INSTRUCTIONAL COOPERATIVE AND LECTURE TEACHING STRATEGIES ON CHEMISTRY STUDENTS' ACADEMIC ACHIEVEMENTS ON THE CONCEPTS OF ELECTROCHEMICAL CELLS IN IBESIKPO ASUTAN LOCAL GOVERNMENT AREA, NIGERIA.

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ABSTRACT

The study was to investigate the instructional cooperative and lecture teaching strategies on chemistry students' academic achievements on the concepts of electrochemical cells in Ibesikpo Asutan Local Government Area, Nigeria. The research design adopted a quasi-experimental design for the study. The population of the study was made up of all the students of chemistry studying electrochemical cells in the study area. However, SSII chemistry students were randomly selected and each school produced 40 students making total schools produced 40 students making total sample of 200 students for the study. The hypotheses were tested using t-test statistical tool. The instrument for data collection was Chemistry Achievement Test (CAT). Findings of the study shows that, there is a significant difference between students taught the concept of electrochemical cell using cooperation instructional method and those taught using the same chemistry concepts using lecture method and also there was academic difference between male and female students in terms of academic achievement. The following recommendations were made based on the findings, that cooperative instructional method should be adopted by teachers' in the learning of electrochemical cells as it will help the learners to understand the concepts better, if adopted by teachers in secondary schools and it will also enhance students achievement and interest in the learning the concepts of electrochemical cells in both public and private secondary schools.

KEYWORDS: Cooperative, Lecture Teaching Strategies, Chemistry, Electrochemical Cell, Academic Achievement

INTRODUCTION

The learning obligation of a teacher is to impact useful knowledge and ideas on the learners by adopting appropriate learning and teaching instructional teaching strategies (Brain 2023). The responsibility of the teacher is to help the students attain maximum achievement in their learning tasks. Several competencies are expected of the teacher in order to achieve these goals to become credible; some of the competencies include the ability to adopt appropriate instructional strategies in teaching.

Brain Sunday and Asuquo, Patience (2023) reported that chemistry is a branch of science which deals with almost all the fundamental issues of life, counting from the food we eat, the water we drink, our cloth, cars, phones and drugs. Chemistry is also describe as a branch of science which is highly important in modern and developed societies because of the significant role it plays in making life cheap and meaningful for human existence and survival.

Chemistry can also be describe as a branch of science which is a necessity or apre-requisite for students wishing to study professional courses such as, medicine, pharmacy, engineering and other science related courses in institution of higher learning.

Ajeyalemi (2003) and Boyuwoye (2005) reported that there are several attempts through the use of carefully planned instructional learning strategies to improve the status of chemistry teaching and learning. One of such methods of instruction is the cooperative instructional method adopted by chemistry teacher to teach chemistry in secondary schools. Cooperative learning is the umbrella brain for a variety of educational approaches involving joint intellectual efforts by teachers and students (Wendy, 2005).

Co-operative instructional methods expose the students to various teaching styles and approaches, which increase the learning methods of students which in returns enhances their academic achievement. Goetz (2000) opined that students expose to various learning strategies face frustration because they do not really know the actual instructional strategies to be adopted.

Lecture method of teaching is a verbal presentation of ideas, facts, concepts, theories principles and laws of science by a teacher to students. The students listen to the teacher and obtain the information with less options of no or yes. Lecture method of teaching is a teacher centered, what the teacher says seems to be the ultimate. In most times lecture ways of teaching is based on the premise that the learner must have been acquainted with certain facts and knowledge and there is no need in western time to deliberate more on a topic.

Electrochemical cells is a concept in chemistry taught in senior secondary school class SSII and it is a major concept in the senior secondary school science class curriculum. Electrochemical cells is concerned with the flow of electronic (i.e an electric current) can be set up between two electrodes which have different electrode potentials. The readiness and speed of this electron flow are determined by the magnitude of the difference between the two electrode potential (Julius, 2021) electrochemical cells are widely employed to generate small currents of electricity for everyday purposes and industrial operations.

The set-up in which chemical energy is converted to electrical energy is called electrochemical cell. Examples of an electrochemical cells with a practical use is Daniel cell, lead accumulator, Leclanchecell, secondary cell. Several studies have been carried out in order to popularize appropriate teaching strategies for teaching electrochemical

cells in our secondary schools. These suggested teaching strategies do not include co-operative instructional methods rather lecture method was mentioned, irrespective of the above mentioned instructional strategies, the academic achievement of student in electrochemical cell shall remain in a dwindling state. Therefore the study seeks to examine the instructional cooperative and lecture teaching strategies on chemistry students' academic achievements on the concepts of electrochemical cells in Ibesikpo Asutan Local Government Area, Nigeria.

