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Bi-Annual

ENHANCING TEACHING AND LEARNING OF CHEMISTRY IN SECONDARYSCHOOLS USING COMMUNITY CONTACT INSTRUCTIONAL TECHNIQUE IN SOUTHWESTERN NIGERIA

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Abstract
The study explored enhancing Chemistry teaching and learning in secondary schools using community contact instructional technique in southwestern Nigeria with a view to improving tuition in Chemistry by taking secondary students out of the classroom and laboratory into resource persons on concepts in Chemistry curriculum. The population comprised all Senior Secondary (SS) II Chemistry students in Ondo West Local Government Area, Ondo State. A sample size of 81 students formed the study sample. It adapted a pre-test, post-test, control group design. Instruments used for the study are Achievement Test in Chemistry (ATC), a standardized test, and Chemistry Attitude Scale (CAS). The reliability of Chemistry Attitude Scale (CAS) was ensured through Cronbach's co-efficient of 0.82. Findings revealed that the community contact instructional technique improved students' performance ($t = 13.33$; $df = 79$; $p = 0.036 < 0.05$) *and attitude* ($t = 45.16$; $df = 88$; $p = 0.00 < 0.05$) *better than the teacher expository method. It is therefore, recommended among others that, community contact instructional technique should be adopted for learning and teaching to enhance conceptual understanding.*

Keywords: Attitude, Chemistry, Community contact, Instructional techniques, Performance teacher expository

Introduction

The philosophy of science discipline to a great extent could be conceptualized to train students the scientific approaches through verifiable practical ways and reproducible strategies in solving developmental needs of the society in general. In order to accomplish this, there is the need to develop students' abilities and attitudes to apply scientific knowledge and skill in solving practical problems of the society (Thorburn & Allison). Ceci, (2015) also posited that there is the need to engender in students an appreciation of the fact that no nation may develop without science and its application most especially if there is no considerable reference to the nucleus of science which is Chemistry. Matter and its compositions as well as its reactions with different substances are subsumed in branches of Chemistry. Applications of knowledge of Chemistry proffers solutions to diversified human problems through turning of discoveries in science to drive the economic growth of a nation, provision of innovations and practical solutions to unemployment and enhancement of sustainability promotion that could lead to the growth of industries. Curriculum implementation in the classroom setting however showed, inability of teachers to relate its concepts adequately well to day-to-day human activities has become the order of the day therefore, students viewed the subject as abstract and not completely relevant to them (Ceci, 2015).

According to the Nigerian Educational Research and Development Council (NERDC, 2009), secondary school Chemistry curriculum objectives are designed to inculcate in students, the right attitude, interest, theoretical and practical skills to solving societal needs coupled with obtaining good grades for easy admission for higher education. From the foregoing, realizing this, major hindrances to the learning and teaching and of the subject should be curtailed. From the perspectives of the students, there are complaints of Chemistry being very abstract and difficult to comprehend because of not adequately relating its terms to visible things in society, this seems to make it irrelevant to everyday life (Bamidele, Irinoye&Adetunji, 2019). Students are scared away from learning Chemistry because of terminologies that look unfamiliar to them (Irinoye & Adeleke, 2019). Despite the importance of Chemistry in daily activities, the persistent poor performance of secondary school students as well as their negative attitude to it has not been adequately addressed.

Bamidele, Irinoye & Adetunji, (2019) maintained that students' performance have been poor in the subject because, teachers uses Teacher Expository Method (TEM) probably to be able to complete the syllabi that could be regarded as overloaded. The current trend of “students must pass” as a prerequisite for subject teachers promotion by the government further compound the situation. Therefore, teachers seems to teach for learners to pass examinations without necessarily having focus of applying and diversify the knowledge obtained to entrench better academic performance as well as self-reliance as stipulated in the general goal of science teaching.

The Teacher Expository Method (TEM) is an approach to teaching that is based on the subject teacher's own traditional ways of giving classroom instruction.

