



Effect of Three Modes of Reward on Private Secondary School Students' Academic Achievement in Biology, Adamawa State, Nigeria

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Abstract

The study investigated the effect of three modes of reward on private secondary school students' academic achievement in Biology in Adamawa State, Nigeria. Three research questions and three hypotheses were formulated and tested at 0.05 level of significance. The study employed quasi experimental pre-test, post-test non-equivalent control group design. The study involved 223 SSII Biology students from four private schools in Yola education zone. The instrument used for data collection was a 50 items Biology Achievement Test (BAT). The reliability coefficient of 0.85 was obtained using Cronback Alpha. Data were analyzed using mean and standard deviation to answer the research questions and Analysis of Covariance (ANCOVA) to test the hypotheses. The findings revealed students' rewarded with prizes ($x=42.43$, $F=60.156$, 0.000 , partial $\eta^2=0.354$). Praises ($X=37.89$, $F=1.119$, $P=0.022$, partial $\eta^2=0.10$). clapping hands ($x=39.56$, $F=6.406$, $P=0.013$, partial $\eta^2=0.057$) (42.43) achieved better than those rewarded with praises (37.89) and clapping (39.56) among others.

Keywords: Private schools, Biology, academic achievement, Expository method and Reward.

Introduction

Education is the responsibility of all. Government cannot carry the burden alone. Neboh (2009) opined that it will be misleading to assert that government has all that it takes to fund education in Nigeria. Increasing demands for education and conducive learning environment has combined to make it difficult for government alone to continue to carry the burden of education. The school ownership be it private or public is expected to function in compliance with the goals and objectives of National Policy on Education (2013). To this end, students are expected to perform brilliantly in the final examination, as this determines the quality of output of secondary schools. This is one of the parameters used to measure the effectiveness of a school system. The better the performance of students, the more effective the system is assumed to be (Philius & Wanjobi, 2011). There are basically three types of secondary schools in Nigeria, these are; the private schools, public schools and the community schools.

The name "Private" secondary school applies to all secondary schools owned by corporate bodies, religious organization, individuals or establishments. In Nigeria, it is the general opinion of people that private schools are better in terms of availability of human and physical facilities and consequently students perform better than those in public schools. According to Alimi (2012) and Nawaz and Yasin (2015) that most public owned schools are characterized by failing structures, dilapidated buildings, teachers with outdated informations, lack of planning and non-motivated

teachers and learners. These have a negative effect on the students' academic achievement.

Also, private schools which serves as a correction of the failed public schools are better funded and tend to aid students learning and thus influence the academic achievement of students by making available a conducive learning environment and learners motivation thus, having a positive impact on their academic performance (Owaduge, 2015). According to Odeleye, Oyelami and Odeleye (2012) teachers' qualification are difficult to measure, public schools teachers appears to be qualified than private school teachers in terms of educational qualification and years of teaching experience. There are some private schools that employ and maintain poorly paid staff. Also the school fees in private school is outrageous as compared to the virtually free education in the public schools in Adamawa State. These affects the teaching of science subjects especially biology.

Biology as a core science subject at the secondary school level in Nigeria, has a large students' enrolment than any other science subject (Ofoegbu, 2005). This has been attributed to several factors including students perception of the subject as simple and non-availability of other science subjects in some schools especially in private schools such that the Biology is made compulsory for both science and non-science students. In spite of the popularity of Biology among students, the failure rate in both internal and external examination has remained very high. Several researchers such as Nwagbo (2007); Uzoечи (2009); Nzelum (2010)

West African Examination Council (WAEC) Chief examiner's report (2016) and Joda and Mohammed (2017) have pointed out different reasons for students poor performance, some of which are due to the abstract nature of the subject, lack of understanding of certain Biological terminologies and concepts which lead to poor persistent performance by the students. Amuma and Idoli (2012) and Abba (2018) suggested that an effective behaviour modification system within the classroom in form of reinforcement should be applied to enhance positive attitude which is crucial to performance in any subject using effective teaching methods.

