical thinking skills for better understanding of course content. The strategies drives teacher's instruction as they work to meet specific learning objectives and ensure that students are equipped with the tools they need to achieve successfully.

Academic achievement connotes learning outcome of the learner. Eremie and Doueyi-Fiderikumo (2018) conceived academic achievement as the degree or level of success attained at the end of an academic endeavor. As for Buseri (2017), academic achievement is the outcome of education, the extent to which a student teacher or institution has achieved his or her educational goals. In summary, Abumchukwu & Okeke (2020), concluded that academic achievement is the extent to which the goals of instruction have been achieved by the students. It depicts how much learners own learning. Hence, it is commonly measured by examinations or continuous assessment, but there is no general agreement on how it is best tested or which aspect is most important. Therefore, the need for high academic achievement of individual learner could be attained to proper reinforcement which is the very key to learning and to anyone who see education as an instrument of societal transformation and development.

Reinforcement Strategy (RS) is one of the innovative ways of motivating learners towards learning. It equally stimulates and increases their academic achievement and social behaviour. According to Morin (2019), reinforcement strategy could be any factor which when made to follow a response immediately will increase the probability of the re-occurrence of the response. Agbasi and Achugbu (2020) termed it as encouragement, motivation, praise, hope to learner in the learning process. It is an act that is done intentionally to provoke learners' interest as well motivates them adequately to learn. This purposive act of motivation can be positive or negative regardless of the purpose and what to motivate on but its main objective is for change in behaviour. Akinade in Eremie and Doueyi-Fiderikumo (2018) added that reinforcement strategy involves the application of pleasant or desirable stimuli in the treatment of behaviour. In other words, reinforcement is the encouragement that follows good behaviour. For instance, a student submits an assignment on time and includes some extra information gathered about the topic. The teacher wanting to appreciate the students' efforts asks the other students to clap for her. The teacher's action acts as an impetus for the student to repeat the same effort again. Generally, most students want to be successful and will do so, more often when their achievement is acknowledged and reinforced. Hence, reinforcement strategy is a central concept in human acquisition of skill, performance and competencies (Kendra, 2009). It is central to success

of school learning or acquisition of skill, knowledge and attitude in informal school setting. Therefore, this study sought to find out whether RS could enhance students' achievement in computer studies.

Statement of the Problem

Computer studies as one of the VSTE subjects taught in senior secondary schools in Nigeria plays a vital role in vocational, science and technology education (VSTE) in national development. However, there is evidence in literature that students' academic achievement in the subject is persistently average. The persistent average academic achievement have been attributed to teachers' use of ineffective teacher-centered methods which make students passive in the teaching and learning process. One of the learner-centred methods that can motivate and engage students actively in learning process is reinforcement strategy (RS). Research reports on reinforcement strategy (RS) and students' achievement is conflicting. The problem is would the use of RS in teaching computer studies to secondary school students improve their academic achievement in the subject?

Purpose of the Study

The purpose of this study is to investigate students' academic achievement in computer studies through the use of reinforcement strategy. Specifically, the study sought to determine;

- Difference in the mean academic achievement scores of students taught computer studies using reinforcement strategy (RS) and their counterparts who were not taught computer studies using reinforcement strategy (RS)
- Difference in the mean academic achievement scores of male and female students taught computer studies with reinforcement strategy (RS)

Research Questions

The following research questions guided the study;

1. What is the difference in the mean academic achievement scores of students taught computer studies using reinforcement strategy (RS) and their counterparts who were not taught computer studies using reinforcement strategy (RS)?
2. What is the difference in the mean achievement scores of male and female students' taught computer studies using reinforcement strategy (RS)?

Hypothesis

One null hypothesis was formulated and tested at 0.05 level of significance.

H₀₁: There is no significant difference in the mean academic achievement scores of students taught computer studies using RS and their counterparts who were not taught computer studies using RS.

H₀₂: There is no significant difference in the mean achievement scores of male and female students' taught computer studies using reinforcement strategy (RS).

Method

Quasi-experimental research design specifically pre-test post-test non-equivalent control group design was employed in this study. This design was chosen because the participants were not randomized hence intact classes were used.

The population of the study comprised of all senior secondary school II (SS2) students from Nnewi North Local Government Area (NNLGA) of Anambra State. Thus, numbering one thousand two hundred and ten (1,210), PPSSC, Awka, 2022. The choice of choosing the LGA is that the area is a commercial area with high population which is surrounded with government establishments like Nnamdi Azikiwe University teaching hospital and so on.

The total sample size of the study was one hundred and thirty nine (139) computer studies students. Purposive sampling technique was used to select only two (2) public secondary schools out

of eight (8) offering computer studies in external examination in NNLGA of Anambra State. The researchers made use of intact classes from the two groups. These intact classes served as the experimental and control groups for the study.

Computer Operations Achievement Test (COPAT) with 50 items, 4 options was used for the study. The COPAT was adapted by the researchers while lesson plan of the two groups was developed by the researchers for the study. The adapted and developed instrument was validated by experts in Educational Measurement and Evaluation from Odumegwu Ojukwu University, Uli, Anambra State and an experienced secondary school teacher who had taught computer studies for at least five years and had marked WAEC for the same stated periods. The validated instrument was attested to be suitable for the study. The COPAT was trial tested with 30 SS2 students outside the area of the study and the scores obtained were used to establish the reliability. Pearson product moment correlation coefficient was used to establish the reliability of the instrument. The reliability index of 0.72 was obtained for the instrument.

COPAT was administered on the students in both groups as pre-test before the commencement of the treatment and no feedback was given to the students on their pre-test achievement. The experimental group was taught a concept using reinforcement strategy (RS) like reward such as pencil, pen, ruler, exercise books and other tangible items, praise, clapping hand, smile, engagement, feedback and so on. Control group was taught the same concept but without reinforcement which is referred to as conventional method. Each of the lessons lasted for 40mins.

