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An Assessment of the Use of Workbook on the Reading Culture and Performance of Students in Integrated Science in Abeokuta, Nigeria

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Abstract
This study is aimed at assessing the use of workbook in the reading culture and performances of students in junior secondary schools in Abeokuta using Integrated Science. The workbook is a form of programmed learning or programmed instruction meant to supplement traditional classroom teaching. We hypothesized that there would not be significant differences Questionnaires were administered to thirty teachers and thirty students. Students' samples were chosen at random while the Integrated Science teachers available in the six schools selected for the project completed the teachers' questionnaire. The data collected were subjected to t-test and correlation analysis. A significant difference was established in the reading culture (16.55 @ p≤ 0.5) and the academic performance (8.66 @ P ≤ 0.5 as assessed by teachers&12.041@ P ≤ 0.5 as assessed by students) of students before and after the introduction of workbook. It shows that the use of workbook is found to improve significantly the reading culture and the performance of students in Integrated Science. The use of workbook should be extended to other subjects in the school curriculum.

Introduction

The lack luster attitude of secondary school students in Nigeria to reading culture has been a source of worry to most educationists for over a decade (Onukaogu 2006). This is further compounded by the fact that most schools lack library facilities, while those that have display an array of outdated textbooks, journals and other publications. Most unfortunate is the fact that in schools that have well equipped libraries, many of the students shy away from using such facilities. Sequel to the above, the performances of the students in academics have nose-dived as indicated by their terminal examination results, such as the West African Secondary School Certificate Examination (WASSCE) results which recently put the students' pass level at about 15 per cent (Ezekwesili 2006).

Reading Culture

A critical look at literature, as shown in the review below, shows that the issue of reading culture is not peculiar to Nigeria. It seems to be a universal problem that may impinge academic achievement.

The only difference is that the status varies from one country to the other. For instance, Sisulu (2004) recognizes the absence of a culture of reading as a major concern in South African region, using the following statistics:

- at least 3 million adults who are completely illiterate.
- About 5 to 8 millions who are functionally illiterate, that is, unable to function adequately in the modern world due to under-developed reading and writing skills
- Tens of millions who are "alliterate" able to read but who don't read because the society lacked a culture of reading.

In line with Sisilu's classification of 'alliteracy', Lyimo (2006) cited in Haonga (2006) asserts that in Tanzania, unlike many countries, one hardly finds anyone reading a novel while on transit using public service vehicles or trains. Serious minds that read seem to be a few privileged people in Tanzania. It is worse in the rural areas where there are no libraries and prospective readers are too poor to afford buying books. Haonga (2006) puts the factors that hinder Tanzania from evolving an appreciable reading culture as:

- limited availability of books;
- prevalence of idle minds;

- poverty; and
- illiteracy

Efforts have been made by various researchers to improve reading habit and ability of students thereby promoting reading culture in them. Kaija (2002) reports a six week programme for 1800 students from 11 registered schools in Kampala launched by 'The New Vision' to promote reading culture among children. The schools pay for the 'The New Vision' paper at half price twice a week. Parents were to help the children with any challenging activities and to buy copies of the paper to enable their children read more (Dumeha, 2006, cited in Haonga, 2006). The sustainability of the project is really in doubt when the parents have to be saddled with the responsibility of paying for the daily newspaper.

Nigerian Book Fair Trust (NBFT) put in place the idea of using the Nigerian International Book Fair (NIBF) as an instrument for sensitizing the general public, especially Nigerians, to the place of books and other instructional materials in human and national development (Lawal-Solarin, 2007).

A practical demonstration of this is a special focus on writing competition and essay writing exercise for school children from age 8 to 18. Netherlands inaugurated 'Stichting Lezen', the national platform for the promotion of reading, as a creative structure that makes a broad range of reading promotion activities possible. Based on a public - private partnership, new methods and materials are developed. An example is The National Reading Aloud Day; a modern competition for primary school children (ages 10 - 12). After several pre-rounds, the National Final is a top scoring event among youngsters. Libraries, schools, the press and the media all work together to stimulate the fun of reading.

