Effects of Mentoring in the Utilization and Improvisation of Biology Learning Resources on the Performance of Senior Secondary School Students in South West Nigeria

Olu-Ajayi Funmilayo Elizabeth,
Department of Science Education,
Faculty of Education, Ekiti State University Ado-Ekiti, Nigeria

doi: 10.19044/esj.2017.v13n4p270 URL:http://dx.doi.org/10.19044/esj.2017.v13n4p270

Abstract

The aim of this study is to investigate the effects of mentoring in the utilization and improvisation of Biology learning resources on the performance of senior secondary school students. The main purpose of this study is to mentor the senior secondary students on the utilization of the available Biology learning resources in their schools and the improvisation of unavailable resources, when necessary, for effective learning. The study employed the quasi-experimental design which utilizes non-randomized pre-test, post-test, and experimental-control group system. The population of the study was made up of senior secondary school students in South West Nigeria. The sample consisted of 180 Biology students selected from six secondary schools. The sampling technique was multi stage, involving simple random and purposive sampling techniques. The instruments used in the study were Biology learning Resources Questionnaire (BLRQ) and Biology Concept Test (BCT). There was a mentoring package involving a Supplemental Instruction Learning Model. The instrument was validated by experts in science education and test evaluation, and the reliability of the instruments was ascertained using test-retest method. Reliability coefficients of 0.72 and 0.67 were obtained through Pearsons Product Moment correlation statistics. The BCT was administered as both pre-test and post-test, while BLRQ was used to gather information on available learning resources in the secondary schools. In addition, SILM was used for treatment. Data collected were analyzed using Pearsons Product Moment Correlation. It was discovered from the study that mentoring served as an effective tool in encouraging the utilization of available and improvisation of unavailable, but needed, learning resources for Biology teaching and learning in secondary schools. This was discovered to improve students' performance in Biology. Based on the findings of the study, recommendations were made. Among which was that mentoring should be

used by Biology teachers as an adjunct to normal classroom teaching, especially in improvisation of learning resources for experiment demonstration during practicals, for effective performance by students.

Keywords: Effects, mentoring, utilization and improvisation, biology learning resources, performance, senior secondary school students

Introduction

There is a notable consensus across school effectiveness literature regarding the importance of resources in the teaching and learning process. The role of science in the society cannot be overemphasized. The learning of science is imperative to the technological development and growth of the society. Resources in science pedagogical process include textbooks, models, charts, and laboratory and science equipment. It is the positive combined effects of these resources that have a significant impact on students' or pupils' teaching and learning and/or achievement. Effective science learning and teaching depends largely on the teacher and the availability of equipment (Onderi & Makori, 2013). A key activity in science learning according to Owolabi and Oginni (2012) is regarded as an experiment, through which students demonstrate psychomotor skills by practicalizing the theoretical knowledge acquired in class or read in textbooks. However, this requires the use of equipment. If learning in schools is to be facilitated, it is necessary that schools should be provided with adequate instructional materials (Gillani, 2005). As rightly observed by Onocha in Olu-Ajayi (2013) that when parents provide academic material needs for their children, and the school management also plays their necessary part, the children are likely to improve their scholastic performance in science subjects. It is of note that the unavailability and inadequate science learning resource is a common situation in most public secondary schools. Academic material possession, among four other variables (sex, size, education, and occupation of the parent), is believed by Gillani (2005) to exert the strongest direct influence on the achievement of the students. Betts and Danenberg (2001) estimated the possible effects of partial or full equalization of resources across California schools. They found that even the radical step of fully equalizing teacher preparation across schools would contribute only modestly to eliminating the achievement gap among schools. Consequently, it is also possible that the teachers who use a particular resource are not well trained or competent enough. As a result, the impact of that resource in the teaching and learning process may be poor or rather weak. In this case, the resource's negative contribution to the teaching and learning process is attributable to the teacher's incompetence or lack of the necessary skills. Furthermore, merely equipping schools with resource

facilities is not enough to raise student achievement, rather what matters most is whether these facilities are utilized properly.

Statement of the Problem

Unavailability and or inadequacy of Biology learning resources are predominant in senior secondary schools. Topics meant to be taught practically are being taught theoretically as part of adaptive mechanisms by teachers due to inadequate resources to enable effective teaching of the same. Thus, this have, in most cases, been responsible for low performance in science subjects. Financial constraint on the part of school authority have hindered adequate stocking of schools with needed learning resources for science learning, making it hard to meet the required learning experiences to effect performance in students. It was, thus, thought that introducing teaching strategies to utilize and manage the available resources to compliment the classroom lessons would help effect learning in students.