STATEMENT OF THE PROBLEM

Persistent poor academic achievement of 'students' in chemistry in external examinations is a major problem to all lovers of education. WAEC Chief Examiners' reports in Nigeria as at 2021, 2022 and 2023 showed a high percentage of secondary school students poor achievement in chemistry during external examinations. The poor achievement of students in chemistry may be associated and attributed to poor teaching methods adopted by teachers during classrooms, instructions. Researchers in chemistry have continually sought for better teaching strategies that would provide a bridge between the concepts that seems practicable, abstract and ambiguous. The concept of electrochemical cell in chemistry is not excluded. Nigeria is a develop nation that makes use of electrochemical cell products such as dry and wet cell battery, every automobile vehicle uses battery to drive and scientific research reveals that the production of battery is not done here in our nation Nigeria and the achievement of chemistry with regards to the concepts of electro-chemical cells in previous WASCE, NECO examination is poor and this is link to the learning strategies adopted by teachers and this as affected strategies adopted by teachers and this as affected students' academic achievement when the subjects matter is examined. It is on this basis that, the study sought to examine the effects of instructional cooperative and lecture teaching strategies on chemistry students' academic achievements on the concepts of electrochemical cells in Ibesikpo Asutan Local Government Area, Nigeria.

SIGNIFICANCE OF THE STUDY

The findings of this study would be of benefit to students, chemistry teachers, school administration, examination agencies, curriculum planners and developers, textbooks publishers, Parent Teacher Association (PTA), federal, state and local government area as well as future researchers.

The study would encourage active participation of learners during teaching and learning process. The findings of this study would be beneficial to chemistry teachers to educate them on the need to select appropriate methods and instructional teaching strategies for the teaching of electrochemical cells to improve students achievement in chemistry. Federal and State Ministry of Education as well as Local Government Authorities would benefit from the findings of this study as it would serve as basis for planning and organizing conferences, seminars and workshops for teachers in order to sharpen their skills in the use of instructional cooperative and lecture learning strategies.

Finally, the findings of the study would provide empirical framework and literature for future researchers in the area.

PURPOSE OF THE STUDY

The purpose of the study is to determine cooperative instructional teaching methods and academic achievement of students in electrochemical cells. Specifically the study sought to determine

- To determine the difference between the academic achievements of students taught electrochemical cell using cooperative learning strategy and those taught using the conventional lecture method.
- To determine the extent to which cooperative instructional learning strategy affects the academic achievement of students in electrochemical cell in secondary schools as a result of gender.

RESEARCH QUESTION

- What is the significant difference between the academic achievement of students taught electrochemical cells using cooperative learning strategies and those taught using the conventional lecture method?
- What are the mean scores of male and female chemistry students taught electrochemical cells using instructional cooperative learning strategy and those taught with lecture teaching method?

RESEARCH HYPOTHESES

The following null hypotheses were postulated to be tested.

- There is no significant difference between the academic achievement of students taught electrochemical cell using cooperative instructional methods and those taught using the conventional lecture method in secondary schools in Ibesikpo Asutan.
- There is no significant difference between the academic achievement of male and female students taught electrochemical cells using cooperative instructional learning strategy and those taught using lecture teaching method.

RESEARCH METHODS

The research methods deals with the area of study, research design, population of the study, research design, sampling and sampling techniques, instrumentation, validity of the instrument, reliability of the instrument, method of data collection and method of data analysis.

SCOPE OF THE STUDY

The scope of the study will focus on two independent variables instructional cooperative and lecture teaching methods and one dependent variable-academic achievement of students in the concepts of electrochemical cells in Senior Secondary Two (SSII)as indicated in the curriculum. The study will also be delimited to students in selected public co-educational secondary schools in Uyo Local Government Area, Akwa State.

- **Constructivist Theory by Jerome Bruner (1961)**

Constructivist theory was propounded by Bruner in 1961. The theory state that learning is effective when learner are giving the opportunity to discovered fact by themselves. Bruner pointed that human beings construct new ideas or concept based upon existing knowledge. That is instruction should address four major aspects;

predisposition toward learning structure and other forms of knowledge; sequence of knowledge; posing of rewards; punishment that learning is an active process in which learners construct how knowledge based on their current knowledge. Bruner opined that students should discern for themselves a structure of subject, contents, discovered the link and relationships between difference fact concept and theories rather than the teacher telling them.

AREA OF STUDY

The area of study is the area in which the research was carried out and in this case the area of study was Ibesikpo Asutan Local Government Area, Nigeria, according to 2023 population census, the population is 87,101 including male and females.

RESEARCH DESIGN

The design adopted for this research was quasi-experimental design. The design is used where it is not randomly permissible to randomly assign participants to groups and the researcher may have no option but to use already existing groups in form of classroom (Awotunde and Ugoduluwa, 2004). The design was adopted to investigate the effect of instructional cooperative and lecture teaching strategies on chemistry students' academic achievement on the concept of electrochemical cells in Ibesikpo, Akwa Ibom State.

POPULATION OF THE STUDY

The population consisted of all chemistry students in senior secondary public schools in Ibesikpo Asutan. The 7 senior secondary schools have a population of 2050 chemistry students.

