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Achievement Scores of Chemistry Students Taught using think aloud Self-Assessment and Conventional Instructional Strategies

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ABSTRACT

Chemistry is a central science and has great impacts in our lives. The study was carried out in Imo State, the state comprises three education zones namely Orlu, Owerri and Okigwe. The study adopted the quasi-experimental control group design using. The population of this study comprised 7,825 senior secondary two (SSII) Chemistry students in all the public senior secondary schools in Imo State. The male students were 2805 while the female students were 5020. The study shows that the mean achievement gain of chemistry students taught using think-aloud instructional strategy is 29.85, those taught using self-assessment strategy had 25.44 while those taught using conventional instructional strategy is 17.00. This means that students taught using think-aloud strategy performed better than those taught using self-assessment and then the conventional strategies. There was an improvement in the mean achievement scores of students taught chemistry using think aloud strategy self-assessment strategy than conventional lecture method. There was a significant difference in the mean achievement scores of students taught chemistry using think aloud strategy, self-assessment strategy and lecture method.

Keywords: achievement scores, chemistry, students, think aloud self-assessment, conventional instructional strategies

INTRODUCTION

Chemistry is a central science and has great impacts in our lives. Chemists have synthesized new fiber, machine, fertilizer, pesticide and structural materials. These, among others, are the reason why the National Policy on Education (2014) gave it a place as a core subject. The importance of science is anchored on chemistry as a science for scientific and technological development. That may be why Okeke [1] reported that chemistry is undoubtedly described as the pivot subjects for technological development. These descriptions and assertions indicate the significant portion accorded to chemistry as a veritable tool for sustainable science and technological development. Chemistry has contributed immensely to the betterment of the human condition in engineering, plastics, paints, antibiotics portable, energy, cooking, cleaning, medicine, drug and environmental issues.

Chinda [2] stated that students show negative attitude towards learning of chemistry, which result to poor academic achievement and low enrolment of chemistry students. These among others had affected the academic achievement of students in chemistry subject in the past decades. Njoku [3] and Chinda [2] posited that secondary school students in chemistry have poor and unimpressive results over the years. This may have adverse effect on the study of chemistry subjects at SSS level which discourages students losing interest in chemistry [4]. They asserted that

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for students to achieve better in chemistry, instructional materials should be used in the teaching of chemistry because chemistry requires real objects and activities/experiments that can convert topics that seem imaginary to concreteness for students' understanding. The WAEC chief Examiners' report of May/June 2004-2009 stated that the poor performance of candidates in chemistry was affected by the following weaknesses:

In Nigeria, conventional teaching methods indicate a method that is formal and has been in use for long [5]. Chemistry teachers have been teaching their students using C.T.M over the years yet WAEC annual reports for the year 2004 to 2010 revealed that students' pass rate at credit level in chemistry was poor and fluctuating consistently below average. This is an indication that the use of CTM in teaching chemistry has not delivered effectively. The situation therefore calls for exploration of other teaching methods found effective in some other fields.

METHODOLOGY

Design of the study

The study adopted the quasi-experimental control group design using:

Area of study

The study was carried out in Imo State, the state comprises three education zones namely Orlu, Owerri and Okigwe.

Population of the study

The population of this study comprised 7,825 senior secondary two (SSII) Chemistry students in all the public senior secondary schools in Imo State. The male students were 2805 while the female students were 5020 (SEMB, Owerri 2017 – 2018). The choice of SSII students was based on the following:

- i. That the proposed students must have selected and enrolled for chemistry subject.
- ii. That they have been exposed to the teaching of the SSCE chemistry syllabus and are not pre-occupied with any major examination.

Sample and sampling techniques

The study adopted two-stage sampling techniques. Firstly, a simple random sampling was adopted to select Mbaitoli Local Government Area from zone one in Owerri Educational zone. Secondly, stratified random sampling was used to select schools in the zone. Purposeful sampling was used because the researcher's discretion as needed to select the schools' availability of experienced chemistry teachers with years of teaching in each school, the number of students offering chemistry and classification of students into science and art class. In each school, three inter classes were used for the study. Two classes were randomly assigned to experimental groups and the other control group. From the three selected schools, two schools were assigned to experimental group with 40 chemistry students treated with think aloud and 40 chemistry students treated with self-assessment strategy, the other school was assigned to control group with 48 chemistry students and was taught using the Lecture Method (LM). The three schools are co-educational schools that consist of both male and female students. Therefore, the total number that was sampled for this study from the three sampled schools were 128 which constitute the sample size of the students (68 male and 60 female) see appendix B.

Instruments for data collection

The instrument for data collection was Chemistry Achievement Test (CAT) developed based on the topic as contained in WAEC chemistry syllabus. Chemistry Achievement Test is a 5 – option multiple choice test. The reason for adopting the multiple-choice objectives was due to a number of considerations such as number of subjects, the procedure for scoring and data analysis. CAT had 50 items multiple choice typed questions which were developed by the researcher from the six content areas used for the study such as, Rate of chemical reaction, energy change and chemical reaction, chemical equilibrium, energy change (Endothermic and Exothermic reaction), energy change (Hess Law, lattice energy law of thermodynamics, enthalpy and entropy change), energy change (energy of reaction, bond energy, enthalpy, entropy and free energy change).

Method of data collection

The instrument for data collection (CAT) was administered to the students before the experimental treatment. The student scores in this first administration serve as pretest scores of the study. The pre-test result enabled the researcher to determine the equivalence of the groups' ability in chemistry concepts at the beginning of the study which is essential in the quasi-experimental method. The treatment commenced and lasted for six weeks. At the expiration of the treatment, the items of this instrument were reshuffled and were re-administered to the students. The scores obtained from the second administration served as post-test scores in the study. The essence of item reshuffling is to distract the students from realizing that they had responded to items in the instrument before. The test scores generated from the pre-test and post-test collected using chemistry Achievement Test (CAT). After the

experiment, the achievement test was marked from which data were generated. The scores generated from the pre-test and post-test were recorded accordingly in a tabular Form.

