

REFOCUSING CHEMISTRY THROUGH PERCEIVED EFFECT OF INCLUSIVE EDUCATION ON STUDENTS ACADEMIC ACHIEVEMENT AND ATTITUDES TOWARDS CHEMISTRY AND COLLABORATIVE SKILLS OF CHEMISTRY TEACHERS IN OBUDU EDUCATION ZONE OF CROSS RIVER STATE, NIGERIA

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Abstract

The documental empirical findings on the effect of inclusive education on students' academic achievements and attitudes of secondary school students towards chemistry and collaborative skills of chemistry teachers seem to be inconclusive. This study adopted an experimental research design, while the area of this study is Obudu Education Zone of Cross River State, Nigeria. The population for the study is 72 secondary schools which consisted of 552 students. The sample for the study is 20 (Secondary School Chemistry Teachers (SSCT) and Secondary School Special Education Teachers (SSSET) and 80 (Students Without Disabilities (SWOD=70) and Students With Disabilities (SWD=10)). The researchers used subjective random sampling technique to accommodate all handicaps students with disabilities and subjected the rest to simple random sampling. Two different classes were assigned: experimental and control groups in the study. The study sampled 80 SSII students randomly selected from two senior secondary schools in Obudu education. Hence, the purpose of this study was to determine the effects of inclusive education on secondary school chemistry students' academic achievement and attitudes toward chemistry and promoting chemistry teachers collaborative skills as a way of refocusing chemistry. The study was guided by one research question and two research hypotheses. Data were collected using a structured questionnaire, pre-test and post-test research model with a control group. Three instruments were used for the present study. Students with Disabilities (SWD) and Students' Without Disabilities (SWOD) were enrolled to the combination of periodic table and chemical reactions skills in all the public secondary schools in Obudu Education Zone of Cross River State, Nigeria. The findings of the study indicated that inclusive education increases students' academic achievement and attitudes towards chemistry. It also indicated that inclusive education promotes chemistry teachers and special education teachers' collaborative skills. Based on the findings, the researchers concluded that inclusive education aids the teaching and learning of both junior and senior secondary education which invariably promotes National development. The educational implications of the study were discussed and recommendations were proffered.

Keywords: Inclusive Education, Collaborative Skills, Academic Achievement, Attitudes, Students with Disabilities (SWD), Students without Disability (SWOD), Secondary school chemistry students, Chemistry teachers and Special education teachers

Introduction

Internationally, over the last several decades, discussion regarding the most appropriate methods for educating children with disabilities has abounded (Itkonen, 2007) in Kimbrough & Melle (2015). The landmark reauthorization of the Individuals with Disabilities Education Act (IDEA) in 1997 did not actually broaden the concept, but it effectively modified the principle and practice of inclusion by admitting that students'

Individualized Education Programmes (IEPS) would ensure the general education curriculum.

Furthermore, Kluth, Villa & Thousands (2002) cooped that authorization is the landmark concept broadened by the concept of inclusion to include: academic as well as physical and social access to general education instruction and experience. They also added that there was continued evolution towards inclusive education however, tremendous disparities exist among schools and states in the United States of America (Nigeria inclusive). There were different views surrounding the inclusive education and in different places. In some schools, inclusive education means the mere physical presence or social inclusion of students with disabilities in regular classroom. In other schools Albert, (2003) stated that: it means active modification of content, instruction and assessment practices so that students can successfully engage in core academic experiences and learning strengthened by the No child left behind Act of 2001-2002. The importance of inclusive education according to Greenspring (2017) include: (i) Development of a positive perception of themselves and others; (ii) Healthy friendship development; (iii) Parental involvement in education; (iv) A basis for an inclusive society; (v) A broader range of learning methods; (vi) Better academic performance of students; (vii) Development of leadership skills; (viii) The use of a broader range of instructional material; (ix) teaching aids and models inclusive academic curriculum; (x) Building relationships.

According to King in York (2004), inclusion is defined as involving students' attending the same schools as siblings and neighbours, being members in general education classrooms with chronological age, appropriate classmates, having individualized and relevant learning objectives and being provided with the support necessary to learn e.g. Special Education and related services. Ryndak, Jackson and Billings (2000) Identified seven components in the definitions of inclusion: five components related to the inclusion of individual students with moderate to severe disabilities in the general education setting, include: (a) Placement in natural general education settings, (b) All students together for instruction and learning, (c) Supports and modifications within general education to meet appropriate learner outcomes, (d) Belongingness, equal membership acceptance, and being valued and (e) Collaborative integrated service by education teams. The other two components addressed the systemic concept or philosophy of inclusion.

