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SCIENCE AND DEVELOPMENT

A book of readings in honour of

Professor
IMMANUEL OLAGUNJU ODUBUNMI



SCIENCE AND DEVELOPMENT

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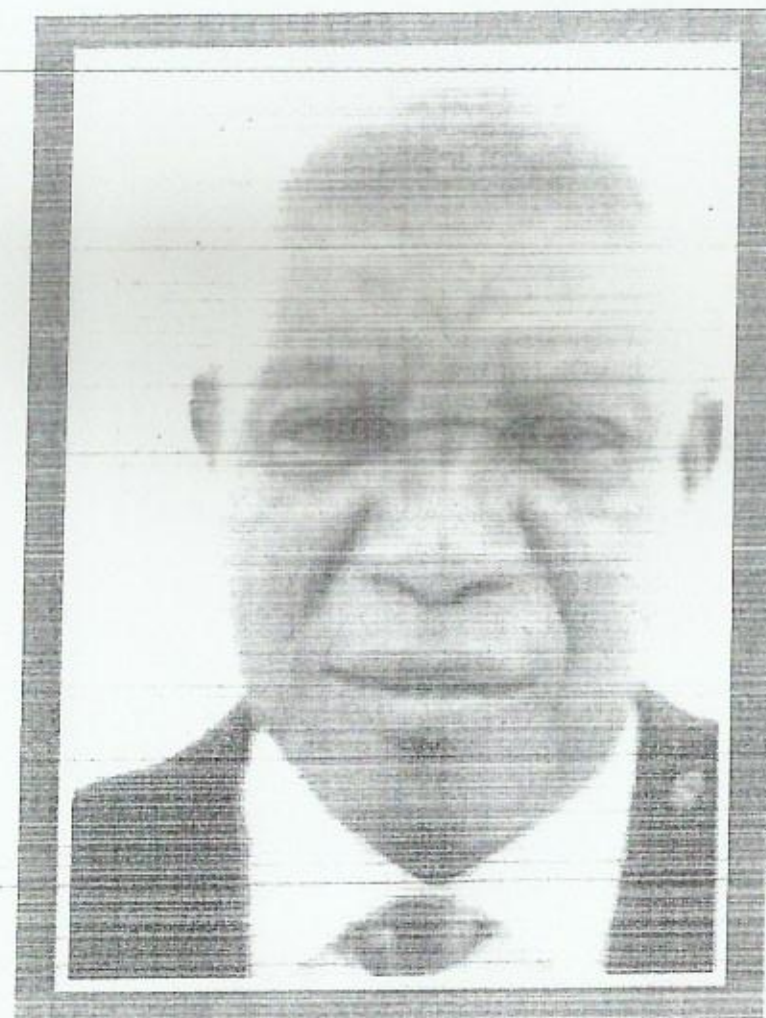
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Correlates of Reading Ability on Students' Achievement in Chemistry Among Selected Lagos State Secondary Schools in Nigeria.

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Abstract

Reading is intimately related to success at any level academic endeavour. This study investigated correlates of reading ability on student's achievement and attitude to Chemistry among selected Lagos Secondary Schools. The subjects for the study were 200 (109 males and 91 females) students selected from SSII classes Federal, State and Private Schools in Lagos State. Three instruments used in the study were: Degree of Power Reading Text (DPRT), Attitude to Chemistry and an Achievement text in Chemistry. Data analysis involved the use of Analysis of variance. (ANOVA); Pearson's Product Moment Correlation and Scheffe Post Hoc Analysis. Results indicate that reading ability correlates significantly with students' achievement in Chemistry; students' attitude to Chemistry and school type. It is therefore recommended that language teachers should provide varied reading materials in the classroom and derive adequate strategies to make reading more interesting and attractive to students.

Key Words: Reading; Reading Ability; Academic Achievement; Students' Attitude; Strategies

Introduction

For students to have a better understanding of Chemistry as a science, they must be exposed to printed materials, which might be textbooks, articles, handouts and laboratory manuals. The proper use of these materials facilitate students' achievement. Nwosu (1996) observed that many students are poor readers and have difficulties with textbooks, workbooks and supplementary materials. On the same issue, Umolu and Oyetunde (2001) in

Olagunju (2003) posit that Nigerian students are faced with additional burden of having to do most of the reading in a second language, which present a greater danger because of the level of difficulty of textbooks used in schools.

Reading, an essential aspect of literacy is tangential to success in all academic fields. Kolawole (2005) opines that reading is considerably vital to the attainment of literacy. Onukaogu (2002) in Kolawole (2005) explains that reading is the cornerstone of literacy, for without it, there can be no literacy. Varada (1987) defines reading as a process of getting meaning from printed word symbols. According to him, it transcends the mere process of making conventionalized noises associated with these symbols. It is an indispensable foundational skill for all school-based learning. Wikipedia.org. (2007) defines reading as the cognitive process of understanding a linguistic message. Reading is the process of retrieving and comprehending some form of stored information or ideas. These ideas are usually some sort of representation of language as symbols to be examined by sight, or by touch (Braille for example). Other types of reading may not be language based such as music notations and pictograms.

