Effect of Token Economy on Academic Achievement of Secondary School Students: Implications for Counselling

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Abstract *The study centered on determining the effect of token economy on academic achievement of secondary school students. Demonstration Secondary School, Federal College of Education (Technical), Omoku, Rivers State, Nigeria was used for the study. Eighty (80) Junior Secondary 3 Integrated Science students and eighty (80) Senior Secondary 1 Biology students making up one hundred and sixty (160) students of the chosen school, during the 2009/2010 academic session constituted the study sample. Each level of students taught by the same teacher was divided into experimental and control groups. The experimental groups were motivated with token economy during the lessons while the control groups were not motivated. Raw scores of the students from the two tests they were given made up data for the study. Data analysis involved the use of mean scores and t-test of significant difference between two independent group mean scores, supported by F-test of homogeneity of two independent group variances. It was found out that the experimental groups put up higher academic achievement than the control groups. It was also found out that token economy had significant effect on academic achievement of the experimental groups. These findings and their counseling implication were discussed*

Background of the Study

Motivation is pivotal to actions and achievements of people. Based on this, one could ask this important question. What is motivation? Ihiegbulem (1993) defines motivation as the arousal of a person's internal tendencies to act properly with a view to producing desired effects. According to Lahey (1995) motivation is an internal state that activates and gives direction to a person's thoughts, feelings and actions. Furthermore, Wikipedia (2011) holds that motivation is the driving force by which people achieve their goals. A look at the above definitions depicts substantial concordance among them. They reasonably stress the point that motivation has to do with the arousal of a person's internal state to accomplish a goal (Ihiegbulem, 2006).

Motivation enables people to achieve their goals in various spheres of life. In education, motivation can have several effects on how students learn and behave towards subject matter or content to be learnt (Wikipedia, 2011). One form of motivation that is applied in education to boost students' learning is token economy (Uams, 2007). What then is token economy? In the view of Ihiegbulem and Onomuodeke (2006), token economy is a behaviour therapy in which people are given tokens for exhibiting desired bahaviours. Uams (2007) defines token economy as an intensive in-class positive reinforcement programme for building up and maintaining appropriate classroom performance and behaviour. According to Wikipedia (2009), token economy is a form of behaviour modification designed to increase desirable behaviour and decrease undesirable behaviour with the use of tokens.

The above definitions portray the fact that tokens are used as motivators and positive reinforcers of desired target behaviour (Wikipedia, 2011). A token economy is demonstrated when a person is immediately given a token for exhibiting a desired bahaviour (Nayak and Rao, 2007). On a geberal note, Hackenberg (2009) defines a token as an object or symbol that is exchanged for goods and services. In the school setting, Ihiegbulem, (2010) defines a token as whatever the teacher uses to motivate a learner (pupil or student) towards exhibiting desired academic behaviour. Tokens can include physical material things such as money, biscuits, sweets, biros, pencils and books as well as award of points (Ihiegbulem, 2010 and Wikipedia, 2011).

Token economy has been accepted as a form of motivation. Sequel to this, secondary school teachers are expected to apply token economy during their lessons with a view to motivating their students towards enhanced academic achievement. Teachers in the Demonstration Secondary School, Federal College of Education (Technical) Omoku, which was used for this study, are no less expected to apply token economy in teaching their students. Based on this, the researchers deemed it necessary to investigate the effect of token economy on the academic achievement of Junior Secondary 3 (JS3) Integrated Science and Senior Secondary 1 (SS1) Biology students of Demonstration Secondary School of Federal College of Education (Technical), Omoku, Rivers State. Thus, they carried out this study.

Statement of the Problem

In classroom token economy programme, students earn tokens for performing teacher-desired academic activities (Moore, 2001 and Uams, 2007). Such teacher-related academic activities of students are often considered to be reasonably enhanced by tokens. This trend should no less be true of Junior Secondary 3 (JS3) Integrated Science and Senior Secondary 1 (SS1) Biology students of Demonstration Secondary School of Federal College of Education (Technical), Omoku. In consideration of this trend, the effect of token economy on the academic achievement of these students is the focus of this study. The problem of this study therefore centres on detection of the effect of token economy on the academic achievement of students of Demonstration Secondary School of Federal College of Education (Technical), Omoku, Rivers State.

Purpose of the Study

The purpose of the study was to find out:
1. the extent of academic achievements of Junior Secondary 3 Integrated Science Students motivated with token economy and those not motivated with token economy.
2. the extent of academic achievements of Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy.
3. whether the academic achievements of Junior Secondary 3 Integrated Science students motivated with token economy and those not motivated with token economy differ significantly.
4. whether the academic achievements of senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy differ significantly.