The guidelines of Inclusive Education according to National Policy on Education (2012) encompasses: i. The nine categories of impairment/disability and gifted/talented that "have traditionally been excluded from educational opportunities". ii. The changes that need to occur to ensure successful inclusion: adjustments to be made to physical infrastructure, provision of special equipment and material, intensive advocacy to mobilize all stakeholders and communities/grassroots organisations partnership, collaboration and alliance-building; the specification of the roles of key stakeholders especially the National and State Ministries and parastatals and other agencies. There are other inclusion strategies at the formal school system and a four-phase implementation procedure comprising, "teacher training as special needs educators, deployment and retraining; and the need for/establishment of special education assessment centres in every local government area which would "provide support for inclusion through identification, referral to relevant services, and supply of adaptive materials where necessary" (FME 2008).

Refocusing Chemistry through Perceived Effect of Inclusive Education on Students Academic Achievement and Attitudes towards Chemistry and Collaborative Skills of Chemistry Teachers in Obudu Education Zone of Cross River State, Nigeria

In spite of this central and important position of chemistry among other sciences and related disciplines, studies revealed that academic achievement of students in chemistry at senior secondary school certificate examination (SSCE) has consistently been very poor and unimpressive (Njoku in Sabiru, 2014). Among all the factors responsible for the poor performance of students are the poor teaching methods, (Ayogu 2001) inadequate laboratory equipment in chemistry (Eniayeju, 2010) and mathematical nature of chemistry among others. Pajanes and Graham (1999) observed that as one of the factors during students' attitude to chemistry such as an academic task perceived effects have been seen in students who have high mathematics performance have high perceived effect of chemistry. The Obudu Education Unit, Cross River State reported Students general poor performance in chemistry as seen in Table I. for the past four years.

Table I: Performance of students in chemistry at SSCE Level (WAEC) in Obudu Education Zone, Cross River State from 2015 to 2018.

Year	No of Students Present	No of Students Pass	No of Students Fail	% Pass	% Fail
2015	900	205	695	22.7	77.2
2016	1020	350	670	34.3	66.0
2017	1232	515	717	41.8	58.1
2018	1550	428	1122	27.6	72.3

From table I, it could be seen that chemistry students' poor performance at senior secondary school level was as a result of not using variety of effective method for different circumstances depending on which would be most effecting for a particular lesson. The concepts of periodic table and chemical reactions have been recognized as some of the basic concepts in chemistry, as suggested by the (Ababio, 2016). The understanding of the family of elements and energy changes in reactions is a prerequisite to comprehension of some learning tasks in chemistry such as electronic configuration of atoms, as the basis of the periodic table, groups and periods, periodicity of some properties, ionization energy and variations in chemical properties. Chemical reaction is also one of the difficult concepts chemistry students encounter in both practical and theory. This is supported by the chief examiners reports of 2016 – 2018, which ascertained that, what made most chemistry students perform poorly in chemistry, was the inability of the students to write correctly and chemistry teachers inability to work collaboratively using variety of strategies, as well as to balance the reactions of equation correctly. Thus, there is need to have a paradigm which recognized the role of students personal in the development of scientific knowledge. It is to this end that this study is being conducted to examine the perceived effects of inclusive education on chemistry students' attitudes towards chemistry and academic achievement in Obudu Education zone of Cross River State. The probable impact of inclusive education in promoting secondary school teachers collaborative skills were also investigated.

According to Just Different (2013), the aims and objectives of Inclusive Education include, to: (i). Provide innovative, exiting and informative primary and secondary workshops on disability and difference; (2). Provide work and training opportunities for disabled young people; (3). Help educate parents and teachers regarding disability and

difference; (4). Promote the inclusion of disabled children into mainstream education with the correct support and resources and; (5). Make an early and positive impact on the education of children in disability and difference education. In addition, Greensprings (2017), noted that the development of a culture of acceptance and giving attention to the diversities and differences of all the students in the school is what inclusive education is all about also outlined some of the essential elements that characterise inclusive education as:the use of broader range of instructional materials, teaching aids and models;inclusive academic curriculum; and building relationships.