Holte (1998) gave some examples of the activities initiated, coordinated and stimulated by Stichting Lezen. He summarized them into three categories:

- Development of new strategies
- Improving the reading environment
- Improving the image of reading.

The dearth of books in schools and libraries has prompted a campaign for the improvement of the culture of reading in Nigeria. This development of new

strategies campaign is spearheaded by the Reading Association of Nigeria (RAN) with the help of books donated by the Global Literacy Project (GLP). Pilot schools were chosen, each of such is surrounded by a cluster of five schools participating in the capacity building programme. All the teachers in the participating schools are involved in the project. The first core group of teachers drawn from the participating schools will re-train the other teachers in their schools with support from the project consultants Onukaogu (2006). The effect of the programme on the reading culture has not been reported. It is hoped that at completion of each cluster, new clusters will be created. The efforts are laudable. It may take a pretty long time before the clustering exercise gets to all schools. It is therefore very important that a programme that will be continuous irrespective of the school location needs be worked out.

Most advanced countries like America, Britain and Japan have strived to overcome this problem with the introduction of Programmed Learning or Programmed Instruction based on the principle of operant conditioning and which was first introduced by Professor B. A. Skinner of Harvard University, USA in the 1950s. Programmed Learning is operated through two main materials or devices. These are Programmed Textbook and Teaching Machines. The latter is expensive to acquire which may be difficult for most schools in developing countries. However, the cheaper alternative, programmed textbooks in form of workbooks, has been gaining popularity in junior secondary schools in recent years. As the usage of workbooks gathers momentum, there is the need to verify if they are producing similar results of improved performance experienced by learners in the advanced countries where teaching machines are used as supplements to the conventional class teaching.

Historical Background of Workbook

The seed of programmed learning was sown in the 20th century with what Pressey called adjunct auto-instruction (Caskey 2006) while the modern programmed learning is Skinner's linear teaching programmes designed to replace traditional courses of study. Both the former and latter could be traced to Pressey and Fredrick Skinner respectively. The traditional classroom instruction was described as being too aversive, too large, too negative, and improperly sequenced. Unlike Pressey's "adjunct" programming designed to supplement regular course study, Skinner's programmed learning required the user to construct an answer by filling in a

blank with the correct response, rather than to select one of four options as correct as in Pressey's machine. Filling-in-a-blank is a recall type of learning because the user has to recall the answer from memory rather than merely recognizing it as in multiple choices. After filling in the blank, the user compares his or her answer with the correct one (Caskey 2006).The characteristics were designed by Skinner to overcome the classroom limitations stated above. Specifically, users learn without aversive threats, they work one step at a time, from simple to hard, they work at their own pace, and they are frequently reinforced for their responses. The use of programmed learning grew until the early 1960's when low-quality programs flooded the educational market and gave many educators a negative impression of programmed learning that lasted until the early 1970's. Three primary reasons were the nature of the material and processes, the higher publishing costs, and the attitudes of teachers. It wasn't until the late 1960's, when a corpus of research became available which indicated that programmed learning was most effective as a supplement to normal instruction, which began to abate (Caskey 2006). The early programmed learning was often delivered by some form of 'teaching machine' but later it brought the concept of interactive text. The programmed instruction movement extended the use of printed self-instruction to all school subject areas. Text forms include programmed books and workbooks.

Attitudes of Learners to Reading

Students' attitude is a significant factor in reading engagement as it affects motivation and performance. It is a state of mind accompanied by feelings and emotions that makes reading more or less probable (Turner & Paris, 1995). Students' attitude to reading is a learnt characteristic and it is the feeling that can influence whether students engage in or avoid reading opportunities (McKenna et al, 1995). Attitude and motivation towards reading can be influenced by cultural and school-based factors (Baker 2003). The child's environment play a prominent role in motivating him or otherwise to reading culture. It is important that students learn to read effectively at an early age in order to overcome literacy difficulties (Black & Young, 2005). Motivation to read affects students' application to reading tasks. It is imperative that students develop not only the skills, but also the emotional will (attitude and motivation) to engage in reading experiences (Gambrell, 2004). Motivation can be internal or external and it energizes behaviour (Woolfolk, 1995; Western, 1996). Both intrinsic and extrinsic motivational factors influence students' reading attitude and application, but

intrinsic motivational factors are more strongly aligned to engagement with reading tasks (Waugh, 2002). Meaningful learning takes place when a student is personally willing to invest time, effort and cognitive attention to the task.