According to Makinde (2004), reading requires the reader to think, feel and imagine which the essentials of purposeful reading. Indeed the ability to read and understand clearly what is read is a lifetime investment whose social and economic values cannot be adequately quantified. According to Ntia (1990), "a good reading ability is a pre-requisite to good academic performance" (p 34). Citing Strang (1967), Ntia (1990) further notes that reading proficiency is the "royal road to knowledge" (p 34). In modern life, learning depends upon one's ability to interpret the printed page accurately and fully (Makinde, 2003). The implication of this according to Unoh (1987) is that reading is language related, purposeful and functional behaviour that all literate individuals are expected to exhibit and promote throughout their life time. Therefore, reading must be given the attention it deserves. Studies like (Odubunmi, 1992; Braimoh, Ogunmade & Badejo, 2005; Owolabi 2005 and Odubunmi 2006) found that students' academic achievement in science is predicated on a number of factors within the students' educational climate.

As earlier indicated, reading is language based. Language according to Joshua (1996) refers to medium through which communication takes place. And communication involves passing, sharing or exchange of information. Language from previous researches has been found to be one of the sources of problems in science class which eventually affects the teaching learning process (Ibe and Bello, 1977. Olarenwaju, 1997) in Olagunju (2003). Verbal communication is a very important tool in an effort to communicate science to learners. According to Ogunleye (1987) in Nwosu (1998), the language of

science is a language within a language serving no more than its own purpose of borrowing words from the major language of its environment. Odunmusi (1991) in Olagunju (2003) lamented that students' lack of proficiency in English language is the root cause of decline in achievement in science. Empirical studies have also confirmed that children taught in the mother tongue performed better than those taught in English (Fafunwa, Macauley and Sokoya, 1989; Olanrewaju, 1998 in Olagunju, 2003 and Makinde & Olabode, 2006).

In view of the importance of language in science, science educators and major science organizations are increasingly advocating the preparation of scientifically literate students (National Research Council, 1996; Baptiste, 2000; Nwagbo, 2000 in Onafowokan & Okebukola, 2003). The reason is not farfetched. The attainment of high level of scientifically literate individuals is one of the major goals of science teaching. It is a truism that scientific literacy is a bastion for technological development and the hallmark of any modern society (Onafowokan & Okebukola, 2003). In view of the foregoing, this study focuses on correlates of reading ability on students' achievement in and attitude to Chemistry in selected schools in Lagos State of Nigeria. Other variables, which could affect students' achievement, and attitude, include socio-economic status (Nwaboku, 2006), school types (Oderinde et al, 2004) and attitude (Odubunmi, 2006). These variables were covered in this study.

Hypotheses

The following hypotheses were tested in this study at .05 level of probability;

1. There is no significant relationship between students' reading ability and their achievement in Chemistry
2. There is no significant relationship between student' attitude to Chemistry and their reading ability in the subject.
3. There is no significant relationship between students' ability and school types
4. There is no significant relationship between students' reading ability and social economic status.
5. There is no significant relationship between student achievement in Chemistry and their socio-economic status.
6. There is no statistically significant difference between the DPRT scores of students from federal, state and private schools.
7. There is no statistically significant difference in DPRT scores, achievement and attitude of students from nuclear and extended families.
8. There is no statistically significant difference in achievement in Chemistry of students of High and low reading ability levels.

Method Research Design

The study adopted a descriptive survey design.

Subjects

The target populations for this study were senior secondary students in Ojo Local Government Area of Lagos State schools. Five were selected randomly consisting of three school types: federal, public and private. The senior secondary class three was chosen because they were believed to have covered a-substantial part of the Chemistry West Africa Examination Council (WAEC) and National Examination Council (NECO) Syllabus in preparation for their Senior Secondary School Certificate Examination. In all 200 students (109 male and 91 females) were involved in the study.

Instrumentation

Three instrument were used for the study

1 Degrees of Power Reading Test (DPRT)

The DPRT, a standardized reading ability test developed by Friend, Karsh and Siegal (1989) to assesses a student's ability to comprehend prose materials written at various degrees of difficulties. The test contains passages between 110 and 310 words. By mean Cloze format at regular interval, between five and ten words are deleted. Subjects are to choose between the deleted, from five possible alternatives, using the surrounding text as a guide. Subjects must be able read and comprehend the passage in order to respond correctly. Scores obtained were used to categorize subjects into High and Low reading ability levels. The researchers invalidated the DPRT by administering the instrument on a neutral sample of 40 students using the test-retest method of two week's interval. A reliability level of .72 was established.