The theoretical framework in this present study is based on the cultural-historical theory of Akhmetova, D.J; Chelnokova, T.A; &Morozova I.G. (2017), the cultural-historical theory of Vygotsky are made in two sentence about Inclusive Education; (1) The qualitative change in the social situation of human activity- the basis of his mental development. This shows that inclusion of the students with disabilities into the environment of joint training and education together with students without disabilities is making qualitative charges in the social situation of development. They added that the analysis of the scientific heritage of Vygotsky allows taking an inclusive model of education and this path must empower child's social inclusion. (2)Secondly, the cultural-historical theory also has a positive potential for the development of the idea of inclusive education and that training and education are the principal conditions for the human mental development. Vygotskyin Lascioli (2018) also emphasised that realizing the institution can guarantee the equality of educational rights for all its members, including including those with intellectual disabilities.

Science educators recognized the importance of inclusive education and started to work on methods and techniques which can improve collaboration (Hu &Adey, 2002). For students to gain the collaborative skills they will need adults, in each stage of their education, beginning in primary school, must be one of the most important purposes of chemistry education, (Koray, 2003). Several observations made on the National Science Education Standards (NSES 1996), showed that inclusive education and collaboration had important roles in science education (chemistry inclusive). More so, in the school education, both chemistry teachers and the special teachers share in planning presenting lessons and checking assignments and this brings about improvement of collaborative skills. Moreover, students (as well as teachers), sometimes view both classrooms and special educators as teachers rather than one as a teacher, the other as a helper, as is vital in inclusive initiatives.

Some evidence related to improving inclusive initiative and collaborative skills during the study could be provided and then chemistry and the special educators could consider conventional method as an educable strategy rather than as a compromise endowment or an extra-ordinary method. The importance of conventional method(students centred method)in science education leads to functional knowledge or meaningful knowledge, (Sabiru, 2014). The results of the study can help both teachers to understand the factors affecting the academic performance of students. Teachers can use inclusive education settings to increase the functional knowledge of the students. The attitude towards chemistry involves the attitudes towards scientific attitudes and attitudes towards chemistry careers, teaching methods, interests related to scientific knowledge and the content of the chemistry. Determining the students' attitudes towards chemistry, and chemistry educators takes a key role in determining their collaborative skills. As the results from the study conducted by

Wigg (2011) and Bloom (2009) showed that the use of inclusive education improves the collaborative skills of teachers (chemistry teachers inclusive).

Chemistry is one of the important science subjects taught at the senior secondary school (SSS) (FRN, 2012). Chemistry is defined as science that systematically studies compositions, properties, and activities of organic and inorganic substances and various elementary forms of matter (Nnoli, 2011). Nations at the forefront of sustainable development are those that have invested enormous resources over considerable time in establishment (Akpan, 2008) and maturing of a stable well supported science and technology for regular education students (SWOD) and students with disabilities (SWD) with (Pugach and Johnson, 1995). In learning chemistry effectively in an inclusive setting, it is recommended that SWOD and SWD should be motivated and allowed in knowledge getting process of observing, exploring, organizing and interpreting knowledge with minimum direction and guidance (Okeke, Okey and Omeodu 2018).

This resulted to Science Teachers Association of Nigeria (STAN) gearing towards improving the methods of teaching science subject (chemistry inclusive), needs for methods or materials based on their particular learning style and/or strengths will help students build successful experiences in chemistry- related skills. Chemistry teachers are the specialist in chemistry particularly in secondary schools. As soon as a student masters basic concepts, the acronym of Periodic Table Elements, then the chemistry teacher should teach chemistry, while the teacher of physically challenged students is responsible for teaching any new code information, and transcribing materials into mnemonic concepts, noted the first group elements and other groups elements and the properties exhibited by the elements in each group. Each of the students uses his or her particular expertise working hand-in-hand to facilitate learning. Further, the most advantage of inclusion is that, it eliminates the problem of quality (or perceived quality) of chemistry instruction from a special education teacher, and reduces the issues created when a mathematics teacher is not versed in accommodations and adaptations for disable students (Osgome, Simson and Collins 2003).

Students' academic achievement, and attitude to chemistry and chemistry teachers' collaborative skills could be influenced by inclusive education. This may be true for teachers and students of chemistry. However, this position has not been adequately reinforced in most places and especially in Obudu Education zone. Thus, a gap exists in research that needed to be filled. This vacuum justifies the need for the study.