Purpose of the study

The main purpose of this study is to mentor the senior secondary students on the utilization of the available biology learning resources in their schools and improvisation of unavailable resources when necessary, for effective learning.

Instrument

Biology Learning Resources Questionnaire

Biology Learning Resources Questionnaire was used to obtain information from the recipients on the available learning instructional materials in their school for adequate Biology learning. It consisted of four parts: bio-data; part II which consisted of items on a four-point Likert scale, it solicited for information about availability and condition of Biology apparatus in the schools e.g. not available, available but not sufficient for use, available and sufficient for use, and available but obsolete; in part III, students were expected to rate their teachers on the use of Biology apparatus and facilities e.g. textbooks, chart, improvisation of apparatus in and use of the laboratory on a 4-point Likert format; frequently, occasionally, rarely, and not at all. It is used for collecting information about how often students use Biology learning materials. Thus, the mentoring package included the use and improvisation of simple Biology equipment.

Biology Concept Test (BCT)

A Biology Concept Test, developed by the researcher, was used as a pre-treatment supporting system achievement test (PTSSAT). The items of this test were based on the topic ‘Tissues and supporting systems” in Biology

syllabus, which was taught in this study, because of its practical aspect. This was used to establish the level of achievement at which the students were functioning in biology prior to treatment. There was the post-test supporting system achievement test (POTSSAT) used at the end of the treatment to establish the level of achievement at which the subjects were now functioning in Biology. In developing this instrument, a test blue print with reference to Bloom's taxonomy of learning was constructed considering the 6 taxonomic cognitive domains of learning.

Mentoring package used for the treatment was made up of these sections;

(1) Acquainting with the students - This involved knowing their names, sex, age, family background, parents' occupation, likes and dislikes. The mentor identified the factors affecting performance in each student: is it a problem with the teacher? Is it a problem with family? Is it a problem with classmates? Is it a problem with culture? Is it tied to home/environ? Or is it related to school or phobia for the subject?

(3) Use of Biology learning resources: learning resources in Biology includes books, charts, diagrams, and laboratory.

(4) Need for a laboratory: mentor discussed the necessity of a laboratory. Hence, laboratory is a necessary learning resource in Biology. Experiments are performed in the laboratory. Experiments improve the understanding of Biology concepts and they are usually performed with laboratory equipment.

(5) Use and improvisation of basic equipment: the mentor itemized Biology equipment for secondary school Biology and stated their uses. Considering the inadequacies in secondary schools Biology laboratories, mentor discussed how to maximize the use of available learning resources and embarked on improvisation when necessary to make learning interesting and effective. Mentor gave examples of equipments that can be improvised and explained how. Mentor brought relevant charts, diagrams, and preserved animal bones to class to show the mentee for this study.

The validity of the instruments was ensured by experts in science education as well as in test evaluation. The instruments were ascertained to be reliable with a coefficient value of 0.72 and 0.67. This value was obtained through the use of Pearsons Product Moment correlation statistics in a test-retest method on a group of students outside the sample of this study. The mentee were given opportunities to call at anytime on phone or meet with the mentor when around for counseling. This would enable them to discuss, share experiences on how well they are fairing, and ask questions on Biology and other things.

Methodology

The study employed quasi-experimental design which utilizes non-randomized pre-test, post-test, and experimental-control group system. The population of the study was made up of senior secondary school students in South West Nigeria. The sample consisted of 180 Biology students selected from six secondary schools in three states of South West Nigeria. The sampling technique was multi stage, involving simple random and purposive sampling techniques. Treatment lasted for six weeks after which post-test was administered on the subjects for the study. The results of the pre-test and post-test were recorded and used for analysis.

A general question was raised in this study: What are the effects of mentoring activities on Biology students' performances in secondary schools?

In order to answer this question, pre-test and post-test achievement mean scores of Biology students exposed to mentoring activities and those in the control group were computed. The results are presented in Table 1.

Table 1. Descriptive Analysis showing Performance of Senior secondary Biology students exposed to Mentoring and that of the control group

		Pre-test		**Post-test**		**Remark**
Group	**N**	**Mean**	**SD**	**Mean**	**SD**	
Experimental	90	34.20	8.96	53.77	6.48	Effective
Control	90	29.37	8.60	32.48	9.58	

Table 1 presents the Biology achievement mean scores of students in mentoring and control groups before and after treatment. The result shows that students in the mentoring group had pre-test mean score of 34.20, while that of those in the control group was 29.37. Their post-test mean scores were 53.77 and 32.48 respectively. The higher mean score of mentoring group when compared with control group implies that mentoring activities constitute an effective tool for improving the performances of senior secondary Biology students.

Hypothesis

The only hypothesis formulated for this study is:

There will be no significant relationship between availability of science learning resources and students' performance in mentoring.