2 Chemistry Achievement Test (CAT)

The CAT is a 15 multiple choices -item achievement test which evaluated the ability of subjects to respond correctly to concepts learnt in Chemistry. These researchers validated the instrument through the test - retest procedure of two week's interval and using the Pearson's Product Moment Co-efficient statistical formula, a reliability value of .68 was established.

3 Chemistry Students' Attitude Questionnaire (CSAQ)

The CSAQ is a 24-item questionnaire using the four point Likert techniques of summated ratings. The statements were assigned scale values of 4,3,2,1 representing Strongly Agree, Agree, Disagree and Strongly Disagree respectively. The instrument was validated using Crombach Alpha technique at .77.

Procedure

The researchers visited the selected schools (five) that were involved in the study in order to obtain the necessary permission from the school principals. They discussed the research intentions with the teachers. A double period out of the four periods allocated to Chemistry on the time table was used to enable students participate fully in the study. The instruments were personally administered by the researchers and collected on the spot to ensure high percentage returns.

Findings

Data collected were analyzed using Pearson Product-Moment Correlation, Analysis Of Variance (ANOVA), Students' t-test and Scheffe's Post Hoc Analysis

Ho 1: There is no significant relationship between students' reading ability and their achievement in Chemistry. The summary of the analysis is presented in Table 1 below.

Table 1: Correlation between Students' Achievement in Chemistry and DPRT Scores

Variables	N	Mean	S.D	R	P	Remarks
Achievement test	200	10.27	2.611	0.490	.00	P<.05
DPRT scores	200	5.50	1.936			Significant

Table 1 reveals that r value is .490 at 0.05 level of significance, that shows a positive and significant relationship between reading ability and their achievement in Chemistry. Hence the null hypothesis is rejected.

Ho2: There is no significant relationship between students' attitude to Chemistry and their reading abilities.

Table 2: Correlation Between Students' Attitude and DPRT Scores.

Variable	N	Mean	S.D	R	P	Remarks
Achievement test	200	10.27	2.611	.209	.03	P<.05
DPRT scores	200	5.50	1.936			Significant

Table 2 shows an r value of 0.209 at 0.05 level of significance. This shows a positive and significant relationship between reading ability and students' attitude to Chemistry. Hence, the null hypothesis is therefore rejected.

Ho3: There is no significant relationship between students' reading ability and school types.

Table 3 Correlation between DPRT Scores and School Types

Variable	N	Mean	S.D	R	P	Remarks
DPRT scores	200	5.50	1.936	.351	.00	P<.05
School Type	200	1.81	0.746			Significant

It could be observed from table 3 that there is a significant relationship between reading ability and school types going by r value of .351 at 0.05 level of significance. The null hypothesis 3 is therefore rejected.

Ho4: There is no significant relationship between students' reading ability and Socio-Economic Status.

Table 4: Correlation between Students' DPRT Scores and Socio-Economic Status

Variable	N	Mean	S.D	R	P	Remarks
DPRT scores	200	5.50	2.611	-0.101	.490	P<.05
S.E.S	200	2.06	1.936			Significant

Table 4 reveals a r value of -0.101 at 0.05 level of significance. This shows a negative and non-significant relationship between students' reading ability and their socio-economic status. The null hypothesis is therefore not rejected.

Ho5: There is no significant relationship between students' achievements in Chemistry and socio-Economic Status.

Table 5: Correlation between Students' Achievement and Socio Economic Status.

Variables	N	Mean	S.D	R	P	Remarks
Achievement test	200	10.27	2.611	.74	.300	P>.05
S.E.S	200	2.06	0.551			Not significant

Table 5 shows an r value of 0.74 which indicate positive but non-significant relationship between students' achievement in Chemistry and their Socio-Economic Status. The null hypothesis is therefore not accepted. Ho6: There is no statistically significant difference in the reading abilities of student in federal, public and private schools.

Table 6: Summary of ANOVA (Using Scheffé's Post Hoc Test) For DPRT Scores of Federal, Public and Private Schools.

School type	N	Mean	S.D	Sources	Sum of square	Df	Mean square	F	Sign (p)
Public	78	4.96	1.86	Btw group Within group Total	113.165	2	56.582		
Private	82	5.29	1.84		632.835	197	3.215	17.614	.000
Federal	40	6.98	1.52		746.00	199			

It could be observed from table 6 that there is a significant difference in DPRT scores between the school types ($F_{2,197}=17.614$; $P<0.05$). It further shows that students in federal school score highest (6.98) followed by those in private (5.29) and those in public scored least (4.96). The null hypothesis is rejected in view of these findings.

Table 7: There is no statistically significant difference between DPRT, achievement and attitude score, of students from nuclear and extended families.