It could be viewed as a modified conventional teaching approach in that it is not governed or influenced by universal criteria but by the teacher's personal approaches to providing instruction during lessons. In the context of this study, TEM will be any approaches that the Chemistry teacher would use at his/her own discretion to teach the concepts laid out in the curriculum. Therefore, the TEM was used as a control against which impact of the experimental treatments in this study would be judged. According to Bamidele et.al (2019) there is room for improvement in students' performance in Chemistry by using student-centred methods such as Community Contact Instructional Technique (CCIT).

Oloyede, Ajibade & Bamidele (2010) described Community Contact Instructional Technique (CCIT) is a strategy used either to bring the community to the classroom or to take the class to the community. Taking the students out of the classroom and engaging them in utilization of resources in the community relevant to Chemistry classroom experience for the purpose of learning some concepts in Chemistry have been proven to improve students, performance in sciences (Jegstad, &Sinnes, 2015). The focus for the CCIT is to enable the learners see in reality what has been taught in theory and discover things themselves. CCIT perhaps represents a process of creating a deep and meaningful learning experience through the development of three independent elements such as social, cognitive and experiential learning. It could promotes collaborative, equitable and beneficial sharing of ideas to find sustainable solution to educational problems encountered in Chemistry The teachers and the learners would have to come into first hand contact with resource persons, places and materials that would be of benefit in the teaching and learning process (Alasela, 2013). Based on the background, it is pertinent to examine whether or not using Community Contact Instructional Technique in the teaching and learning of Chemistry.

Statement of the Problem

Over the years, stakeholders in education have observed perplexing situations on who have been taught Chemistry and still perform poorly in external examinations such as West African Examination Council (WAEC) and National Examination Council (NECO) despite huge resources government claims to spend on science education in Ondo State. Secondary school Chemistry curriculum objectives is designed to inculcate in students, the right attitude, interest, theoretical and practical skills to solving societal needs coupled with obtaining good grade for easy admission for higher education. Unimpressive attitude and achievements raise the doubt of producing youths imbued with skills to solving theoretical and practical problems required for 21st century that the science education is designed for. Unimpressive performance could be adduced to inappropriate teaching methods, poor thinking ability and inadequate utilization of resources in the community. It could be noticed that many Chemistry topics could be better understood by making use of local products manufacturers and artisans in students' community, thereby, improving the attitude and performance of learners and engendering self-reliance

among students. Instructional designs in most Chemistry classroom may not have met learners' needs for conceptual understanding and promotion of the right attitude to learning probably due to conventional teaching method used. It is therefore, pertinent to investigate whether or not CCIT could improve the students' attitude and performance, hence, this study.

Purpose of the Study

This work explored enhancing Chemistry teaching and learning in secondary schools using community contact instructional strategy with the aim of improving the attitude and performance of students in Chemistry based on the following specific objectives:

a. ascertain effects of Community Contact Instructional Technique (CCIT) before and after being taught Chemistry on students' achievement in Ondo, Ondo State;
b. determine the relative effectiveness of Community Contact Instructional Technique (CCIT) and Teacher Expository Method (TEM) on students' achievement in Chemistry in the study locate; and
c. assess the attitude of students towards learning Chemistry before and after being exposed to Community Contact Instructional Technique (CCIT).

Hypotheses

The following null hypotheses generated at 0.05 level of significance guided the study.

1. There is no significant difference in the performance of students in Chemistry before and after being exposed to Community Contact Instructional Technique (CCIT).
2. There is no significant difference in the performance of students taught with Community Contact Instructional Technique (CCIT)**.**and those taught using Teacher Expository Method (TEM) in learning Chemistry.
3. There is no significant difference in attitude of students before and after being taught using Community Contact Instructional Technique (CCIT) in learning Chemistry.