Statement of the Problem

The advancement of any nation has to do with the development of her individuals with Disabilities Education Act (IDEA) and Individual without Disabilities (IWD). The design and management of primary and secondary schools in Nigeria are reportedly non-inclusive and inaccessible to children with disabilities (Vanguard News, in Greensprings, 2017). The article also reported that 7 million children makeup more than 50% of over 10 million children out of school in Nigeria. There is need to ensure that these issues are addressed by various institutions because failure to ensure that the issues of trans-disciplinary teaming model and inclusion of children with disabilities incorporated may jeopardize secondary school chemistry ambitions and goals. A study of this nature is imperative on Nigerian institutions/schools in order to determine the extent to which inclusive education has

led to promoting students attitudes towards chemistry and academic achievements in chemistry also which invariably promotes the collaborative skills of secondary school chemistry teachers.

Reports of researchers such as Pugach and Johnson (2006) shows that there is movement away from the traditional to multidisciplinary model, where experts work independently and usually on a pull out basis on assessment, development of several goals, and instruction related to their particular area of expertise meeting occasionally to report progress to the team. In a study carried out by Fore, Buke, Burke, Boon and Smith (2008), to determine the academic achievement of students with learning disabilities in inclusive settings, they examined the reading and science scores, relative to grade level, number of special education classes attended, and placement in inclusive or non-inclusive setting. The results revealed that students in the inclusive setting performed significantly better than the students in the non-inclusive setting.

This leads the Spence (the researcher) to assume that instructional strategies, teacher characteristics and inclusive team work may have had an impact on the outcomes. Spence (2010) recommended further research on this topic in another discipline. This research therefore identifies a gap of trying to incorporate both opposing views and mainly focusing on perceived effects of inclusive education and collaborative skills on the academic achievements of secondary school chemistry students. Psychologists such as Winant, (1997) has generally agreed that the theory of normalization explains that when people are segregated, labelled or treated in any way that is different, then their worth is devalued. Another psychologist Vygotsky a father of social learning, (1896-1934), had an ideas of the zone of proximate development. This theory of social learning considers collaboration to increase teachers' awareness of other concepts. It can also allow challenge and differentiation, enhanced confidence and self-esteem as well as strengthening social skills- a critical skill for life (Kelly, 2017). Inclusive education and collaborative skills can influence academic achievement of students. This may be true for secondary school students of chemistry. However, this position has not been adequately reinforced in most places and especially in northern education of cross river state. A gap exists that need to be filled by the current study.

Purpose of the Study

The broad purpose is to determine the perceived effects of inclusive education on students' academic achievements, and attitudes to chemistry and collaborative skills of secondary school chemistry teachers in Obudu education zone.

Specifically, the study was designed specifically to determine the;

- (i) Effect of inclusive education on collaborative skills of chemistry teachers and special education teachers in secondary schools.
- (ii) Effect of inclusive education on students academic achievements in secondary school chemistry.
- (iii) Influence of inclusive education on students attitudes towards Chemistry in Secondary schools. .

Research Question

This research question was formulated to guide this study:

- (a) To what extent has inclusive education promoted secondary school chemistry teachers and special education teachers' collaborative skills in Obudu education zone?

Research Hypotheses

The following hypotheses were formulated for the present study and were tested as 0.05 level of significance.

1. There is no significant difference in the mean ratings in the respect of the chemistry students' academic achievement when exposed to inclusive education training and those who were not exposed to the training, according to their pre-test and post-test results.
2. There is no significant difference in the mean ratings in the respect of the students' attitudes towards chemistry, when exposed to inclusive education training and those not exposed to the training, according to their pre-test and post-test results.

Significance of the Study

The students with disability will benefit from the study will benefit from the study as they gain some impulse in the regular school accelerating the pace of their cognitive development. The education authorities will benefit from the present study by based on a comprehensive knowledge of organizing the educational environment in a right way.

The researchers hoped that this study will be of immense importance to chemistry teachers and special education teachers, as this will help them create a conducive learning environment that is challenging and relevant to boost students interest and motivation. With this study, necessary methods will be taken by chemistry and special education teachers on the use of strategies that would improve inclusive education of the secondary schools (Chemistry inclusive), as this will help them create a conducive learning environment that is challenging and relevant to boost students interests and motivations.

