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ASSESSMENT OF CHEMISTRY TEACHERS' AWARENESS OF OBJECTIVE AND CONTENT COVERAGE OF THE CHEMISTRY CURRICULUM IN SECONDARY SCHOOLS IN NORTH CENTRAL NIGERIA

[1]Nagenu, Safiya Umar, Dr. R. G. Dajal and Prof. M. A. Apochi
Email: safiyaumarnageny@gmail.com; 08035967314/ Bodydajal2@gmail.com; 08065901975/ apochima@gmail.com; 08132080840

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Abstract
The study investigated the level of awareness of the objectives and content coverage of the Chemistry Curriculum by Chemistry teachers based on location. The descriptive survey research design was adopted and Chemistry teachers in Senior Secondary Schools in North Central Nigeria were employed. The population of the study was two thousand and forty-eight Chemistry teachers from three out of the six North Central States. The three selected states are Benue, Nasarawa and Niger. The sample size was 264 Chemistry teachers from the randomly selected schools for the study. The Chemistry Curriculum Implementation Questionnaire was used to determine the level of curriculum awareness objectives. The research hypotheses were tested using independent t-test statistics at alpha 0.05 level of significance. It was revealed that there was no significant difference in the level of awareness of the objectives of the Chemistry Curriculum irrespective of gender and location in Senior Secondary Schools in North Central Nigeria. It was recommended that teachers should be retrained through workshops and seminars on the objectives of the Chemistry Curriculum and teachers should always be part of curriculum planning for appropriate implementation of the Chemistry Curriculum among others.

INTRODUCTION

Science education equips young people to contribute as citizens to shaping the world in which they live. Science education can be viewed as a process of teaching and training that improves one's knowledge about the environment and to develop one's skill of systematic enquiry as well as natural characteristics. Jessani (2015),

[1] Department of Science and Environmental Education, Faculty of Education, University of Abuja, Nigeria.

perceived science as a combination of cognitive processes that involve emotional and practical activities. The main objective of incorporating science as a subject in secondary schools is to create awareness of the influence of scientific knowledge on everyday life and to promote advancements in technology and socioeconomic growth (Eze, 2010).

Science was introduced into the senior secondary school curriculum to enable students to gain preliminary knowledge in science before beginning university level studies. Chemistry is a branch of science that deals with the study of the structure, composition and properties of substances that have masses and occupy space. Mahdi (2014) view Chemistry as a supportive subject for various disciplines, including pharmacology, physiology, clinical, chemical industry and the environment.

The performance of individual students determines their operational choice in science and technology at tertiary institutions (Katcha, 2017).

Teachers, according to Ijidike and Oyelana (2015) are catalysts for radical behavioral transformation among students. As such, they are considered to hold a significant position in Curriculum practice. They are involved in actual Curriculum implementation in their work stations. Furthermore, a classroom teacher ensures the implementation of a Curriculum by first analyzing the objectives, themes, and contents of the curriculum, and then introducing the appropriate teaching method(s) to the classroom. Additionally, the teacher establishes evaluation procedures for the curriculum's content. In other words, the educator must possess the necessary educational foundation for teaching as well as the necessary professional interest and drive to excel.

Teachers' professional development is an essential factor in the success of curriculum implementation. The expertise of the teacher is required because they are the ones who manipulate the instructional materials and methods to achieve the subject's objectives. Like their counterparts in other subjects, teachers of Chemistry must possess the aforementioned qualities in order to effectively implement the Chemistry Curriculum content. If they possess the qualities, Curriculum content will be effectively implemented, if they do not, Curriculum implementation will experience setbacks. In addition to the teachers, the accomplishment of Chemistry objectives through the implementation of Curriculum content is contingent upon the subject teachers' use of appropriate teaching methodologies, which are numerous in teaching Chemistry. The students in urban areas are more likely to be exposed to adequate teaching and learning materials for effective implementation of the Chemistry Curriculum than their rural counterparts. The schools located in urban towns are more likely to have better laboratory, trained Chemistry teachers and more practical activities classes. Some researchers have found that females have lower teaching competency scores than males. Michael (2013) also found that female teachers had less experience working with instructional materials than their male colleagues. Contrary to this, Nworgu, (2014) found that women are more comfortable teaching non-science subjects like basic science with instructional materials than male teachers.