To test the hypothesis, scores of students on science learning resources availability and academic performance in Biology, when exposed to mentoring activities, were subjected to Pearson's Moment Product statistics at a 0.05 level of significance. The result is presented in table below.

Table 2. Pearson Correlation of resource availability and performance of students' in mentoring.

Variable	N	X	SD	r-cal	r-tab
Resource availability	90	43.36	10.28	0.269	0.195
Academic performance	90	53.77	6.48		

P<0.05

Discussion

From the result, r-cal (0.269) > r-tab (0.195), thus, the null hypothesis was rejected. A significant difference was discovered in the achievement of students exposed to mentoring when compared with those exposed to normal classroom teaching alone. This is in line with the work of Rhodes, Jean and Nancy (2000), who believed that good mentoring should help students recognize their abilities and limitations. Some students may require personalized attention, counseling and encouragement, but no student is totally dull. Availability of resources may be inadequate in schools, mentoring on utilization of available and improvisation. Thus, an inadequate availability of Biology learning resources of students to effect academic performance was found necessary. The better availability of Biological equipment, the tendency for it to be used for learning when appropriate because learning resources are used to facilitate learning, and the better understanding by students would result to good performance. However, this is seen to agree with the study of Ainley, Kos and Nicholas (2008), who while discussing student's participation in science, stressed the need for instructional facility and affirmed that learning resources, especially laboratory, plays an essential role in science achievement and performance.

The results of this study showed that mentoring activities had significant effects on the performances of senior secondary Biology students. Problems of performance were identified and treated during mentoring. This agrees with Adodo (2006), who said it is important to develop methods of analyzing learning problems as this will enable teachers to pinpoint pupils' competencies and weaknesses which could form the basis of mentoring tips for overcoming the difficulties. Teachers should be able to use students' results in tests and examinations to discover his/her level of performance. He also agreed that prompt knowledge of results can serve as an effective reinforcement agent in directing the learning process, and that if such a learning process is directed properly and students are carried along with sustained interest and outspread mind to acquire every bit of information they require in the subject, their performances will improve. The study, therefore, offers encouragement for the use of mentoring as an approach to help the students in improving in their academic performances as they

nourish their psychomotor domain through improvisation of learning resources. They will always look forward to practical lessons which will opportune them to see, touch, make, and use the equipment they read about in textbooks, thus, promoting retention in students.

Conclusion and Recommendations

Based on the findings of this study, mentoring has the potency of improving students manipulative and psychomotor skills, while serving as a good yielding, non-formal way of teaching science. It has the potency of improving students' achievement in Biology. In addition, complimenting normal classroom teaching with mentoring will help students learn faster and better.

The researcher hereby recommends that;

i. Mentoring relationships should be encouraged by policy makers in secondary school system, amongst teachers and students, to affect the general good performance of students.

ii. Mentoring should be used by teachers as an adjunct to normal classroom teaching to enable students' active participation in science teaching/learning process.

iii. Mentoring strategy should be used by teachers to discover and improve on students' talents and psychomotor skills, making science learning interesting and enjoyable through improvisation of basic equipment for science learning by teachers and students.

References:

1. Adodo, S.O. (2006). *Effect of diagnostic remediation on student's learning outcomes in integrated science in junior secondary schools in South Western Nigeria*. An unpublished Ph.D thesis University of Ado-Ekiti
2. Ainley, J; Kos, J & Nicholas, M. (2008). Participation in Science, Mathematics and Technology. Australian education. Cambuwell, VIC: Australian council of Educational Research (ACERS)
3. Betts, J.R., & Danenberg A (2001). 'Resources and students achievement: An assessment'. In J. Sonstelie & P. Richardson (Eds.) *School finance and California's master for education*. San Francisco, California: Public Policy Institute of California.
4. Gillani S. (2005). Effectiveness of Instructional Technology in Teaching Biology to Secondary School Students. http://prr.hec.gov.pk/Chapters/379-6.pdf.

5. Olu-Ajayi, F.E (2013). Effect Of Mentoring On Low-Performing Biology Students in southwest Nigeria Secondary Schools. An unpublished Ph.D Thesis. Ekiti State University Ado- Ekiti.
6. Onderi, H., and Makori, A. (2013). Secondary school principals in Nyamira County in Kenya: Issues and challenges. Educational Research International, 1(1):67-89.
7. Owolabi, T., and Oginni, I. (2012). Improvisation of science equipment in Nigerian schools. Universal Journal of Education and General Studies, 1(3):44-48.
8. Rhodes, J.E, Jean B. & Nancy L (2000). "Agents of change: Pathways through which mentoring relationships influence adolescents' academic adjustment." *Child Development* 71, 6