After four weeks of teaching and the revision period, the same instrument (COPAT) was reshuffled and re-administered to the same students in their classes on the fifth week.

The research questions were answered using mean and standard deviation while the hypotheses were tested using analysis of covariance (ANCOVA).

Results

Table 1: Mean achievement scores students taught computer studies using reinforcement strategy (RS) and lecture method

Groups	N	\bar{X}	SD	\bar{X}	SD	\bar{X} Gain
Experimental	65	37.8	16.7	68.8	16.7	31.0
Control	74	28.7	18.5	44.0	20.1	15.3
Total	139					

The analysis on Table 1 shows the pre-test and post-test mean achievement of students exposed to reinforcement strategy (RS) is 37.8; 68.8 and those taught with lecture method (RM) 28.7; 44.0 in computer studies. The analyses further revealed that mean post-test achievement scores of students exposed to RS is 68.8 which is higher than that of the students taught with lecture method (44.0). This shows that RS is effective in enhancing students' achievement in computer studies.

Table 2: Mean achievement scores of male and female students taught computer studies using reinforcement strategy (RS).

Groups	N	\bar{X}	SD	\bar{X}	SD	\bar{X} Gain
Male	24	37.9	15.2	71.7	13.5	33.8
Female	41	37.8	17.6	67.1	18.4	29.3
Total	65					

From Table 2, it shows the pre-test and post-test mean achievement scores of male and female students exposed to RS in computer studies. The analysis also revealed that mean achievement scores of male students exposed to computer studies is higher than that of their female counterparts exposed to RS in computer studies.

Hypotheses

H₀₁: There is no significant difference in the mean academic achievement scores of students taught computer studies using RS and their counterparts who were not taught computer studies using RS.

Table 3: ANCOVA results of students taught computer studies using RS and their counterparts who were not taught computer studies using RS.

Source of Variation	Type III Sum of Squares	Df	Mean squares	F	Sig
Corrected Model	25857.987 ^a	2	12928.993	40.887	.000
Intercept	62517.319	1	62517.319	197.705	.000
Group	15443.146	1	15443.146	48.837	.000
Pretest CAT	4548.534	1	4548.534	14.384	.000
Error	43005.251	136	316.215		
Total	498629.000	139			
	68863.237	138			

*p<0.05

Data in Table 3 portray that test mode effect on achievement is significant given that $F_{(1,136)} = 48.837$ and $p < 0.05$ (.000 < 0.05). Therefore, the null hypothesis is rejected, thus, the difference in the mean achievement scores of students taught with RS and those taught with lecture method is significant. The mean achievement score of students exposed to RS is higher than those taught with lecture method in computer studies.

H₀₂: There is no significant difference in the mean achievement scores of male and female students' taught computer studies using reinforcement strategy (RS).

Table 4: ANCOVA results of Male and Female students' taught computer studies using reinforcement strategy (RS).

Source of Variation	Type III Sum of Squares	Df	Mean square	F	Sig
Corrected Model	1046.818 ^a	2	523.409	1.912	.156
Intercept	39132.069	1	39132.069	142.961	.000
Gender	306.216	1	306.216	1.119	.294
Pretest CAT	737.488	1	737.488	2.694	.106
Error	16970.967	62	273.725		
Total	325829.000	65			
Corrected Total	18017.785	64			

*p<0.05

Table 4 reveals that $F_{(1,62)} = 1.119$ and $p < 0.05$ (.294 > 0.05), this implies that gender effect on achievement of those exposed to RS is not significant. Therefore, the null hypothesis is not rejected, thus, the difference in the mean achievement scores of male and female students taught with RS in computer studies is not significant.

Discussion

The finding of this study revealed that the academic achievement of students taught computer operations as a topic in computer studies using reinforcement strategy (RS) is significantly high than the students taught computer operations as a topic in computer studies without using reinforcement strategy (RS). This is in line with the findings of Eremie and Doneyi-Fiderikumo (2018), Morin (2019), Agbasi and Achugbu (2020) that both positive and negative reinforcement plays important role in promoting learners high academic achievement in teaching-learning. Both reinforcements are basically good to increase the students' motivation that might later on affect their achievement during the teaching and learning process.

The study revealed that the mean achievement scores of male students exposed to RS was higher than that of the female students exposed to RS. Nevertheless, the difference in the mean achievement scores of male and female students exposed to RS was not significant. The present study supports the findings of Eremie and Doyeyi-Fiderikumo (2018), that both male and female students achievement were not influenced differentially by verbal and tangible rewards during instruction process. The use of reinforcement in teaching-learning process has a key role to play on the academic achievement of secondary school students. This result is not surprising because naturally humans love praise, free gifts, and encouragements to get the best out of them.

Conclusion

This paper had discussed the issue of reinforcement strategy in teaching and learning of computer studies. The study has revealed that the use of reinforcement strategy such as praise, encouragement, motivation, hope and so on improves academic achievement of computer studies students. Thus, Computer studies teaching and learning can still be exciting if the suggested remedial processes can be incorporated in the classroom. Above all, appropriate education authorities could encourage other teachers from other disciplines to adopt this strategy for maximum academic achievement in other fields of study.

Recommendations

Based on the findings of the study, the researchers made the following recommendation;

- Teachers at all levels should learn the use of reinforcement to help improve academic achievement of students since it was found effective.
- State and federal government ministries should train teachers on how best to apply reinforcement for the maximum academic achievement of students in the teaching-learning process.
- Teaching without any form of reinforcement should be discouraged in the teaching and learning situation.

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