It will help Chemistry teachers to connect with all the students in the classroom. The study will also help Education Authorities to prepare the content of the school academic programme in such a way that gives equal opportunities for all the students (SWD and SWOD) to participate in all the school educational activities at the same pace of progress. Finally, the students that are taught chemistry will benefit from the study because the integration of inclusive education will go a long way to increase the academic achievement and interest of SWD and SWOD in chemistry. The findings of this study will also assist the ministry of education to improve on policy formulation and implementation policies.

Conceptual Studies

Inclusive Education: According to Greensprings (2017), Inclusive Education is conceived as when all students regardless of any challenged they may have are placed in age appropriate general education classes that are in their own neighborhood schools to receive high, quality instruction, interventions, and support that enable them to meet success on the core curriculum. He went further to explain that it is the act of placing students in age-appropriate

general education classes in schools available in their immediate environment that gives access to high-quality instructions, interventions and assistance to meet up primary academic curriculum irrespective of any challenges they may have.

Collaborative Skills: Collaborative skills are the behaviors' that help two or more people work together and function well in the society. The chemistry teachers and special education teachers should be able to train their students in the skills of collaboration so that they will be able to accomplish group tasks not just within themselves but also in work settings, social settings and other aspects of life.

Achievement: Achievement in modern English dictionary is the accomplishing something successfully with effort and skills (Hornby, 2001). The students without disabilities (SWOD) and students with disabilities (SWD) poor achievement in chemistry could mean that students have not successfully mastered the scientific concepts necessary to achieve high in chemistry.

Attitudes: Attitude is a way of thinking or behaving (Mairi 2004). It means the way chemistry students both (SWD) and (SWOD) behave or think toward chemistry. According to Naki (2009) attitude is a tendency for individuals who organize thought, emotions and behaviours towards a psychological object. He also added that some attitudes are based on people's own experiences, knowledge skills and some are gained sources. Kalu in Ochu (2007) supported this idea by adding that students' attitudes towards chemistry and their achievement motivation are more likely to be related. Many researchers have found significant correlation between student attitudes towards chemistry and their achievements in chemistry. The poor achievement of chemistry in SSCE and NECO is in a way related to their attitudes (Kalu in Ochu 2007).

Students without Disabilities (SWOD): This is a student that is able to function normally in the classroom and does not have a documented cognitive social or physical impairment, (Riegert, 2006).

Students with Disabilities (SWD): This is a student who is eligible for special education services (Riegert, 2006). According to Wisconsin Law (2005) these are students that may be eligible for special education services include: Asustism, Deaf-blind, Health impairments, Brain injury, or vision impairment etc.

Methodology

Research Design

The study adopted an experimental research design, involving pre and post-tests. The researchers will employ experimental research design. According to Nworgu, (2018) experimental research design involves exposing one or more experimental groups to one or more treatment condition(s) and absencing the difference(s) between this/these group(s) and one or more control groups to which the treatment was not administered. This design will be adopted because the subjects used for the experiment will be comparable to baseline.

Area of Study

The study was carried out in Obudu local Government Area of Cross River State, Nigeria. Obudu education zone was chosen because it has many secondary schools teaching chemistry. The variable of physically challenged is of interest to the study. It was also chosen because almost all the secondary schools in the local government prepare students for chemistry examinations at the Senior School Certificate Examinations (SSCE) conducted by West African Examination Council (WAEC) and National Examination Council (NECO) where their physically states are not discriminated.

Population for the Study

The population for the study comprised of the entire senior secondary school two (SS2) the statistics collected from the Post-primary Schools Management Board Obudu zone for the 2017-2018 academic session which showed that there were 525 students who formed the study. The chemistry secondary school two (SSSII) students were used because it is at this level that periodic table and chemical reactions appear copiously in the chemistry scheme of work.

Sample and Sampling Techniques

A sample of 80 students and 20 chemistry teachers and special education teachers were used in the study. Purposive sampling technique was used to select two (2) public government secondary schools in Obudu Local Government Area of Cross River State. A simple random sampling technique by balloting was used to select two (2) intact classes of equal number (40 each) in a class. From the two schools selected, one was randomly assigned to experimental group and the other to control group, the students were randomly assigned through balloting technique into their various groups. Five of the SWD were assigned to the experimental group and another five were assigned to the control in each school chosen for the study. This showed that 35 of the SWOD were selected from one school, while another 35 SWOD were selected from the other school, making a total of 70 SWOD and 10 SWD.