Statement of the Problem

There are still questions regarding the implementation of the Chemistry Curriculum in secondary institutions. Some concepts involving mathematical calculations, such as thermodynamics, mole concepts, and electrolysis, among others, are labeled as complex, and instructors therefore avoid them (Omoniyi, 2021). This could be due to a lack of comprehension of the content on the part of teachers, inappropriate use of teaching strategies, and inadequate instructional materials.

In Nigeria, the implementation of the Chemistry Curriculum has yet to meet the expected standards. The ineffective implementation of the subject's curriculum is a result of inadequate funding, poor teacher motivation, incomplete curriculum coverage and a lack of laboratories. Laboratory facilities in Nigerian secondary schools

are inadequate for teaching Chemistry. Hence, there is still the need for improvement in the implementation process in order to reduce underachievement in Chemistry education. Therefore, it is necessary to assess the implementation of the Chemistry Curriculum in senior secondary schools in North Central, Nigeria.

Purpose of the study

The purpose of this study was to assess chemistry teachers' awareness of the objective and content coverage of the chemistry curriculum in secondary schools in North Central Nigeria. The objectives of the study were to;

i. Examine the level of awareness of the objectives of the Chemistry Curriculum by the Urban and Rural Chemistry teachers for the implementation of the Chemistry Curriculum in Senior Secondary Schools in North Central Nigeria.
ii. Examine the level of content coverage by the urban and rural chemistry teachers for the implementation of the Chemistry Curriculum in Senior Secondary Schools in North Central Nigeria.

Research Question

1. What is the level of awareness of the objectives of the Chemistry Curriculum by urban and rural Chemistry teachers for the implementation of the Chemistry Curriculum in Senior Secondary Schools in North Central Nigeria?
2. What is the level of content coverage by the urban and rural Chemistry teachers for the implementation of the Chemistry Curriculum in Senior Secondary Schools in North Central Nigeria?

Hypothesis

Ho1: There was no significant difference in the level of awareness of the objectives of the Chemistry Curriculum by Chemistry teachers for the implementation of the Chemistry Curriculum in Rural and Urban in Senior Secondary Schools in North Central Nigeria

Ho2: There is no significant difference in the level of coverage of content by Urban and Rural Chemistry teachers for the implementation of the Chemistry Curriculum in Senior Secondary Schools in north Central Nigeria

Methodology

The research design was a descriptive survey. Descriptive survey according to Nworgu (2015), is one in which a researcher gathers information about the characteristics of a population and analyzes data from the group through the use of questionnaires and interviews to obtained data from the entire population.

The study population consisted Two thousand and forty-eight (2,048) Chemistry teachers in public Senior Secondary Schools in North Central Nigeria. The six states of the North Central Zone are Benue, Kogi, Kwara, Nasarawa, Niger and Plateau and the FCT is also included. The sample size of Two hundred and sixty-four (264) Chemistry teachers formed the sample of the study. The multi stage sampling technique was adopted to select the sample size. A simple random technique was used to select the three state which of Benue, Nasarawa and Niger.

The instrument for data collection was designed by the researchers to measure the Chemistry Curriculum Implementation Questionnaire (CCIQ). The instrument was divided into sections A and B. Section A sought information on the personal data of the respondents, while section B contained items that sought answers to the research questions. All response to the items were based on four rating scales. The validity assessment was carried out by three experts from the Science and Environmental Education, Department, University of Abuja. Face and content validity were assess using the research objectives, question and hypothesis. The reliability was determined by internal consistency method and Cronbach's alpha statistics, which gave a reliability coefficient of 0.82, indicating the high reliability of the instrument.