Methodology

The research design for the study was pre-test, post-test control group design with two groups. Two coeducational public Senior Secondary School two (SSSII) in Ondo State formed the sample for this study. They were selected through the use of purposive sampling technique of secondary schools in Ondo West Local Government of the State. Intact classes were used and a total of 81participants took part. The instruments used for the study were Achievement Test in Chemistry (ATC) and Chemistry Attitude Scale (CAS).

The instruments were subjected to face content and construct validity. To ensure that the instruments were adequately validated, they were given to

experienced Chemistry teachers and experts in tests, measurement and evaluation for their suggestions, corrections and to ascertain its suitability. Achievement Test in Chemistry (ATC) was adapted from West African Africa Examination (WAEC) past questions, hence a standardized test. The reliability of Chemistry Attitude Scale (CAS) was ensured through Cronbach's co-efficient of 0.82 which suggested that the instrument was reliable enough for use. Six weeks was used for the study. General procedure for teaching methods together with the researcher's instructional guide were jointly studied and discussed with the research assistants used, therefore, students were taught by them. The marks obtained by the students in their respective groups were recorded. The scores obtained serves as the dependent variable. Chemistry Attitude Scale was administered before and after the post-test.

Results

In an attempt to determine if the participants have similar fundamental knowledge, pre-test was administered and analyzed with t-test statistics and the result obtained is shown in Table 1 as:

Table 1:
Summary of analysis of t-test of Pre-test of Community Contact Instructional Technique (CCIT) and Teacher Expository Method (TEM)

Variable	N	$\overline{X}$	SD	Std. Error	t	df	p
Pre-TEM	36	2.61	0.94	0.156	1.09	79	0.73
Pre-C CIT	45	2.38	0.98	0.15			p>0.05

t = 1.09; df = (79), p = > 0.05

From the table, the value of t = 1.09; df = (79), p = > at 0.05 level of significance indicated no significant difference in the performance of the two groups before treatment and further showed the participants have similar fundamental prior knowledge before intervention.

Hypothesis 1:

There is no significant difference in the performance of students in Chemistry before and after being exposed to Community Contact Instructional Technique (CCIT).

In an effort to determine if the participants differ or not in Community Contact Instructional Technique (CCIT) usage, pre-test and post-test were compared using t-test statistic and the result obtained is shown in Table 2 as:.

Table 2:
Summary of analysis of Mean, Standard Deviation, and t-test of Community Contact Instructional Technique (CCIT) before and after treatment

Variable	N	$\overline{X}$	SD	Std. Error	t	df	p
Pre-C CIT	45	2.38	0.98	0.15			0.00
					40.01	88	
Pre-C CIT	45	15.53	1.97	0.29			p>0.05

t = 40.01; df = (88), p =< 0.05

From the table, the value of t = 40.01; df = (88), p = < 0.05at 0.05 level of significance revealed existence of significant difference in performance of students taught Chemistry using Community Contact Instructional Technique (CCIT).Thus, the hypothesis is rejected. The post-test mean score ($\overline{X}$= 15.53) CCIT was better than mean the score obtained before treatment ($\overline{X}$= 2.38).

Hypothesis 2:

There is no significant difference in the performance of students taught with Community Contact Instructional Technique (CCIT)**.**and those taught using Teacher Expository Method (TEM) in learning Chemistry.

In an effort to determine if the participants differ or not in Community Contact Instructional Technique (CCIT) and Teacher Expository Method (TEM) in learning Chemistry, their post-test were compared using t-test statistic and the result obtained is shown in Table 3 as:.

Table 3:
Mean, Standard Deviation, and t-test Analysis of Post-test Scores of Community Contact Instructional Technique (CCIT) and Teacher Expository Method (TEM)

Variable	N	$\overline{X}$	SD	Std. Error	t	df	p
Pre-TEM	36	10.39	1.98	0.25			0.036
					13.33	79	
Pre-C CIT	45	15.53	1.97	0.29			p>0.05

t = 40.01; df = (88), p =< 0.05

From the table, the value of t = 13.33; df = (79) p = < 0.05 is an indication of significant difference existence in performance of students taught Chemistry using Community Contact Instructional Technique (CCIT) and that of Teacher Expository Method (TEM). Thus, the hypothesis is rejected. The post-test mean score ($\overline{X}$= 15.53) CCIT was better than mean the score obtained using TEM ($\overline{X}$= 10.39). Also, the higher mean difference ($\overline{X}$= 5.14) of CCIT further confirmed its superiority to TEM in terms of students' performance

Hypothesis 3: There is no significant difference in attitude of students before and

after being taught using Community Contact Instructional Technique in learning Chemistry.