Expository method is a teaching method in which the teacher presents a verbal discourse on a particular subject, theme or concept to the learners. It is an ideal way of communicating coherent sequence of ideas and it is used to elaborate, clarify and discuss factual information or views on issues and problems. The teachers deliver preplanned lesson to the students with little or no instructional aids (Okoli, 2006). According to Jimoh as cited in Joda (2014) that expository method can be improved and made more useful in science teaching when the teachers adequately and thoroughly prepares his lesson; uses media or instructional materials to teach, tailors his lessons to learners goals and provides motivational cues for learning such as reward.

Reward (reinforcer) is technically defined as any contingently delivered consequences associated with an increase in the future likelihood of a behavior in a similar situation. Reward always adopts the perspective of a learner, not the intentions of the person delivering the reward. It is the effect of the consequence on future behavior that determines if the consequences are reward (Reiss, 2005). Rewards are important for both encouraging appropriate behaviors and preventing or discouragement of inappropriate behavior. Reward can be in form of verbal reinforcement like praises or in form of action like clapping of hands (applause) or a token (prize) for rewarding hardwork among learners (Abba, 2018).

Acknowledging the effect of reward (reinforcement) strategy, numerous behavioural and cognitive behavioral interventions have incorporated the use of either praise or prize for positive reinforcement. Classroom prizes might motivate students to work harder, but sometimes it may be for wrong reason. Students benefit from their work when feel proud of their accomplishments and have an internal drive that motivates them to succeed (Malik, 2010).

Adaji (2004) conducted a research on the effect of verbal reinforcement (praises) on students' academic achievement in English language. The finding shows that the use of verbal reinforcement strategy has a facilitative effect on the students. Vargo (2012) conducted a study on the effect of extrinsic rewards in the high school classroom in Louisiana, USA. The finding revealed that the performance of students materially reinforced differ significantly with those that are not materially reinforced. Amuma and Idoli (2012) conducted a research on effect of material and non-material reinforcers on the academic performance of students in Health science. The result show that the students that were materially reinforced had higher achievement score than those with non-materially reinforcement. Adedeji (2007) investigated on the impact of motivation (reward) on students' academic achievement and learning outcomes in Mathematics in secondary schools in Nigeria. Result indicated that motivated students performed significantly better than non-motivated students. Araoye (2013) conducted a research on readdressing students' motivation and academic achievement in Biology in Oyo State. The finding revealed that motivated students performed better than non-motivated students. Sulkin (2010) researched on students reinforcement at Isreal's Ben-gurion University of Negev found out that clapping hands and other related activities have direct link with students performance.

Bryan (2009) investigated on the effect of reward and motivation on students' academic achievement. The finding in the study indicated that when the teachers no longer provided reward, students' behavior changed or reverted back to their original form. The impact of reward was not felt. Mfonobong and Imaobong (2013) conducted a research on the analysis of achievement motivation and academic engagement of students in Nigerian senior secondary schools. The finding revealed that achievement motivation had a significant impact on academic engagement than the moderately and lowly motivated students.

Oke and Maliki's (2009) finding revealed that students in private schools are always reinforced and hence, performed better than those in public schools. Alimi, Ehinola and Alabi (2012) investigated the influence of school types and motivation on students' academic achievement and found that school type had no significant influence on students' academic achievement.

Statement of the Problem

Private Schools is another form of school type in Nigeria. They are better funded and equipped in terms of instructional and infrastructural facilities. It aid students learning by making available a conducive learning environment and learners motivation. However, public school teachers appear to be more qualified than the private school teachers in terms of educational qualification and years of experience. Several researchers (Nzelum, 2010; Joda & Mohammed, 2017) have pointed out that students perform poorly in Biology and the reasons for students poor academic performance in the subject are due to poor teaching methods, abstract nature of the subject, inadequate laboratory equipments to support the theoretical aspect of the subject and lack of appropriate reinforcement on the part of the teachers to encourage learners. It is against this background that this paper seeks to investigate the effect of three modes of reward on private secondary school students' academic performance in Biology in Adamawa State.

Based on the problem of the study, the following research question was formulated to guide the study.