Data were collected by distributing the instrument to the Chemistry teachers at the visited Schools in both Urban and Rural areas. The letter of introduction from the head of Department was initially given to the administrators

to ask for their approval before distributing the questionnaire. The personal data were analyzed using frequency and simple percentage, the research questions were analyzed by mean and standard deviation and the hypotheses were tested using t-test. The decision rule for research questions was that if the overall mean was 2.50 and above then the questionnaire items were considered positive and if it was below 2,50 the questionnaire item were considered negative. For null hypotheses, if the P- value was greater than or equals 0.05 level of significance the null hypotheses were rejected; there was no significant difference between the variables, while if the P-value was less than 0.05 level of significance null hypotheses was accepted or retained; there is significant difference between the variable.

Results and Discussion

The following research questions were answered and hypotheses were tested at a significance level of 0.05.

Table 1: Mean and Standard Deviation on Level of the Awareness of the Objectives of the Chemistry Curriculum by Urban and Rural Chemistry Teachers

S/N	Objectives	Urban Mean	N=156 SD	Dec	Rural Mean	N=108 SD	Dec
1.	Develop interest in the subject of chemistry	3.67	0.47	VMA	3.81	0.39	VMA
2.	Acquire basic theoretical and practical knowledge and skills in chemistry	3.44	0.57	MA	3.38	0.52	MA
3.	Develop interest in science, technology and mathematics	3.44	0.58	VMA	3.66	0.53	VMA
4.	Acquire STM knowledge and skills	3.10	0.69	MA	3.48	0.65	MA
5.	Develop reasonable level of compliances in ICT applications that will encourage entrepreneurship skills	2.99	0.59	MA	3.02	0.31	MA
6.	Apply skills to meet societal needs of creating employment and wealth	3.24	0.63	MA	3.47	0.68	MA
7.	Be positioned to take advantage of the numerous career opportunities offered by Chemistry	3.25	0.55	MA	3.03	0.68	MA
8.	Be adequately prepared for further studies in Chemistry.	3.41	0.59	MA	3.27	0.52	MA
9.	Providing the students with the basic knowledge in chemical concept and principles.	3.68	0.49	VMA	3.71	0.45	VMA
10.	Show chemistry and it uses in industry; daily life hazards.	3.44	0.52	MA	3.19	0.57	MA
	Cluster Mean	3.02	0.57	MA	3.30	0.53	MA

Table 1 shows the mean and standard deviations of respondents on level of the awareness of objectives of the chemistry curriculum between urban and rural chemistry teachers in Senior Secondary Schools. The analysis indicated that urban chemistry teacher had a sectional mean score of 3.02 with standard deviation of 0.57 while rural chemistry teachers had a sectional mean score of 3.30 with standard deviation of 0.53, based on the acceptance limit of 2.5 mid-point on a 4-point Likert scale. The result indicates that urban and rural chemistry teachers did not differ in their level of awareness of objectives of chemistry curriculum.

Research Question Two: What is the difference in the level of coverage of the content of chemistry curriculum by urban and rural chemistry teachers in Senior Secondary Schools in North Central Nigeria?

Table 2: Mean and Standard Deviation on Level of Coverage of the Content of Chemistry Curriculum by Urban and Rural Chemistry Teachers