Instrumentation

The research instruments used for the study include;

- i. The worksheet contained the Chemistry Teachers and Special Education Teachers Questionnaire; (CTSETQ)
- ii. Combination of periodic table and chemical reactions skills; Chemistry Achievement Test (CAT). The CAT consists of 25 multiple choice questions and only four options with one correct option
- iii. Students Attitudes Towards Chemistry Questionnaire (SATCQ)

Validation of the Instrument

The research instruments were face validated by: two experts from the departments of Chemistry Education, Measurement and Evaluation and psychology of F.C.E Obudu, using table of specification.

Reliability of the Instrument

The t-test reliability approach was used to ascertain the reliability of instrument. For data collection, the researchers administered 20 copies each of the validated instruments to chemistry teachers and special education teachers, and students' without disabilities (SWOD) and students with disabilities (SWD) in secondary schools in Ogoja Education zone, who do not form part of study population but possess the same characteristics with the target population of the study. Their responses were collected and analysed using the Cronbach Alpha internal consistency and reliability co-efficient obtained include:-

- 1) Chemistry Teachers and Special Education Teachers Questionnaire (CTSETQ). The reliability co-efficient was 0.78
- 2) Combination of periodic table and chemical reactions chemistry achievement test (CAT). The reliability coefficient was 0.71
- 3) The student attitudes towards chemistry questionnaires (SATCQ). The reliability co-efficient was 0.88.

Experimental procedure

The researchers sampled the chemistry students in the secondary schools. The aim was to gain high level of transdisciplinary teaming model on academic achievement and students' attitude towards chemistry. The transdisciplinary teaming models of inclusive education parallel with this purpose are:

- (i) Using a variety of instructional formats.
- (ii) Ensure access to academic curricular content.

First and foremost, researchers tried to comprehend what inclusive education are to the experimental group by using the activities out of the subject of the lesson for two weeks, and then worksheets were prepared to correlate with the combination of (Periodic table and chemical reactions) and finally these activities for teaching in an inclusive setting were reinforced. The chemistry teachers and special education teachers in the secondary schools instituted a chemistry of a problem of the day and both of them developed and graded it. This will help both teachers to track the progress and skills of individual students' relative to the rest of the class.

The development of skills in self-advocacy was encouraged by both teachers especially the teachers of students with disabilities can periodically develop a planned lesson, present it to the students and role play potential strategies for soliciting appropriate information or assistance. Teachers of chemistry students apply the strategy known as Universal Design for learning (UDL). UDL are multiple ways of representing content to students and for students to represent learning back, such as:-Modelling, manipulating, written responses and technology etc. Statistical Package for the Social Sciences (SPSS) 18.0 software was use in statistical analysis.

Limitation of the study

This research has two limitations. This includes:

- (1) The training in the study was not just for measuring the students' rather, it is for measuring academic achievement and attitudes.

Refocusing Chemistry through Perceived Effect of Inclusive Education on Students Academic Achievement and Attitudes towards Chemistry and Collaborative Skills of Chemistry Teachers in Obudu Education Zone of Cross River State, Nigeria

(2) Another limitation was that the study had a small sample size which causes a significant impact in the direct findings and their interactive effects.

Validation

All of the experts expressed a positive opinion pointing that the scales had high face validity.

Analysis of data

TABLE 1: Mean Responses of SSCT and SSSET on the Extent to which Inclusive Education Promotes Secondary School Teachers' Collaborative Skills in Chemistry.

S/N	ITEMS	SSCT			SSSET			OVERALL	
		X	SD	DL	X	SD	DL	SD	DL
1	Inclusive education has helped teachers to improve instruction collaboratively with strengths.	3.12	0.65	A	3.25	0.60	A	1.25	A
2	Inclusive education has enabled teachers to be working in joint-efforts to solve problems.	3.25	0.70	A	3.32	0.56	A	1.26	A
3	Cooperative teaching is a direct collaboration with the general education and special education teachers working together.	3.30	0.69	A	3.40	0.69	A	1.38	A
4	Collaborative skills of the teachers have helped in reducing professional isolation in Chemistry.	3.25	0.75	A	3.35	0.69	A	1.45	A
5	The building of "a chemistry problem of the day" will help the general education teachers and the special Education teachers to track the progress and collaborative skills of individual students relative to the rest of the class.	3.32	0.85	A	3.36	0.75	A	1.50	A
6	Inclusive education has enabled teachers to be excited over their work.	3.30	0.79	A	3.36	0.65	A	1.44	A
7	Collaborative skills of the teachers have helped in	3.20	0.68	A	3.30	0.65	A	3.25	A