1. What is the mean achievement scores of students taught Biology using rewards (praise, prizes, and clapping) and those without reward? In-line with the research question, the hypothesis was formulated and tested at 0.05 level of significance.

Hypothesis

1. There is no significant difference in the mean scores of students taught Biology with rewards (Praises, prizes, and clapping) and those taught without reward.

Method

A quasi experimental research design involving pre-test, post-test control group was employed. The

population of the study comprised of 2,482 senior secondary school students (SSII) in 42 private schools in Yola education zone. The zone has largest number of private schools in the state being the state capital. The SS II students are stable unlike the SS I students who are freshly admitted into the senior secondary school system and the SS III students who are facing the final year external examinations. Random sampling technique was used to select four schools and four intact classes with 223 Biology students as the research sample-A 50 item Biology Achievement Test (BAT) was adapted from WAEC past question papers 2012-2017 was used as instrument for data collection. The instrument had five options with one correct answer (key) and four distractors. The instrument was subjected to face and content validation by experts. The reliability coefficient was determined by testing 50 students from a school (Nadi International School) outside the main study. Kuder Richardson formular 21 (KR 21) was used in estimating the reliability for BAT. The reliability coefficient of 0.86 was obtained. The three experimental groups were taught Ecosystem, reproduction and cell through the expository method using reward (praises, prizes and clapping hands) while the control group was taught the same topics using expository method without reward. The treatment lasted for six weeks. The Biology teachers in the four schools served as research assistants. They were trained and also used the lesson plan drawn by the researcher in teaching the topics. The research questions were analyzed using mean and standard deviation while the hypotheses were tested using Analysis of covariance (ANCOVA).

Results

The data collected were analyzed using mean and standard deviation to answer the research questions and the Analysis of Covariance (ANCOVA) to test the hypotheses.

Table I: The mean achievement scores and standard deviation of experimental group (praises) and control group in both pre-test and post-test.

Group	N	Pre-test		Post-test		Mean diff
		X	SD	X	SD	
Experimental	55	14.51	2.07	37.89	3.50	23.38
Control	57	12.26	1.80	28.05	4.78	15.79
Mean difference		2.25		9.84		7.57

Data in table 1 revealed that praises group had a pre-test of 14.51. In the post-test, praises had the mean score of 37.89 with standard deviation of 3.50. The control group that is teaching with no reward group had a pre-test mean score of 12.26 with standard

deviation of 1.80 and post-test mean score of 28.05 and standard deviation of 4.78. In summary, the mean score difference between the pre-test and post-test was higher which means that praises were important in improving students performance.



Table 2: The mean achievement scores and standard deviations of experimental (prizes) and control group in both pre-test and post-test.

Group	N	Pre-test		Post-test		Mean diff
		X	SD	X	SD	
Experimental	58	13.45	2.25	42.43	1.91	28.87
Control	57	12.26	1.80	28.05	4.78	15.79
Mean difference		1.19		14.38		13.10

Data in Table 2 revealed that prizes group had pre-test mean score of 13.45 and standard deviation of 2.25. The table further revealed that prizes group had a post-test mean score of 42.43 with standard deviation of 1.19. The control group pre-test mean score of 12.26 standard deviation of 1.80 remained.

The post-test mean score of the control group was 28.05. The mean score difference between the post-test and pre-test was 29.89. One can easily deduce that the use of prizes in teaching enhanced students' achievement in Biology better than when praises were used.

Table 3: Mean achievement and standard deviation scores of students rewarded with clapping of hands rewards and those not rewarded with clapping of hands.

Group	N	Pre-test		Post-test		Mean diff
		X	SD	X	SD	
Experimental	53	13.04	1.94	39.56	1.74	26.52
Control	57	12.26	1.80	28.05	4.78	15.79
Mean difference		0.78		11.51		10.73

Data in Table 3 revealed that clapping of hands group had a pre-test of 13.04. and standard deviation of 1.94. The group also has post-test mean score of 39.56 with standard deviation of 1.74. The control groups post-test mean score of 28.05 and standard

deviation of 4.78 remained. This revealed that clapping hands in teaching Biology is very effective. This is because of the pretest, posttest mean difference of 26.52 when compared with the control groups 15.79.