S/N	Objectives	Urban Mean	SD	N =156 DEC	Rural Mean	SD	N=108 DEC
1.	Chemistry and industry	3.39	0.63	MC	3.41	0.55	MC
2.	Symbols, formulae and equations	3.51	0.59	FC	3.42	0.55	MC
3.	Standard separation techniques for mixture	3.21	0.79	MC	3.16	0.78	MC
4.	Acids, bases and salts	3.48	0.61	MC	3.43	0.62	MC
5.	Non-metals and their compound	3.47	0.56	MC	3.39	0.59	MC
6.	Electrolysis	3.54	0.75	FC	3.55	0.69	FC
7.	Hydrocarbon	2.73	1.09	MC	2.68	1.07	MC
8.	Quantitative and qualitative analysis	2.73	1.14	MC	2.71	1.11	MC
9.	The chemical world	2.75	0.75	MC	2.77	0.72	MC
10.	Chemistry and Environment	2.51	1.03	MC	2.58	0.99	MC
11.	The chemistry of life	3.49	0.67	MC	3.48	0.64	MC
12.	Gas laws	3.13	0.94	MC	3.13	0.92	MC
13.	Water	3.79	0.41	FC	3.76	0.43	FC
14.	Carbon and its compounds	3.59	0.49	FC	3.52	0.50	FC
15.	Periodic table	3.71	0.50	FC	3.66	0.52	FC
16.	Chemical reaction	3.74	0.44	FC	3.68	0.47	FC
17.	Chemical combination	4.30	4.06	FC	4.28	4.25	FC
18.	Petroleum and crude oil	3.58	0.57	FC	3.49	0.63	MC
19.	Metals and their compound	3.65	0.51	FC	3.59	0.62	FC
20.	Bonding and intermolecular forces	3.59	0.58	FC	3.52	0.62	FC
21.	Molecular structures	3.62	0.55	FC	3.53	0.57	FC
22.	Types of chemical reactions	3.21	0.89	MC	3.14	0.87	MC
23.	Rates of chemical reactions	3.63	0.55	FC	3.59	0.56	FC
24.	Electrochemistry	3.07	0.85	MC	3.01	0.82	MC
25.	Kinetics	3.48	0.63	MC	3.43	0.62	MC
26.	Nuclear chemistry	3.35	0.69	MC	3.36	0.66	MC
27.	Equilibrium	3.50	0.66	FC	3.52	0.60	FC
28.	Energy in chemical processes	3.44	0.64	MC	3.37	0.67	MC
29.	Thermochemistry	3.30	0.68	MC	3.24	0.64	MC
30.	Physical and Chemical changes	3.29	0.87	MC	3.27	0.83	MC
	Cluster Mean	**3.39**	**0.80**		**3.36**	**0.80**	

Table 2 shows the mean and standard deviations on the level of coverage of the content of chemistry curriculum between urban and rural chemistry teachers in Senior Secondary Schools. The analysis indicated that urban

chemistry teacher had a sectional mean score of 3.39 with standard deviation of 0.80 while rural chemistry teachers had a sectional mean score of 3.36 with standard deviation of 0.80, based on the acceptance limit of 2.5 mid-point on a 4-point Likert scale. The result indicates that urban and rural chemistry teacher did not differ in their level of coverage of the content for the implementation of the chemistry curriculum in senior secondary schools in North central Nigeria.

Ho1: There is no significant difference in the level of awareness of objectives of Chemistry Curriculum by Chemistry teachers in Urban and Rural Senior Secondary Schools in North Central Nigeria. The hypothesis was tested using t-test analysis at α= 0.05, as shown in the table below.

Table 3: t-test Analysis on the Level of Objectives of the Chemistry Curriculum in Senior Secondary Schools based on Location.

Location	N	Mean	SD	Df	T - Value	P - Value	Remark
Urban	156	3.38	0.36				
				262	-1.609	0.109	Significant
Rural	108	3.45	0.33				

Significant at $p < 0.05$ level

The table showed a summary of t-test analysis on the level of awareness of the Chemistry Curriculum between urban and rural Chemistry teachers. The result showed a mean of 3.38 and 3.45 for urban and rural teachers with a standard deviation of 0.35 and 0.33 respectively. It also indicated a significant p-value of 0.109 which was greater than 0.05 level of significance so, the null hypothesis was accepted. Hence, there was no significant difference on the level of awareness of objectives of the Chemistry Curriculum between urban and rural Chemistry teachers in Senior Secondary Schools in North Central Nigeria.