Research Questions of the Study

The following research questions based on the purpose of the study were raised.
1. To what extent do Junior Secondary 3 Integrated Science Students motivated with token economy and those not motivated with token economy achieve academically in an Integrated Science test?
2. To what extent do Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy achieve academically in a Biology test?
3. To what extent do Junior Secondary 3 Integrated Science Students motivated with token economy and those not motivated with token economy differ in their academic achievements?
4. To what extent do Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy differ in their academic achievements?

Hypotheses of the Study

The following null hypotheses derived from research questions 3 and 4 were tested in the study.
1. There is no significant difference in academic achievement between Junior Secondary 3 Integrated

Science students motivated with token economy and those not motivated with token economy, at the 5% (0.05) level of significance.

2. There is no significant difference in academic achievement between Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy at the 5% (0.05) level of significance.

Significance of the Study

The knowledge of the effect of token economy on the academic achievements of students of the school used for this study, is still in obscurity. The study is most likely to throw light in this direction. Also, one would expect a difference in academic achievement between students motivated with token economy and those not motivated. It is not yet known whether the expected difference is significant or not. The study contributes in this vein and clears the cloud. The study findings are likely to benefit teachers in terms of helping them to enhance the motivation level of their students to learn and achieve higher academically. Furthermore, the study findings will be beneficial to educational researchers. This is in terms of providing basis for further research, in the area of the effect of token economy on the academic achievements of students.

Methodology

Design of the Study

The study is a quasi-experimental research. Being a quasi-experimental research, the quasi-experimental design was appropriate (Amini, 2000). This is because the effects of intervening and extraneous variables like anxiety, fatigue, hunger, sickness among others on academic achievement of the students, cannot be totally controlled by the researchers (Ihiegbulem, 2000).

Study Population

The study population comprised all the one hundred and ninety-eight (198) Junior Secondary 3 Integrated Science and Senior Secondary 1 Biology students of the school used for the study, during the 2009/2010 academic session. It was made up of one hundred and two (102) integrated science and ninety-six (96) Biology students of the school.

Study Sample

One hundred and sixty (160) out of one hundred and ninety-eight (198) students that made up the study population were randomly selected to constitute the study sample. This sample was about 81% of the population. Eighty (80) Integrated Science and eighty (80) Biology students made up the sample. To ensure randomization, the first eighty (80) Integrated science students and the first eighty (80) Biology students were selected from the lists of students after marking the administered tests, irrespective of their scores.

Procedure of the Experiments

The Junior Secondary 3 Integrated Science students had two (2) arms, A and B. There were also two arms, A and B of Senior Secondary 1 Biology students. The "A" arms of the two class levels were used as experimental groups while the "B" arms were used as control groups. The Integrated Science students were taught two topics, one topic per lesson. Also, the Biology students were taught two topics, one topic per lesson. During the teaching the experimental groups were motivated with token economy while the control

groups were not motivated.

Students who answered questions correctly during the teaching were given tokens like fruits, sweets and biscuits in addition to praises. The overall tokens given to students who scored 50% and above in the administered tests were mathematical sets, exercise books, rulers and biros. Students who scored 70% and above were given mathematical sets, exercise books and biros while those who scored 60 to 69% were given mathematical sets and biros. Those who scored 50 to 59% were given exercise books, biros and rulers. The students were made aware of these overall tokens before the lessons and the tests.

Data Collection

Data for the study were collected with two tests administered to the Integrated Science and Biology students used for the study. One of the tests was based on the two topics taught to the experimental and control groups of Integrated Science students. The other test was based on the two topics taught to the experimental and control groups of Biology students. Raw scores from these two tests constituted the data for the study.

Data Analysis and Results

Data analysis involved the use of mean scores, t-test of significant difference between two independent group mean scores and F-test of homogeneity of group variances. Mean scores were used to determine the extents of academic achievements of experimental and control groups of the students. The t-tests were used to find out whether the experimental and control groups differed significantly in their extents of academic achievement. The F-tests were used to ascertain the reliability and robustness of t-test results (Ferguson and Takane, 1989 and Ukwuije, 1994).

Determination of the Extents of Academic Achievement of the Experimental and Control Groups of Students

The extents of academic achievement of the experimental and control groups of the students were determined by calculating their mean scores in the administered tests.

Research Question One (1)

Research question 1 is as follows. To what extent do Junior Secondary 3 Integrated Science students motivated with token economy and those not motivated with token economy achieve academically in an Integrated Science test?
In order to answer this question, the mean scores of the experimental (motivated) and control (not motivated) groups of the Integrated Science students in a test were calculated. The results are presented in table 1 below.