Students' attitude is shaped by social and cultural factors. Literacy discourses, ways in which people know, do, believe, act and read are inherently linked to the cultural and social models available to them (Black & Young, 2005). As students develop their literate ability, they also develop their attitude as members of a cultural and social group. Attitudes can change over time as they are defined by perceptions, in conjunction with those of cultural and social group.

Motivation to read particular text types at home often differs from that at school where academic purposes for reading are included. Resistant school readers often can and do read purposefully at home for pleasure (Perry et al 2003). Connecting classroom reading with real-life activities and areas of personal interest promote heightened positive reading attitudes in students (Kush & Watkins,2003; Guthrie & Davis,1996).This reiterates the assertion that "productive research might highlight at-risk situational contexts rather than at-risk students" (Ivey & Broaddus, 2001).

Engaging students in reading experiences is of significance academically and attitudinally. Allowing students the time to read for enjoyment shapes positive reading attitudes and there's strong relationship between the amount of time students read and their level of reading competence (Worthy et al. 1999; Worthy, 2002). Regular reading experiences are important as the more students read the more proficient they become with reading skills such as fluency, comprehension and vocabulary development (Worthy, 2002). Furthermore, engaging in reading enables students to extend their imagination, creative and critical thinking skills (Gambrell, 2004). The children's attitudes to reading are shaped by family, community and school experiences the way literate practices are modelled in a range of environments.

Performance

Tully et al (2006) once reported that the Programmed Learning Sequence was significantly higher than the control group levels for all responses when .compared the effects of a Programmed Learning Sequence (PLS) with

Traditional Teaching (TT) on 100 sixth-grade Bermudian students' test scores. Kurbanoglu et el (2006) compared the success of programmed instruction with the conventional teaching approach on teaching stereochemistry, and whether gender had any effect on students' success. The result showed that there was a statistically significant difference between programmed instruction and conventional teaching approach on the success level of students' learning in stereochemistry. In addition, it was found that female students were more successful than their male counterparts in the experimental group. The findings suggested that programmed learning could be considered as a better alternative to conventional lecturing in teaching stereochemistry. Learning machine, an aspect of programmed learning, was used for teaching stereochemistry. The use of workbook was the target for the present study.

Theoretical Framework

The study is hinged on Skinner's law of reinforcement (operant conditioning) and Gagne's Hierarchy of Learning. The basic principle behind operant conditioning is that if a given operant is repeatedly followed by outcomes that are pleasing to the learner, the act is likely to be performed more often under similar conditions. If on the other hand, the behaviour is generally followed by unpleasant consequences, it is apt to be repeated less often under corresponding circumstances. The belief on the law of effect proposed by Thorndike and the tendency to emit operant is strengthened or weakened by its consequences (Wikipedia 2007). Behaviour modification is the outcome of learning and teaching using the operant. This procedure, in reaching the desired goal, is termed 'shaping'. An extinction process can also be required if one wants to eliminate a response completely; punishment is often used but more effective is to reinforce the desired behaviour. The effective 'schedules of reinforcement' in the classroom is emphasized.

Gagne hierarchy of learning emphasizes that terminal capability could be achieved by exposing the learner to a set of conditions (instructional conditions) that could bring out a change in the student's capability. The idea stems out from the fact that for terminal capability to be achieved, there are some subordinate or enabling capabilities, which should have been mastered. These subordinate capabilities are pre-requisites that would ease the learning of the new material (Gagne 1977). The pre-requisites are entities or prior learning that is incorporated into the new learning.

Statement of the Problem

Students are expected to develop interest in reading what they are taught without strain. It is observed that learners find it difficult to do this. Effort has been made to motivate the students in order to correct this anomaly. Workbook is one the motivating instruments. The problem that this work seeks to solve is to assess the extent to which the use of workbook has contributed to the performance of students using Integrated Science and their overall reading culture.