Muoneke, Nneora Mary and Ikegbuna, R. Nnonye

	reducing stigma of special education.								
8	Most secondary school teachers, are assigned a laboratory of Students With Disabilities (SWD) and Regular Education Students (RES).	3.22	0.68	A	3.32	0.64	A	3.28	A
9	Some high secondary schools allow the teachers to enlist the assistance of the orientation and mobility specialist to reinforce chemistry concepts in “real life” situation	3.15	0.68	A	3.35	0.61	A	3.25	A

Key

Secondary School Chemistry Teachers(SSCT); Standard Deviation (SD); Secondary School Special Education Teachers (SSSET); Decision level (DL); Strongly Agree (SA); Agree (A); Disagree(D); Strongly Disagree (SD)

Results and Discussion of the Findings

Table I above presents the response of SSCT and SSSET on the extent to which inclusive education has promoted their collaborative skills. It was found to agree that inclusive education has promoted the collaborative skills of secondary school teachers. The table indicates that out of the ten causes questions, the responses of the respondents showed that (i). The building of “a chemistry problem of the day will help the chemistry teachers and special Education teachers to track the progress of secondary school chemistry (ii). Collaborative skills of the teachers have helped in reducing professional isolation in chemistry, (iii). Inclusive education has enabled teachers to be excited over their work, as they had the highest overall standard deviations of 1.50; 1.45 and 1.44 respectively. This is revealed by the results of the study which showed that inclusive education has helped teachers to improve instruction collaboratively with strengths. Also, the study revealed that inclusive education enabled teachers to be working in joint efforts to solve problems.

At the analysis of data, the answer given to the scales by the chemistry students were evaluated by means of the statistical techniques such as mean, standard deviation, independent sample t-test, and paired sample t-test by Research Hypothesis.

Hypothesis One

HO₁: There is no significant difference in the mean ratings on the respect of the effect of inclusive education on chemistry students’ academic achievement when exposed to inclusive education training and those who were not exposed, according to their pre-test and post-test results.

The average of pre-test and post-test achievement scores of the groups were compared by the t-test analysis

Table 2: Achievement scale pre-test of experimental and control groups

	Number (N)	Mean (the highest score: 22)	Standard Deviation	T	P	Significance Level
		22				
Pre-test (experimental)	40	4.00	4.70	1.83		P<00.5 Not Significant
Pre-test (control)	40	6.90	2.04		0.075	

*p<0.05

According to the results given in Table 2, there is no significant difference between the achievement levels of the experimental and control groups before the application. The achievement levels of both groups were close to each other before the application.

Table 3: Achievement scale post - test of Experimental and Control groups

	Number (N)	Mean (the highest score: 22)	Standard Deviation	T	P	Significance Level
		22				
Post-test (experimental)	20	12.90	5.15	3.83	0.001	P<00.5 Significant
Post-test (control)	20	8.30	3.08			

*p<0.05

When Table 3 is examined, it is seen that there was a significant difference between the academic achievement scores of the experimental and control groups after the application. And when the average of both groups was examined in order to determine the difference, it is seen that there was a significant difference in the experimental groups.

Hypothesis Two

HO₂: There is no significant difference in the mean ratings on the respect of the inclusive education influence on the students' attitudes towards chemistry, when exposed to inclusive education training and when not exposed, according to their pre-test and post-test results.

The averages of pre-test and post-test attitude scale scores of the groups were compared by using t-test statistic. The result of pre-test attitude level scores obtained from the control and experimental group before the application are given in table 4.

Table 4: Attitude level scale pre-Test of Experimental and control groups

	Number (N)	Mean	Standard Deviation	T	P	Significance level
Pre-test (experimental)	40	65.05	8.38	0.49	0.627 0.321	p>0.05 Not significant
Pre-test (control)	40	66.50	10.26			
*P<0.05						

According to the results given in Table 4, there is no significant difference between the attitude levels of the experimental and control groups before the application. This result shows that the attitude levels of both groups were close to each other before the application. The result of attitude levels towards chemistry scores obtained after applying attitude level scale again after the application are given in table 5.