Table 1: Mean Scores of the Experimental and Control Groups of Integrated Science Students

Test	Groups	N	Total Score (TS)	Mean Score $(\bar{X})$
Integrated Science	Experimental	40	2050	51.25
	Control	40	1720	43.0

Table 1 indicates that the experimental group of Integrated Science students, motivated with token economy, had a mean score of 51.25. The table also shows that the controlled group of Integrated Science students that was not motivated, had a mean score of 43.0. These mean scores reveal that the extent of academic

achievement of the experimental group of students was moderate while the extent of academic achievement of the control group was low. This judgment is based on the fact that the maximum score obtainable by a student in the test is 100%. Table 1 also indicates that the mean score of the experimental group is reasonably greater than that of the control group.

Research Question Two (2)

Research question 2 goes this way. To what extent do Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy achieve academically in a Biology test?
To answer this question, the mean scores of the experimental (motivated) and control (not motivated) groups of the Biology students in a test were computed. Table 2 below shows the results

Table 2: Mean Scores of the Experimental and Control Groups of Biology Students

Test	Groups	N	Total Score (TS)	Mean Score $(\overline{X})$
Biology	Experimental	40	2340	58.50
	Control	40	1840	46.0

As shown in the table 2 above, the mean scores of the experimental group motivated with token economy and the control group not motivated with token economy are 58.50 and 46.0 respectively. These mean scores indicate that the extent of academic achievement of the experimental group of students was moderately high while the extent of academic achievement of the control group was nearly moderate. This judgment is reasonable because the maximum score a student could obtain is 100%. Table 2 also shows that the mean score of the experimental group is much higher than that of the control group.

Test of Significant Difference in Academic Achievement between Groups

Hypothesis One (1)

Hypothesis 1 states that there is no significant differences in academic achievements between Junior Secondary 3 Integrated Science students motivated with token economy and those not motivated with token economy, at the 5% level of significance. In testing this hypothesis, the mean scores and standard deviations of the motivated (experimental) group and the group that was not motivated (control group), in an Integrated Science test were calculated. The t-test was then applied to test for significance of difference in academic achievement between the experimental and control groups in the test. The t-test was two-tailed and conducted at the 5% (0.05) level of significance, with 78 degrees of freedom and an expected table value of 2.0 from the t-table. Table 3 below shows the t-test result.

Table 3: The t-test Result for the Experimental and Control groups of Integrated Science Students

Test	Groups	N	Mean Score $(\overline{X})$	Standard Deviation (SD)	t-value
Integrated Science test	Experimental	40	51.25	17.50	2.58 (S)
	Control	40	43.0	10.12	

P≤ 0.05; Expected Value = 2.0
S = Significant
N = Number of Students in Each Group

Table 3 shows that the calculated t-value of 2.58 is greater than the expected (table) value of 2.0. This implies that there was significant difference in academic achievement between the experimental and control groups of Integrated Science Students. Thus, the academic achievement of the experimental group motivated with token economy, was significantly higher than that of the control group that was not motivated with token economy. Consequently hypothesis 1 was rejected.

Hypothesis Two (2)

Hypothesis 2 states that there is no significant difference in academic achievement between Senior Secondary 1 Biology students motivated with token economy and those not motivated with token economy, at the 5% level of significance. In order to test this hypothesis, the mean scores and standard deviations of the motivated (experimental) and not motivated (control) groups of students in a Biology test were computed. Thereafter, the t-test was applied to test for significance of difference in academic achievement between the experimental and control groups in the test. The t-test was two-tailed. It was conducted at the 5% level of significance, with 78 degrees of freedom and an expected table value of 2.0. The result of the t-test is presented in table 4 below

Table 4: The t-test Result for the Experimental and Control groups of Biology Students

Test	Groups	N	Mean Score ($\overline{X}$)	Standard Deviation (SD)	t-value
Biology Test	Experimental	40	58.50	20.54	3.40(S)
	Control	40	46.0	10.99	

P≤ 0.05; Expected Value = 2.0
N = Number of Students in Each Group
S = Significant

The above table 4 shows that the computed t-value of 3.40 is much greater than the expected value of 2.0. The import of this is that there was significant difference in academic achievement between the experimental and control groups of Biology students. Based on this, the academic achievement of the experimental group motivated with token economy, was significantly higher than that of the control group that did nor receive token economy motivation. Hypothesis 2 was consequently rejected.

Test of Homogeneity of the Variances of the Experimental and Control Groups

Two F-tests of homogeneity of variances of the experimental and control groups were conducted to support and strengthen the t-test results in this study. In doing this, the F-ratio of the variances of experimental and control groups in the Integrated Science test was computed, with the greater variance as the numerator and the smaller variance as the denominator (Ferguson and Takane, 1989 and Ukwuije, 1994). The F-test was two-tailed and conducted at the 10% (0.1) level of significance, with 39 degrees of freedom each for the numerator and denominator and an expected value of 3.42 from the F-table. This is the doubled table value of 1.71 at the 5% (0.05) level of significance for one-tailed test (Ferguson and Takane, 1989). The same process of computing F-ratio was repeated for the experimental and control groups in the Biology test. The F-test results are presented in table 5 below.