Objectives of the Study

The objectives of this study are:

i to verify the impact of workbook, which is a form of programmed textbook, on the reading culture of students.

ii to observe the effect of the use of workbook on the performance of the students in academics (Integrated Science) as a supplement to conventional class teaching.

Research Questions

(i) What is the impact of students' workbook on the reading culture of students in Junior Secondary Schools?

(ii) What is the impact of students' workbook on students' academic performance.

Hypotheses

i There is no significant improvement in the reading culture of students after the introduction of students' workbook.

ii There is no significant improvement in the academic performances of students in Integrated Science after the introduction of students' workbook.

Methodology

This study is limited to some selected Junior Secondary Schools in Abeokuta, the capital of Ogun State, Nigeria.

The population being studied is made up of students using workbook in Integrated Science in the Junior Secondary Schools in Abeokuta. The students are males sand females of age 11 and 14 years.

A sample of 30 students and 30 teachers were selected from six Junior Secondary Schools that use workbook in Integrated Science in Secondary Schools in Abeokuta, Ogun State, Nigeria.

Two sets of questionnaire were administered to obtain information from teachers and students from schools where students' workbooks have been introduced, especially in Integrated Science.
Students' questionnaire seeks answers to the following:

(i) Rate of usage of workbook for assignment (WbUseS)
(ii) Reading of books to answer workbook questions (ReadBkS)
(iii) Reading of workbook when not given an assignment (ReadWbS)
(iv) Whether students enjoy reading their workbook (EnjoyRdS)
(v) Performance before introduction of workbook (PerfBefS)
(vi) Performance after introduction of workbook (Perf AftS)
(vii) frequency of reading before the introduction of the workbook(RdCulBefS)
(viii) frequency of reading after the introduction of the workbook(RdCulAftS)

Teachers' Category

The variables include the following:.

(i) Assessment of students during marking of workbook to show evidence of reading by the students (AssRdT).
(ii) Rating of performance of students by teachers before the introduction of workbook (PerfBefT)
(iii) Rating of performance of students by teachers after the introduction of workbook (PerfAftT)

Two sets of questionnaire were distributed through direct contact, first with the Integrated Science teachers in the selected schools and the students' questionnaire.

The raw data (responses) generated from the two sets of the questionnaire by the teachers and students were coded into 30 rows each respectively and tested separately for similarities in the results and the extent of relationship (the degree of association) between the variables. These were measured using correlation coefficient.

The performance of the students was tested by grouping the variables into performance before (PerfBefS) and performance after (PerfAftS) the introduction of the workbook using the t-test analysis. The reading culture of the students was tested by grouping the variables on the frequency of reading before (RdCulBefS) and after (RdCulAftS) the introduction of the workbook using t-test to avoid types 1 and 2 errors (Oloyo, 2001). Both were done at P = 0.05 since it is the most used value in educational studies (Kurbanoglu et al, 2006,)

Results and Discussion on Tests of Hypotheses

Hypothesis 1:*There is no significant improvement in the reading culture of students after the introduction of students' workbook*

Table 1 shows the assessment of the reading culture of the students before and after the introduction of the workbook.

A change in the reading culture is noticed as clearly shown in 28 out of the 30 students' scores in Table 1. The t-value in Table 2 further explains the result in Table1.

At critical value α 0.05, 29 degrees of freedom and t table value of 2.045, the calculated t-value (16.5534) shows a significant improvement (Table2). Therefore, the null hypothesis that there is no significant improvement in the reading culture of students after the introduction of the workbook as assessed by the students themselves is therefore rejected.
As evident by the students' responses (Tables1&2), the reading culture was significantly improved ($P < 0.05$) after the introduction of the workbook.

The improvement in the performances of students after the introduction of the workbook is also a factor pointing to the fact that the reading culture has been improved correspondingly. This is further corroborated by the following:

- 90% of the respondents (students) read relevant materials before answering questions from their workbook (Table 3).
- 76.7% of the respondents (students) read their workbook even when assignments were not given from it by their teachers (Table 4).
- 96.7% of the respondents (students) claim to enjoy reading their workbook (Table 5).

