EFFECT OF PRIOR KNOWLEDGE OF BEHAVIOURAL OBJECTIVES AND STUDY QUESTIONS ON STUDENTS’ ACHIEVEMENT IN MATHEMATICS IN AWKA-SOUTH LOCAL GOVERNMENT AREA

CHINWEOKE, FELICIA U.
fchinweoke@gmail.com
SCIENCE EDUCATION DEPARTMENT
CHUKWUEMEKA ODUMEGWU OJUKWU UNIVERSITY,
ANAMBRA STATE

ABSTRACT

The study was aimed at determining the effect of prior knowledge of behavioural objectives and study questions on students’ achievement in mathematics. The population of the study comprised 2,600 Senior Secondary Two (SS II) students in the nine coeducational secondary schools in Awka South Local Government Area of Anambra State. The subject of the study consisted of 220 SS II students (mean age of 16 years) of the four classes which were randomly drawn from each of the four selected schools. Two research questions and two research hypotheses guided the study. The instrument used was a paper and pencil test entitled ‘Mathematics Achievement Test (MAT). Data obtained were analyzed using mean and analysis of covariance with pretest as a covariate. Results showed that students taught with prior knowledge of behavioural objectives and study questions achieved significantly higher (P<0.05) than those taught with conventional lecture method. Again those exposed to study questions only also achieved significantly better (P<0.05) than those exposed to prior knowledge of behavioural objectives. The result implied that prior knowledge of behavioural objectives and study questions is a good teaching method. So, mathematics teachers should be encouraged to employ this teaching method in teaching the students so as to enhance students’ mathematical achievement, for global competitiveness and sustainability of mathematics education in Nigeria.

Key Words: Prior knowledge, behavioural objectives, study questions

Introduction

The Federal Government of Nigeria, realizing the importance of qualitative and functional education in the economic development of our nation, includes education as one of the Seven-Point Agenda come year 2020. According to Jimoh (2009) the Minister of Education, Egwu, pointed out that one of the goals of this initiative is to refocus the nation’s educational system for the production of skilled manpower for gainful employment and international competitiveness to enhance the creativity and productive capabilities of the youths. The Federal Republic of Nigeria (2004) also, seeing education as an instrument for national development, and development of individual and the society, emphasized the need for functional education for the promotion of a progressive united Nigeria.

One thing is obvious, functional education cannot be achieved without proper work being done at all levels of
education, especially primary and secondary school levels. This is because these are the preparatory stages for human capacity building. According to the Federal Republic of Nigeria (2004). The main goals of secondary education are to prepare an individual for useful living within the society and further studies. So, for these goals to be met at secondary school level, our students need to receive sound and qualitative education right from primary school to secondary school levels.

Today, there are cries all over the federation about the falling standard of education in the country. West African Examination Council (WAEC), Chief Examiner (2013) reported bitterly on students’ poor performance in mathematics especially in the area of GEOMETRY. Njelita (2005), Eze (2000) and Chinweoke (2008) discovered teachers’ incompetencies in science and mathematics education in the classrooms. These teachers' incompetencies were pointed out by Okebukola (2002) as one of the causes of students’ poor performance in sciences. Science and mathematics are valuable tools for scientific and technological advancement of the country, and yet teachers are found incompetent in teaching these subjects properly to students. The implication of improper teaching of these subjects is that students might lose interest, attention and motivation in studying them, thus resulting to poor performance in the subject.

Realizing that teachers' poor teaching method (Alio, 1997; Onwudinjor and Onwudinjor, 1999; Nnadozie, 2002; OkebuKola, 2002; and Eze, 2006) is one of the causes of students’ poor performance in science and mathematics, many hands have been on deck in searching for better strategies that will enhance science and mathematics education in the schools. Nzewi and Osisioma (1997) emphasized that research in science education has indicated that students’ prior knowledge of behavioural objectives as well as pre-exposure to study questions before actual teaching encounter could have a facilitative effect on learning. Santrock (2001) defined behavioural objectives as statements that communicate proposal changes in students’ behaviour to desire levels of performance. Hartley and Davis (1976) suggested that behavioural objectives provide students with a clear goal that can be used to organize learning activities permit students to study more effectively and reduce the time wasted on irrelevances as well as provide a bench mark against which they can objectively evaluate their own progress. Ogunbayo (1984) in his own opinion stated that pupils learn better and retain more when the instructional objectives are clearly stated using behavioural terms. Behavioural objectives help the students to follow the step-by-step progress of the lesson as they look forward to achieving the specific goals. Nzewi (1990) pointed out that a meaningful slated objective is one that succeeds in communicating to the learner the teacher's instructional intent. Behavioural objective is meaningful to the extent it conveys to students the idea of what the teacher has in mind. A way material is revealed to students at the beginning of the lesson has a great deal to do with how the students follow and understand the lesson. So, prior knowledge of behavioural objectives simply means here revealing to the students the stated objectives which the teacher and the students are required to accomplish at the end of the instruction.