SAMPLING AND SAMPLING TECHNIQUES

The population of the study consist of all chemistry students in the study area. SS II chemistry students were randomly selected out of the seven (7) secondary schools; each schools produced 40 students making a total sample of 200 student for the research.

VALIDITY OF THE INSTRUMENT

The researcher developed an instrument called (ICALLSOCSAAINE) which was validated by a professor in Science Education Department University of Uyo and two expects from the department of integrated science in the Akwa Ibom State College of Education. The validation was made by the above, experts.

RELIABILITY OF THE INSTRUMENT

The scores obtained from were the data collected were analyzed and was found reliable using an independent t-test statistical tool.

METHOD OF DATA COLLECTION

The data were collected and the students were divided into two groups of 100 each. The first 100 students were taught using cooperative teaching method, they were

made up 50 males and 50 females while the other group also comprises of 100 students who were taught using lecture method.

METHOD OF DATA ANALYSIS

The method for data analysis was the students t-test statistical tool and simple percentage statistical tool was also adopted to analyses the gender composition from the respondents.

ANALYSIS OF DATA AND DISCUSSION OF FINDING

Analysis of Data

Gender Composition of the Respondents

Sex	No of Respondent	Percentage %
Male	100	50
Female	100	50
Total	200	100

The above table shows gender composition of respondents, 100 respondents were male and 100 were females, hence the percentage representation were 50 each.

Test of Hypotheses

Variables	N	$\bar{X}$	SD	DF	t-cal	t-critical	Decision
Academic achievement of students taught chemistry using cooperative instructional method	100	53.40	7.81	198	5.92	1.96	Null Hypothesis
Academic achievement of student taught chemistry using traditional lecture method	100	46.70	8.22				Rejected

Result of the t-test comparing the academic achievement of students taught chemistry with cooperative instructional method and traditional lecture method.

HO: There is no significant difference between academic achievement of students taught chemistry using cooperative instructional method and those taught using lecture method.

From table II, above which shows hypothesis one indicated that the mean score for both groups (students taught using CIM and lecture method) stood at 53.4 and 46.7 respectively while the standard deviation stood at 7.81 and 8.22 respectively.

CALCULATION FOR THE HYPOTHESIS

Variables	N	$\bar{X}$	SD	DF	t-cal	t-critical	Decision
Males	50	56.7	11.07	198	10.32	1.98	Null hypothesis rejected
Females	50	53.5	11.37				

Research Hypothesis 2: There is no significant difference between the academic achievement of male and female students taught using chemistry using cooperative instructional method in senior secondary schools.
The above table shows the comparison of academic difference between male and female students taught chemistry using cooperative instructional method (CIM), the mean score for male was 56.7 and 53.5 for female, their standard deviation were 11.07 and 11.37 respectively.

DISCUSSION OF FINDING

The findings of the study shows that the mean score for students taught chemistry using cooperative instructional method was 53.40 and their standard deviation (SD) was 7.81 respectively. Those taught using lecture method had a mean score (x) 46.70 and their standard deviation (SD) was 8.22, this implies that the given research hypothesis one which states there is no significant difference between students taught using CIM and lecture method, therefore the calculated value of 5.927 1.96 critical value implies that there is a significant difference between the two instructional method, hence the null hypothesis was rejected as the decision rule at 0.05 alpha significant level.

SUMMARY

This study examined the cooperative instructional method and academic achievement of students in Chemistry in Secondary Schools in Ibesikpo Asutan Local Government Area. The study was prompted by the prevalence of poor academic achievement of senior secondary school students in chemistry examination and also observed poor quality at this level of education, particularly as it affect the teaching and learning of Senior Secondary Chemistry. The study population for the study was 2050 Secondary School Students and the sample six for the study was 200 students selected from 5 out of the 7 public secondary schools in Ibesikpo Asutan Local Government Area. Chemistry using cooperative instructional method and those taught Chemistry using traditional lecture method. Also the findings indicated that there is a significant difference between the academic achievement of male and female students taught Chemistry using cooperative instructional

RECOMMENDATIONS

The following recommendations were made based on the findings of the study.

- The use of cooperative instructional method improved the academic achievement of students in the present study. As such, Chemistry teachers should be encouraged to use cooperative instructional method as alternative instructional method that they can fall back on in order to improve the teaching and learning of Senior Secondary Chemistry.

- Cooperative Instructional Method strategy is an effective and gender — friendly instructional strategy that should be used to maximize learning among students cooperative of gender.

CONCLUSION

Based on the findings of this study, the following conclusion is drawn:

- The cooperative instructional method appears to have a strong record of successes in increasing students' motivation to learn and enhancing higher academic achievement. Students exposed to cooperative instructional methods in the present day study performed significantly better than those taught chemistry by means of traditional method.
- The study also concludes that there is a significant difference in academic achievement of student taught chemistry using cooperative instructional method in terms of gender.

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