Black et al (2005) once discovered improvement in school children attitude to academic and recreational reading. The same principle might be the case, particularly that the teacher gives a feedback by going through the workbook not as a faults-finder but emphasizing their level of assimilation and practice.

Table 3 shows that most of the students read one form of text-books or notes to answer questions from the workbook. This shows that the use of workbook has invoked reading habit in them thereby enhancing reading culture and improving their performance.

Table 4 shows that most of the students (76%) read their workbooks even when assignments were not given from them. It is an evidence of behaviour modification based on reinforcement.

Table 5 shows that 96% of the students enjoy reading their workbook. There is no doubt that the students' interest in reading will also reflect in their other subjects since their interest is being elicited in reading.

Testing of Hypothesis 2 on Students' Performance

There is no significant improvement in the performances of students in Integrated Science before and after the introduction of students' workbook. This was done in two ways, first, by teachers' assessment and second, by the students. It is observed from Table 6 based on teachers' that a difference is shown in the performance of 24 out of the 30 respondents, which shows that there is a change in performance.

The extent or degree of the difference in performance is shown in Table 8 with the t- test analysis.

Since the calculated t-value (8.60992) is greater than the tabular t-value (2.045), the null hypothesis that is therefore rejected. There is significant improvement in the performances of students after the introduction of the workbook as assessed by teachers. This shows that the use of the workbook enhances the reading ability of the students which has a positive effect on their performance in Integrated Science.

PerfBefS: Students' assessment of their performance before the introduction of workbook.

PerFAftS: Students' assessment of their performance after the introduction of workbook.
DifInPerfBefAftS**:** Differences in students' assessment of their performance before and after the introduction of workbook

Table 8 shows the assessment of the performances of the students by the students themselves, before and after the introduction of the workbook. It is seen from the table that the students show improvement in performance based on their assessment. The extent of improvement is further established in Table 6 with the t-test analysis.

Table 9 shows the calculated t-value (12.04159) as greater than the tabular t-value (2.045), which nullifies the null hypothesis that there is no significant improvement in the performances of students after the introduction of the workbook as assessed by the students. The hypothesis is therefore rejected.
As evident by the teachers' responses (Tables 6&7), and the students' responses themselves (Tables 8 &9), the students' performance was significantly improved ($P < 0.05$) after the introduction of the workbook. The noticeable improvement in the assessment by both the assessor and assessed gives an objective outcome of the result, enhances and authenticates the use of workbook as a motivating tool for improving learners' performance.
This type of improvement was also noticed in another form of programmed learning as reported by Tully et al (2006) and Kurbanoglu et al (2006).

Conclusion

The statistically significant improvement in the performances of the students after the introduction of the workbook could be hinged on the corresponding improvement in their reading culture. The workbook being a supplement to the traditional classroom teaching has the benefit of making the students to do further reading which could help them to master and perfect the various topics in the workbook and indirectly the topics in their syllabus. Since it is evident that the workbook has improved the reading culture and performances of the students, an enabling environment for the teachers to operate effectively with few students will go a long way to improve their academic achievement thereby improving the educational system in general. Workbook in various subjects should be encouraged in schools to enhance reading culture and academic performance of students. Feedback and discussion should not be compromised in the use of workbook.

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Table 1: Response of Students to Reading Culture

Respondents	RdCulBefS	RdCulAftS	DiffInRdCulBfAftS
1	3	4	+1
2	3	4	+1
3	3	4	+1
4	3	4	+1
5	2	3	+1
6	3	4	+1
7	3	4	+1
8	3	4	+1
9	3	4	+1
10	3	4	+1
11	3	4	+1
12	2	3	+1
13	3	4	+1
14	3	4	+1
15	3	4	+1
16	3	4	+1
17	3	4	+1
18	3	3	0
19	3	4	+1
20	3	4	+1
21	2	3	+1
22	2	4	+2
23	3	4	+1
24	3	4	+1
25	3	4	+1
26	3	4	+1
27	4	4	0
28	3	4	+1
29	2	3	+1
30	3	4	+1
Total	84	115	31

RdCulBefS: Frequency of reading before the introduction of the workbook

RdCultAftS: Frequency of reading after the introduction of the workbook

DiffInRdCulBfAftS: Difference in reading before and after the introduction of the workbook