Experimental procedure

The researcher visited the school to check the facilities available in the schools. Also, an approval was sought from the school authorities to carry out the study. The cooperation of the students and the staff in the selected schools were sought. Four (4) Chemistry teachers were trained as research assistants from the two selected schools. During the training, the researcher discussed with them on what should be required of them during the experiment. The experiment was done during the normal school hours using the school time- table for the classes. When teachers and School coordinators must have been adequately briefed, trained and have demonstrated competence in the successful implementation of the Operational Guides to Instruction (OGI), then the experimentation in the study commenced. The duration for the experiment was six weeks. Before the experiment, a pretest was given to the students after which the treatments commenced to both the experimental and control groups. Two instructional approaches were used for the study think aloud and self-assessment method using tutorial and problem-solving in teaching the experimental group while lecture method of chalk-talk approach was used for the control group. At the end of the experiment, the teachers administer the post- test to the two groups. The pre-test and post-test achievement questions were the same in content for both groups but was rearranged. The students were not informed about the test in advance. The chemistry instructional package lesson plan was identical to the conventional lesson plan in terms of content to be taught, instructional objectives and method of evaluation. The only difference between them was in the instructional activities (teacher's performance and student's performance activities). This was where the use of think aloud and self-assessment employed practical illustrations and activities, whereas the conventional approach proceeded normal in teaching during the class instructions. Each teacher used the appropriate instructional procedure developed in the lesson plan for his group. Their guiding principle was the one-week training received during the pre-experimental period which was conducted for them by the researcher.

Instructional Procedure Variable

The extraneous variable which might arise from instructional procedure was controlled by ensuring that the instructional procedures were the same for subject teachers in all the schools used for the study. The same lesson notes were provided for the teachers in each group.

Subject Interaction

In each of the three schools used for the study, the researcher used one class from each school. This is to avoid the experimental group students from mixing up with the control group students to exchange ideas. This was controlled by not allowing them know that they are used for the study which could be achieved by teaching all the classes by their original teachers.

Method of data analysis

Descriptive statistics (mean and standard deviation) will be used to answer the research questions while the analysis of covariance (ANCOVA) will be used for testing the hypotheses at 0.05 level of significance. Since the research involved pre and post-tests of intact classes, the statistical technique ANCOVA helped to remove initial group differences (Non-equivalence).

RESULTS

Table 1: Mean Achievement scores of chemistry students taught using think aloud self-assessment and conventional instructional strategies

Strategies	Pretest (X)	mean (SD)	Standard deviation (SD)	Posttest (X)	mean (SD)	Standard deviation (SD)	Achievement gain
Think aloud	30.70		7.422	60.55		7.858	29.85
Self assessment	27.77		6.859	53.40		6.379	25.44
Conventional	28.89		8.408	45.89		7.177	17.00

Table 1 shows that the mean achievement gain of chemistry students taught using think-aloud instructional strategy is 29.85, those taught using self-assessment strategy had 25.44 while those taught using conventional instructional

strategy is 17.00. This means that students taught using think-aloud strategy performed better than those taught using self-assessment and then the conventional strategies.

DISCUSSION

The result of the research question one presented in table 1 showed that students taught chemistry using the think aloud strategy and self-assessment strategy (experimental group) had a higher achievement score than the students taught chemistry using the lecture method (control group). This finding is agreement with the findings of Okereke [6] who in their study found that students taught chemistry using think pair share using prior knowledge of instructional objectives on their achievement in chemistry perform better than those taught with lecture methods. However, the corresponding result of the analysed hypothesis showed that teaching method is a significant factor in mean achievement score of students in the chemistry achievement test (CAT) this was because there was a significant difference in the mean achievement scores of students taught chemistry using think aloud strategy, self-assessment strategy and lecture method. This finding was on agreement with Pipette [7], who sought to determine the effect of self-assessment in selected chemistry topics whose separate findings revealed that there was significant difference in the mean achievement scores of students in chemistry taught using self-assessment.

CONCLUSION

There was an improvement in the mean achievement scores of students taught chemistry using think aloud strategy self-assessment strategy than conventional lecture method. There was a significant difference in the mean achievement scores of students taught chemistry using think aloud strategy, self-assessment strategy and lecture method.

REFERENCES

1. Okeke. Effects of electronic calculators on learners' achievements in speeded and difficult arithmetic tasks. *Ebonvi Technology and Vocational Education Journal*. 2005; 1(1).35-41.
2. Chinda W. Comparative study of female and male students state unpublished M.ed., thesis rivers state university of science and technology port Ha2009.rcourt.
3. Njoku ZC. Comparison of students' achievement in three categories of question in SSCE practical chemistry examination. *Journal of science teachers association of Nigeria*, 2007; 42(1, 2) 67-72.
4. Obi NC, Idoha K. Kitchen resources classroom interaction and academic performance and retention of ss2 chemistry students in thermochemistry. *Journal of education and practice a*, 2013; (8): 169 – 173
5. Paramasivan C. Conventional methods of training to teacher and its impact in higher education. *Journal of Innovative Research in Education*, 2015; 2(4), 4-10.
6. Okereke N. The effect of think pair share and prior knowledge of instructional objective on the achievement in chemistry. *An unpublished PGDE thesis*. University of Benin. 2005.
7. Pipette. The effect of self-assessment and retention in integrated science. *An unpublished PGDE thesis*. University of Benin. 2006.

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