Ho2: There is no significant difference in the level of coverage of content by urban and rural Chemistry teachers for the implementation Chemistry Curriculum in Senior Secondary Schools in North Central Nigeria. The hypothesis was tested using t-test analysis at α= 0.05, as shown in the table 4.

Table 4: t-test analysis on the level of coverage of content by Urban and Rural Chemistry teachers in Senior Secondary Schools in North Central Nigeria

Location	N	Mean	SD	Df	T - Value	P - Value	Remark
Urban	156	3.39	0.34				
				262	0.396	0.692	Significant
Rural	108	3.38	0.35				

Significant at $p < 0.05$ level

The table presents a summary of the t-test analysis on the level of coverage of the content of the Chemistry Curriculum for implementation by urban and rural schools. The results showed a mean of 3.39 and 3.38 with a standard deviation of 0.34 and 0.35, respectively and a significant p-value of 0.692, which was greater than the 0.05 level of significance. As a result, the second hypothesis was accepted. This means that there was no significant difference in the level of coverage of the content of the Chemistry Curriculum for implementation in urban and rural Senior Secondary Schools in North Central Nigeria.

Discussion of findings

The findings of this study suggest that Chemistry teachers in North Central are highly aware of the objectives of the Chemistry Curriculum irrespective of location. Several studies have supported this observation. Yusuf and Afolabi (2021) reported that both urban and rural teachers often have similar level of curriculum awareness due to National Policy standardization and centralized teacher training efforts.

However, some studies contradict these findings. Olagunju and Oguniyi (2018) argued that the variations in teachers' professional exposure and continuous access to professional development may lead to differences in curriculum awareness between urban and rural teachers. Their studies suggested that rural teachers often have less access to workshop and seminars.

Based on personal observation, the researcher found that the copies of curriculum in Senior Secondary Schools are scarcely available because each School is normally given just a copy of the curriculum per Subject, so teachers queue to use it to fill diaries and schemes of work. This scarcity of copies of curriculum did not support teachers to learn the objectives of the curriculum in North Central.

The study also revealed that Chemistry teachers in North Central Nigeria demonstrate a high level of Curriculum content coverage, with no significant difference based on location. This finding is consistent with Salami (2020), who noted that national standardized examinations ensure that teachers in all regions cover the Curriculum content effectively to prepare students for assessments. Likewise, Okon (2019) found that teachers, regardless of location, strive to complete the Curriculum to meet school and government expectations.

On the other hand, Adekunle and Bassey (2018) argued that Curriculum coverage can be inconsistent in rural schools due to teacher shortages, infrastructural challenges, and administrative constraints. They noted that some rural schools struggle with inadequate teaching staff, leading to delays in preparing the syllabus. Similarly, Olagunju and Ogunniyi (2018) suggested that rural teachers, who often handle multiple classes due to teacher shortages, may find it difficult to complete the Curriculum within the allocated timeframe.

Conclusion

Based on the findings, the following conclusions were made.

Chemistry teachers are very much aware of the objectives of the curriculum in Senior Secondary Schools regardless of location. This means that both male and female teachers are very much aware of the objectives of the curriculum as well as the urban and the rural teachers. There was no difference in the level of awareness of the objectives between urban and rural Chemistry teachers. There is high level of content coverage by chemistry teachers based on location. This mean that urban and rural Chemistry teachers cover their content moderately.

Recommendations

The following recommendations were made based on the findings.

1. Chemistry teachers should be retrained through workshops and seminars on the objectives of the Chemistry Curriculum and how to them.
2. Chemistry teachers should always be part of curriculum planning for effective curriculum design and implementation.
3. Policy makers and administrators should ensure that schools have enough copies of science curriculum booklets for easy access by all the science teachers.
4. Administrators and policy makers should perform regular supervision to ensure that teachers are adequately covering their content especially in rural areas.

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