Table 2: t-test Analysis of Students' Reading Culture before and after the Introduction of workbook.

t-Test: Paired Two Sample for Means

	RdCulBefS	*RdCulAftS*
Mean	2.866666667	3.833333333
Variance	0.188505747	0.143678161
Observations	30	30
Pearson Correlation	0.698430296	
Hypothesized Mean Difference	0	
Df	29	
T Stat	-16.55396351	
P(T<=t) one-tail	1.28675E-16	
T Critical one-tail	1.699127097	
P(T<=t) two-tail	2.57349E-16	
T Critical two-tail	2.045230758	

Table 3: Responses of students to reading in order to answer workbook questions

Response	Number of Students	Percentage
Read other books	27	90%
Didn't read other books	3	10%
Total	**30**	**100%**

Table 4: Responses of students to reading workbook without given assignments

Responses	Number of students	Percentage
Read workbook without given assignment	23	76.7%
Don't read workbook without given assignment	7	23.3%
Total	**30**	**100%**

Table 5: Students' responses to assessment to reading of workbook

Responses	Number of Students	Percentage
Enjoy reading workbook	29	96.7%
Don't enjoy reading workbook	1	3.3%
Total	**30**	**100%**
Mean	15	50%

Table 6: Teachers' assessment of students' performances

Respondent	PerfBefT	PerfAftT	DifInPerf
1	2	3	+1
2	2	4	+2
3	2	3	+1
4	2	3	+1
5	2	2	0
6	3	3	0
7	3	4	+1
8	2	4	+2
9	2	3	+1
10	2	3	+1

11	2	3	+1
12	2	3	+1
13	3	4	+1
14	2	3	+1
15	2	4	+2
16	4	4	0
17	2	3	+1
18	3	3	0
19	3	4	+1
20	2	4	+2
21	2	3	+1
22	3	3	0
23	2	3	+1
24	2	3	+1
25	3	4	+1
26	2	3	+1
27	2	4	+2
28	2	3	+1
29	3	4	+1
30	3	3	0
Total	71	100	29

PerfBefT: The performance of students before the introduction of workbook

PerfAftT: The performance of students after the introduction of workbook.

DifInPer Difference in the performance of students before and after the introduction of workbook

Table 7: t-test on performances of students as assessed by teachers

t-Test: Paired Two Samples for Means

	PerfBefT	*PerfAftT*
Mean	2.366666667	3.333333333
Variance	0.309195402	0.298850575
Observations	30	30
Pearson Correlation	0.378126562	
Hypothesized Mean Difference	0	
Df	29	
t Stat	-8.609918646	
P(T<=t) one-tail	8.7696E-10	
t Critical one-tail	1.699127097	
P(T<=t) two-tail	1.75392E-09	
t Critical two-tail	2.045230758	

Table 8: Students' assessment of their performances

Respondent	PerfBefS	PerfAftS	DifInPerfBefAftS
1	3	4	+1
2	3	4	+1
3	3	4	+1
4	3	4	+1
5	3	4	+1
6	3	4	+1
7	3	4	+1
8	3	3	0
9	2	3	+1
10	3	4	+1
11	2	3	+1
12	2	3	+1
13	3	4	+1
14	3	4	+1
15	3	4	+1

16	3	4	+1
17	3	4	+1
18	3	4	+1
19	3	4	+1
20	3	4	+1
21	2	3	+1
22	3	4	+1
23	3	4	+1
24	3	3	0
25	3	3	0
26	3	3	0
27	3	3	0
28	2	3	+1
29	2	3	+1
30	3	4	+1

Table 9: t-test on students' performance as assessed by the students

t-Test: Paired Two Sample for Means

	PerfBefS	*PerfAftS*
Mean	2.8	3.633333333
Variance	0.165517241	0.240229885
Observations	30	30
Pearson Correlation	0.657128741	
Hypothesized Mean Difference	0	
Df	29	
T Stat	-12.04159458	
P(T<=t) one-tail	4.1649E-13	
T Critical one-tail	1.699127097	
P(T<=t) two-tail	8.32979E-13	
T Critical two-tail	2.045230758	