Table 4: Analysis of Covariance on Praise rewards and no reward groups pretest, posttest mean scores.

Source of Variance	Sum of square	Df	Mean square	F	p. val	Partial eta
Correction model	79.039	2	39.520	3.415	0.036	0.059
Intercept	4359.860	1	4359.860	376.728	0.000	0.777
Pre-test	78.305	1	12.951	6.766	0.011	0.059
Praise rewards	12.951	1	12.951	1.119	0.022	0.010

Data in Table 4 showed that the groups had value of $F=1.119$ at $P=0.022$ and partial $\eta=0.10$. Therefore, null hypothesis was rejected. This means that there was a significant mean difference between group taught with praise rewards and those taught with no

reward since the p value was less than 0.05 level of significance.
 H_{02} : There is no significant difference in the mean scores of students taught Biology with Prize rewards and those taught with no reward.

Table 5: Analysis of Covariance on Prize rewards and no reward groups pretest, posttest mean scores.

Source of Variance	Sum of square	Df	Mean square	F	p. val	Partial eta
Correction model	618.112	2	309.056	42.713	0.000	0.437
Intercept	4041.614	1	4041.614	558.568	0.000	0.835
Pre-test	74.952	1	74.951	10.359	0.002	0.086
Praise rewards	435.270	1	35.270	60.156	0.000	

Data in Table 5 revealed the following values $F=60.156$, $P=0.000$ and partial $\eta^2=0.354$. This means that there was a significant difference between the group taught Biology with prize

rewards and those taught with no reward. This was because the p value of 0.000 was less than 0.05. This implies that the null hypothesis was rejected.

Table 6: Analysis of Covariance on clapping hands rewards and no reward group

Source of Variance	Sum of square	Df	Mean square	F	p. val	Partial eta
Correction model	84.800	2	42.400	5.609	0.005	0.096
Intercept	3042.836	1	3042.836	402.498	0.000	0.792
Pre-test	22.511	1	22.511	2.978	0.087	0.027
Praise rewards	48.431	1	48.431	6.406	0.013	0.057

Data in Table 6 indicated that the groups have the following values $F=6.406$, $P=0.013$ and partial $\eta^2=0.057$. This implies that the null hypothesis was rejected since the computed p value (0.013) was less than p value of 0.05 level of significance. Thus, the effect of clapping hands is significant on the achievement of the students. In other words, the treatment played an important role in enhancing students' achievement.

Discussion

It was revealed that praises group had a higher means score than the no reward group. This implies that the use of praises in teaching Biology in the private schools is important in reinforcing students for better performance. Verbal praises are easier to make and teachers repeat it several times in a lesson. This motivate the students and give them confidence in what they learn. This finding is in agreement with the research conducted by Mfonobong and Imaobong (2013) and Adaji (2004) which shows that students rewarded with verbal praises indicated significant improvement in their performance than those unrewarded. The study revealed that the use of prizes (biros, pencils, eraser, exercise books) played a significant role in reinforcing students' performance than students taught without reward. This is in consonance with the findings of Amuma and Idoli (2012) and Vargo (2012) that the mean scores of students materially reinforced differ significantly with those that were not materially reinforced.

The study also revealed that the use of clapping hands whenever student provided the right answer improves the cognitive ability of the students', creates conducive atmosphere in teaching and raised the spirit of participation among students. These therefore, boost the academic performance of the students. This finding is in line with the finding of Sulkin (2010) that clapping hands and other

related activities have direct link to development of important skills in children and young adults.

Conclusion

It was concluded that the use of reward (praises, prizes and clapping hands) in private senior secondary schools enhanced students' academic achievement in Biology.

Recommendations

1. Biology teachers of private schools should use prizes like exercise books, biros, pencils and the like with appropriate teaching method to enhance students' performance.
2. Teachers of Biology should be encouraged to use verbal praises and clapping hands if prizes are out of reach with appropriate teaching method like expository method to enhance students' performance in the subject.

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