Table 7: T-Test Comparison of DPRT Scores Achievement And Attitude Student In Nuclear and Extended Families

Variables	Family types	N	Mean	S.D	T	Df	P	Remark
DPRT	Extended	179	5.59	1.928	1.858	198	.065	$P>.05$ N.sig
	Nuclear	21	4.26	1.858				
Achievement	Extended	179	10.33	2.568	1.022	198	.308	$P>.05$ N.sig
	Nuclear	21	9.71	2.969				
Students' Attitude	Nuclear	179	72.93	9.272	0.849	198	.397	$P>.05$ N.sig
	Extended	21	71.14	7.845				

Table 7 above reveal that there is no significant difference in DPRT scores of students from nuclear families and those from extended ($t=1.858$, degree of freedom=198, $P>.05$) also there is no significant difference in achievement scores ($t=1.022$, degree of freedom = 198, $P>.05$) and in their attitude scores ($t=0.849$, degree of freedom=198): $P>.05$ hence the null hypothesis is not rejected.

HO8: There is no statistically significant difference in Chemistry of students of High and Low reading ability levels.

Table 8: T. Test Comparison of Achievement in Chemistry of Subjects of High and Low Reading Ability Levels.

Variables	N	N	S.D	Df	t value	P	Remark
High Reading Ability	115	11.23	2.29	198	7.08	.003	$P<.05$ *Significant
Low Reading Ability	95	8.68	2.9				
Total	200						

$t(df 198) = 7.08$; $P<.05$ *Significant

In table 8, t value of 7.08 is found to be significant at .05 level of probability. Therefore the null hypothesis is rejected.

Discussions

Findings reveal that there is a significant relationship between students' reading ability and achievement in Chemistry; attitude to Chemistry and school types as shown in tables 1-3. This corroborates Makinde (2003) opinion that the "relationship of reading ability to success is not open to dispute; teachers and students are aware of it." He also opined that improvement in reading ability will help students understand the trends of thought put across by others thus stimulating a good reading habit. As revealed in the analysis of hypothesis 8, a significant difference was established between the achievements of subjects of High and Low reading ability levels in Chemistry. This goes to show that reading ability is a determining factor in students' performance in Chemistry. This agrees with the view of Onafowokan and Okebukola (2003) who noted that scientific literacy is the foundation upon which technological advancement rests. The relationship between reading ability and school types imply that instructional environment and facilities can determine success of a learner (Nwaboku, 2006). The non-significant relationship between achievement and socio-economic background contradict the submission of Nwaboku (2006) that success of a learner is determined by number of factors, which include the learners' social and economic background.

Scheffe's Post Hoc test for multiple comparisons in table 5 reveal difference in the achievements of students from three school types i.e. federal, public and private. Federal scored highest 96.980 followed by private (5.29) while public had 4.96. Student in federal secondary schools are highly favoured in terms of availability of human and material resources. This situation has been aptly captured by Oderinde (2004) in Nwaboku (2006) that the teacher-pupil ratio in Lagos state secondary schools is 1:336 in English in public senior schools and 1:78 in private senior schools. In the light of these, improving reading ability will be imperative to achieving high in examinations at the senior secondary school certificate level, since poor teaching, poor facilities and negative attitude toward science lead to poor achievement (Odubunmi, 2006).

Recommendations

In this study, students' attitude, reading ability and achievements are positively correlated. The following re-commendations are therefore proffered:

- Reading techniques such as Survey, Question, Reading, Reflect, Recite and Review (SQ4R) (Robinson & Thomas, 1972) Mood, Understanding, Recall, Digest, Expand and Review (MURDER) (Dansereau, 1985) Preview, Question, Read, summarize and Text (PQRST) (Okebukola & Onafowokan, 2003) should be taught in science classrooms.
- Teachers should encourage students to think beyond literal information so as to apply what is read to problem solving.
- Teachers should encourage students to read extensively in order to familiarize themselves with registers of different subject areas.
- Teachers and reading specialists should endeavour to identify their learners with reading problems and help such out through well packaged remedial programmes.
- In order to effectively cope in a technologically advancing world, both teachers and learners must be skillful in the use of the computer.
- Analogy enhanced texts with models, charts and illustrations should be used in science classrooms to make science learning more interesting.
- Government should adequately fund and equip public schools with libraries so as to enable students become scientifically literate to attain technological advancement.
- Teacher training programmes should be repackaged to inculcate good reading habit and reading in the content area.

- Language proficiency course is equally a necessity especially for science teachers who are deficient in the language of instruction.

Conclusion

In conclusion, it can be said that the thesis of this study lies in the fact that reading technique could contribute in no little way to improve reading ability of students. By addressing the problem of inadequate scientific facilities, bloated classrooms and ill-equip libraries, students' achievement in Chemistry will also improve. It is therefore recommended that teachers should encourage students to read extensively so as to be able think beyond literal information.

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