Again, study questions also mean the take home tasks or assignments given to the students, which they have to do at their own leisure to practice, and master what teacher has taught them. According to Mkpa (1985) the use of question in instructional material is that which does not simply provide students with answering skills but in
addition, question indicates to students what they are to do and how they are to do it; giving them greater control over their own learning processes. When questions are at the appropriate level of difficulty for the learners, they are highly effective in helping the learners to improve their learning and retention of learned materials. In respect of the above facts, it is obvious that the use of prior knowledge of behavioural objectives and study questions in teaching could have a facilitative effect on learning. At this end the problem of the study put in question form is thus; how would the use of prior knowledge of behavioural objectives and study questions affect students' achievement in mathematics? The purpose of the study is to determine the effect of prior knowledge of behavioural objectives and study questions on students’ achievement in mathematics in Awka-South Local Government Area of Anambra State.

Research Questions

1. Which of the group of students achieved better, those exposed to prior knowledge of behavioural objectives and study questions or those exposed to conventional lecture method (CLM)?

2. Would there be any difference in the mean achievement scores of students taught with prior knowledge of behavioural objectives (PKB) and those taught with study questions (SQ)?

Hypotheses

Ho₁: The students exposed to prior knowledge of behavioural objectives, and study questions would not achieve significantly better than those exposed to conventional lecture method at 0.05 level of significance.

Ho₂: There would be no significant difference (P ≤05) in the mean achievement scores of students taught with prior knowledge of behavioural objectives and those expose to study questions (SQ).

Method

The study was a pretest-posttest, non-randomized, non-equivalent, control group quasi-experimental design. This was as a result of 'intact' classes in order not to disrupt the already organized school system.

The population of the study comprised 2,600 Senior Secondary Two (SSII) students in the nine coeducational schools in the twenty (20) slate secondary schools in Awka-South LGA of Anambra State.

The subjects of the study consisted of 220 SSII students (mean age of 16 years) in the four classes randomly drawn from each of the four selected schools and assigned to the four treatment groups. Four coeducational schools were selected from the nine coeducational schools purposively.

The research instrument used was paper and pencil teacher-made achievement test on mathematics (MAT), which consisted of thirty multiple-choice questions. Three university lecturers who are experts in test development, validated the 30 multiple-choice test items on mathematics.

After validation exercise the reliability of the test items was done using test-retest reliability method. The scores were correlated using spearman's rank order and the estimated reliability coefficient was 0.97.

The course content and behavioural objectives/instructional objectives on 'Circle Geometry' were specified using table of specification, the lesson plans were also written accordingly. The groups were first pre-tested, to
determine their entering points, before the actual treatments were administered to them. The students were taught for six weeks. One of the experimental groups was exposed to prior knowledge of behavioural objectives and study questions (PKS). Another group was exposed to study questions (SQ) only and the other was exposed to prior knowledge of behavioural objectives (PKB). Then, the control group was taught with the conventional lecture method (CLM). At the end of each instruction class exercises were given to each of the groups, marked and reworked. At the end of the treatment exercises, all the groups were post tested. The tests were marked and all the scores both pretest and post test scores were recorded. The scores obtained were analyzed using mean, Analysis of Covariance (ANCOVA) and Scheffe test

**Results**

**Table 1: Mean scores of post-test and pretest in mathematics achievement**

<table>
<thead>
<tr>
<th></th>
<th>Mean Post-test</th>
<th>Mean Pre-test</th>
<th>Mean Gain score</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKS</td>
<td>53.46</td>
<td>24.10</td>
<td>29.36</td>
</tr>
<tr>
<td>PKB</td>
<td>36.41</td>
<td>19.69</td>
<td>16.72</td>
</tr>
<tr>
<td>SQ</td>
<td>47.27</td>
<td>25.30</td>
<td>21.97</td>
</tr>
<tr>
<td>CLM</td>
<td>33.28</td>
<td>16.72</td>
<td>16.57</td>
</tr>
<tr>
<td>MEAN TOTAL</td>
<td>42.61</td>
<td>21.45</td>
<td>21.16</td>
</tr>
</tbody>
</table>

In answering research question I, from Table 1, the result revealed that the group that achieved better is the group that was exposed to prior knowledge of behavioral objectives and study questions (PKS) with mean achievement score of 53.46 as against their counter parts exposed to traditional lecture method (CLM) which had the mean score of 33.28.

The table again revealed that those taught with study questions had mean score of 47.27 while those exposed to prior knowledge of behavioral objectives had mean score of 36.41 giving the mean difference to be 10.86. This shows that there is difference in the mean scores of the two teaching groups.