Table 5: The F-test Results for the Experimental and Control Groups of Integrated Science and Biology Students

Test	Groups	N	Standard Deviation (SD)	Variance (SD)^2	F-Value
Integrated Science	Experimental	40	17.50	306.25	2.99(NS)
	Control	40	10.12	102.41	
Biology	Experimental	40	20.54	421.89	3.49 (S)
	Control	40	10.99	120.78	

P≤ 0.1; Expected Value = 3.42
N = Number of Students in each group
NS = Not significant; S = Significant

Table 5 shows that the computed F-value of 2.99 for the two groups in the Integrated Science test is less than the expected (table) value of 3.42. Consequently, the variances of both groups were homogenous, implying that they did not differ significantly. Also, the table reveals that the F-value of 3.49 is just slightly greater than the expected value of 3.42. Based on this very slight (negligible) difference, one could comfortably say that the variances of the Biology test groups were homogenous to a moderate extent. The two F-test results support and strengthen the reliability and robustness of the t-test results in tables 3 and 4.

Summary of Results (Findings)

The following results (findings) came up from data analysis.
1. The extent of academic achievement of the experimental (motivated) group of Integrated Science students was moderate, while that of the control group that was not motivated was low.
2. The extent of academic achievement of the experimental (motivated) group of Biology students was moderately high, while that of the control group that was not motivated was nearly moderate.
3. The academic achievement of the experimental group of Integrated Science students motivated with token economy was significantly higher than that of the control group that was not motivated.
4. The academic achievement of the experimental group of Biology students motivated with token economy, was much significantly higher than that of the control group that was not motivated

Discussion of Findings

It was found out from this study that the extent of academic achievement of the experimental (motivated) group of Integrated Science students was moderate, while that of the control group that was not motivated was low, as shown by the mean scores in table 1. Also, it was found out that the extent of academic achievement of the experimental (motivated) group of Biology students was moderately high while that of the control group that was not motivated was nearly moderate, as indicated by the mean scores in table 2. The extents of academic achievement of the experimental and control groups as reflected by their mean scores indicate that the experimental groups achieved higher academically than the control groups in the two tests.
The reason for the above trend of findings is not far-fetched. It is very likely that the experimental groups achieved higher because of their motivation with token economy. This trend of academic achievement is consistent with the notion that token economy has a high tendency to raise the intrinsic motivation of students to learn and achieve higher (Leblanc, 2004). The trend is also in congruity with the view of Wikipedia (2011) that motivation in education can enhance how students learn a subject matter or content and improve their academic performances.
    Furthermore, it was found out that the difference in the extents of academic achievement of the

experimental and control groups of Integrated Science students, as shown by their mean scores in table 1 was statistically significantly (Refer to table 3). The same (similar) trend of finding came up in respect of the experimental and control groups of Biology students as shown in table 4. These findings clearly indicate that token economy used to motivate the experimental groups of Integrated Science and Biology students had significant effect on the students' academic achievement.

The findings agree with the remark of Filcheck and McNeil (2004) that token economies are effective in producing behaviour charge in many settings including the classroom settings. Also, the findings strengthen the belief that incentives like token economy are significantly effective in motivating and boosting students' learning (Weller, 2005 and Uams, 2007).

Counselling Implications of the Findings

The findings of this study have some counselling implications for teaching methods of teachers and academic achievement of students. Based on the findings, there is exigent need for teachers in general and the teachers in the school used for this study in particular, to consistently motivate their students with token economy with a view to boosting their academic achievement. One way to meet this need is by organizing counselling and encouraging talks for teachers by guidance-counsellors. It is expected that the talks would inspire the teachers to make effective use of token economy in motivating their students during their classroom lessons, for the students' higher academic achievement.

Based on the findings, there is also the need for students in general and the students of the school used for this study in particular to avail themselves of the benefits of classroom motivation with token economy. This need could be largely met by organizing educational counselling talks for students by guidance-counsellors. Such talks would enable the students to possibly react positively to their teachers' motivation with token economy, to largely enhance their academic achievement.

Conclusion

From the study findings, it was concluded that:
1. the extent of academic achievement of the experimental groups of students motivated with token economy was on the average moderate, while that of the control groups that were not motivated with token economy was on the average low.
2. the extents of academic achievement of the experimental groups were higher than those of the control groups.
3. the difference in the extent of academic achievement of the experimental and control groups of students was statistically significant, meaning that token economy had significant effect on the academic achievement of the experimental groups.

Recommendations

Based on the study findings, it is recommended that teachers should consistently use token economy to motivate their students during their classroom lessons. To achieve this, it is further recommended that the government should through the school authorities empower teachers financially to enable them purchase tokens used for motivating their students.

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