In an attempt to determine if the participants differ or not in attitude towards Community Contact Instructional Technique (CCIT) in learning Chemistry the pre-attitude and post-attitude rating scores were compared using t-test statistic and the result obtained is shown in Table 4 as:.

Table 4:
Summary of Mean, Standard Deviation, and t-test Analysis of Pre-attitude and Post-attitude Rating Scores of Community Contact Instructional Technique

Variable	N	$\overline{X}$	SD	Std. Error	t	df	p
Post-Attitude CCIT	45	6.47	3.37	0.50	45.16	88	0.00
Post-Attitude CCIT	45	38.53	3.37	0.50			p>0.05

t = 45.16; df = (88), p =< 0.05

Table 4 depicts that the value oft = 45.16; df = 88; p = 0.00 < at 0.05 level of significance revealed existence of significant difference in attitude of participants taught Chemistry usingvCommunity Contact Instructional Technique (CCIT). Thus, the hypothesis is rejected. The post-attitude mean score ((X= 38.53) CCIT was better than mean the score obtained using TEM (X= 6.47). Also, the higher mean difference (X= 32.06) of CCIT further confirmed its superiority to TEM in terms of attitudinal disposition of the learners.

Discussion of Findings

Findings of the first hypothesis, it could be observed that there was a significant difference existed in the performance of students in Chemistry before and after being exposed to Community Contact Instructional Technique. The findings corroborate Alasela (2013) study as well as Ajala (2010) that reported Junior Secondary School Basic Technology students that utilized resources from community had better achievement than those exposed to conventional one. It also corroborated the finding of Thorburn and Allison (2010) who posited that students who went out door performed better than their counterpart who learns only in the class.

The result further showed on hypothesis 2 that significant difference existed in the performance of students exposed to Community Contact Technique compared to Teacher Expository, with the former improving students' performance better than the latter. The result is in tandem with studies of Irinoye and Adeleke (2018), Bamidele, Irinoye and Adetunji (2018) and Irinoye and Adeleke (2019) who maintained that students have the best performed in Chemistry with the use of Community Contact Instructional Technique when compared to Heuristic and Associative Creativity Instructional Techniques.

The third hypothesis that centred on attitude of participants for the study onCommunity Contact Instructional Technique also indicated that it could be observed that students have a positive attitude. Most students attested that the instructional technique was good for learning Chemistry since they could easily observe and connect the relationship between the various Chemistry concepts to every-day life applications. The finding is similar to that of Ceci (2015) and Krischer, Spitzerand Groger (2016) who reported better attitudinal disposition of students in Chemistry and changed their assumption from Chemistry being perceived "toxic" rather than "idyllic" after learning Chemistry concept out of classroom. Students' development of a positive attitude could be adduced to their active participation, motivation and the learning being free from the boredom often associated with conventional teaching methods.

Conclusion

From the result of the study, one could realize that the Community Contact Instructional Technique improved students' performance and their attitude; therefore, it capable for science learning and teaching for classroom setting since it elucidated the central idea in Chemistry concept. It is a suitable instructional technique that could enable learners discover connections among the key ideas, thus, allows recall of facts, applying them, prevents regurgitation of facts without conceptual understanding and make them self-reliant.

Recommendations

Community Contact Instructional Technique should be adopted for teaching and learning of chemistry in secondary schools. Government and school authorities should provide and encourage proper orientation for teachers through seminars, workshops, conferences and in-service training to the instructional technique.

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