Table 5: Attitude level scale Post-Test of Experimental and control groups

	Number (N)	Mean	Standard Deviation	T	P	Significance level
Post-test (experimental)	40	72.45	7.16	0.76	0.454	p>0.05 Not significant
Post-test (control)	40	70.75	7.06			
*P<0.05						

As seen in Table 5, there is no statistically significant difference between the attitude scores of the experimental and control groups after the application according to the significance level of a 0.05. The attitudes towards chemistry of both group is close to each other however, when we look at the averages of attitude scores of both groups before and after the application, the increase in the experimental group was higher. However this increase is not so great as to make a significant difference.

Discussion of results

The discussion of the present study is based on the research question and hypotheses that guided the study and which generated the findings. The results obtained for each sub-problem are as follows.

1. Chemistry teachers and the special education teachers proved that inclusive education promotes their collaborative skills.
2. The students who had inclusive education training succeeded more than the students that had traditional training. This result showed that giving inclusive process skills training increased the academic achievements of the students. Similar results showed that there was an increase on the attitude levels of the chemistry students at the end of the training done in inclusive education training in the following studies, an increase in science, Laboratory and computer-aided training done based on inclusive education

training at chemistry courses by Geban (1990), and the training done based on the activity by Turpin (2000).

3. When academic scores were compared for both groups, the increase on the academic scores of the students given in inclusive education class room training constitute a significant difference compared to the students in the traditional group.

It can be said that inclusive education improves academic achievement. Scientific creativity is an educable or a learned skill in some activities rather than an innate or an extraordinary understanding skill. In addition, Inclusive Education can be used for improving students' academic achievement.

4. There was an increase in both group attitudes; however, there was no significant difference between them. When the post-test results of the two groups were compared, there was no statistically significant difference between both groups, although the average of the groups that showed inclusive education training was slightly higher. Jaus found that inclusive education training did not affect the attitude of the students toward science. Similar results were obtained at the other studies done related to attitude such as; the study of Caliskan, Selcuk and Erol (2005) where the attitude towards physics was investigated, the study of Atiparmak and Nakipoghi (2002) related to attitudes toward biology and the study of Unal and Ergil (2006), where the effects of the science education using the discovery teaching strategy on the students' attitude towards science were investigated. When the studies were investigated, the duration of the applications varied from four weeks to eight weeks. A possible reason for not changing the students' attitude could be due to the short application times.

Although the students who had inclusive education training developed a positive attitude towards the course during the training, the attitude of the students in the group of the traditional training also developed positively, so it is difficult to say that the attitudes of the inclusive education classroom trained students resulted directly from the SPS training.

Recommendations

Based on the findings the following recommendations were made:

- 1) For the students to be able to solve the problems related to them and close relatives or friends, scientific statements related to real life should be given in the worksheets in this study. Generally during the lectures, the problem statements related to subjects were given, but the scientific statements related to real life were not given. This condition does not give the students the opportunity to improve their learning and thinking skills. The problems are two of the most important opportunities to improve students' attitude in science.
- 2) It is necessary to emphasize the inclusive education processes which are also emphasized in science and technology education program in the classroom, and experiments should be done to gain these skills. Moreover, since the open-ended laboratory experiments improved the academic achievements of the students, these types of experiments must be increased to help sustain standard academic achievement.

- 3) Obviously, the secondary school teachers (especially chemistry teachers) lack the necessary competences to develop the collaborative skills and inclusive education skills into secondary school students. To equip these categories of teachers, professional associations such as; science teachers association of Nigeria (STAN), and government agencies should organise seminars and workshop on the issue of inclusive education and collaborative skills of the teachers.

Conclusion

The theoretical framework of the present study is based on cultural-historical theory of L.S Vygotsky which emphasizes the qualitative change in the social situation of human activity. It bases its idea on the children with disabilities that can gain some impulse in the regular school accelerating the pace of their cognitive development in the case that educational environment is handled in a right way. The research findings concluded that: inclusive education increases chemistry teachers and special education teachers' collaborative skills. Significance differences were found when chemistry SWOD and SWD were exposed to inclusive education learning, as compared with academic achievement of chemistry SWOD and SWD who were not exposed to the traditional method of teaching, the difference was in favour of those students exposed to inclusive education learning. Thus, science educators especially primary and secondary school teachers need to recognise the fact that children with disabilities have equal capacity to learn and perform optimally as their age-mates that are without limitations.

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Refocusing Chemistry through Perceived Effect of Inclusive Education on Students Academic Achievement and Attitudes towards Chemistry and Collaborative Skills of Chemistry Teachers in Obudu Education Zone of Cross River State, Nigeria

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