**Table 2: Analysis of Covariance (ANCOVA) with pretest as covariate**

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F.cal</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>13116.108</td>
<td>4</td>
<td>3279.027</td>
<td>68.089</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>10194.261</td>
<td>1</td>
<td>10194.261</td>
<td>211.683</td>
<td>.000</td>
</tr>
<tr>
<td>Pre test</td>
<td>3780 187</td>
<td>1</td>
<td>3780.187</td>
<td>78.495</td>
<td>.000</td>
</tr>
<tr>
<td>Method</td>
<td>4269.502</td>
<td>3</td>
<td>1423.167</td>
<td>29.552</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>6308708</td>
<td>215</td>
<td>48.158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>280175.00</td>
<td>220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>19424.816</td>
<td>219</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
F is highly significant at P<.05

From table 2, the result shows that the F. cal of 29.552 is significant at P≤.05. In order to determine the direction of the significant in the treatment groups, Schette-test was employed.

**Table 3: Scheffe test**

<table>
<thead>
<tr>
<th>Teaching method (I)</th>
<th>Teaching method (J)</th>
<th>Mean difference</th>
<th>Std Error</th>
<th>Sig.</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>PkS</td>
<td>CLM</td>
<td>20.180</td>
<td>2.085</td>
<td>.000</td>
<td>Lower Bound 14.275</td>
</tr>
<tr>
<td>SQ</td>
<td>PKB</td>
<td>11.444</td>
<td>2.169</td>
<td>.000</td>
<td>Upper Bound 26.086</td>
</tr>
</tbody>
</table>

Based on the observed mean, F is significant at P<0.05

Table 3 based on the observed mean difference, 20.180, shows that the students exposed to prior Knowledge of behavioural objectives and study questions achieved significantly (P<.05) better than those exposed to conventional lecture method. And again, that those taught with study questions achieved significantly (P<.05) more than their counterparts taught with prior knowledge of behavioural objectives with the mean difference of 11.444. Research Hypotheses 1 & 2 are therefore rejected.

**Discussion**

The main objective of the study was to determine the effect of prior knowledge of behavioral objectives and study questions on students' achievement in mathematics in Awka-South Local Government Area of Anambra State. The result revealed that the group exposed to prior knowledge of behavioural objectives and study questions achieved significantly better than those exposed to conventional lecture method. The implication is that the teaching method, prior knowledge of behavioural objectives and study questions has positive effect on students' mathematical achievement. The reason may be because the exposure of students to prior knowledge of behavioural objectives and study questions enhanced their rate of participation in the lesson and also their rate of understanding and the retention of the process skills involved in the learning materials. The awareness of the target goals by the students may also increase their concentration rate in the lesson. This conforms to the point made earlier in the study by Nzewi and Osisioma (1997).

Again, the study revealed that the students taught with study questions achieved significantly better than their counterparts taught with prior knowledge of behavioural objectives. This implies that study question is more effective in facilitating students learning than prior knowledge of behavioural objectives. The reason is not farfetched as students may easily forget what they hear faster than what they do because practice leads to perfection. As the students work on the given tasks, they become conversant with the skills and techniques of answering questions and this will enhance their rate of understanding and retention of the learned materials. Prior knowledge of behavioural objectives on the other hand may enhance students' rate of interest, participation and motivation but the rate of retention, recall and increase in acquisition of process skill may not be there. So the...
result was in agreement with the point made by Mkpa (1985) which was stated earlier in the study.

The implication of this study is that mathematics teachers should expose students to prior knowledge of behavioural objectives and study questions in teaching and learning of mathematics in the classrooms since it was found to be an effective teaching strategy so as to enhance students’ achievement in mathematics and thus prepare them for global competitiveness and sustainability in mathematics education in Nigeria.

The result obtained evidently showed that the use of prior knowledge of bahavioural objectives and study questions facilities and enhances students mathematical achievement.

**Recommendations**

The recommendations are:

1. Mathematics teachers should make use of prior knowledge of bahavioural objectives and study questions rather than use of conventional lecture method in their teaching/learning so as to enhance students’ achievement in mathematics for global competitiveness.
2. Mathematics teachers should be given opportunities by their employers and principals to constantly develop themselves and equip themselves with the new techniques in teaching mathematics by encouraging them to go on in-service training and refresher courses.
3. Mathematics teachers should by compelled by their employers to belong to at least one of the professional bodies in Education, like Science Teachers Association of Nigeria (STAN), Mathematical Association Nigeria (MAN) which should be a yardstick for their promotions.
4. Mathematics teachers should also be sponsored to attend conference and workshops for self and students’ development to enhance sustainability in mathematics education.

**REFERENCES**


Mkpa, M.A. (1985). A study of the effect of two types of inserted review questions on the reading and
remembering of written education content. Nigeria Educational Forum, 8 (1).


WAEC Chief Examiners (2013,). Chief examiners report on general mathematics II.WASSCE, May/June.