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# Assessment of Chemistry Teachers Usage of National Commission for Colleges of Education, Pedagogical Methods in South-East Zone Nigeria

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***Abstract:*** *This study assessed the College chemistry teachers assessment of their usage of eleven pedagogical methods in the National Commission for Colleges of Education (NCCE) Benchmark. The study also monitored the influence of teachers qualification and gender on the usage of these methods. The study was carried out in both Federal and State Colleges of Education in the five States in South-East zone of Nigeria. The sample for the study comprises of all the sixty-one (61) chemistry teachers drawn from the seven colleges (state & federal) in the five States. Three research questions and the three hypotheses guided this work. 55-item questionnaire constructed by the researcher from the eleven pedagogical methods in the Benchmark was used as instrument for data collection. This instrument was validated by experts in the field and reliability sought and after pilot study and found to have 0.87 alpha value using Cronbach technique. Data collected were analyzed using means and standard deviation for research questions and independent t-test for hypotheses at 0.05 level of confidence. The result obtained showed that chemistry teachers adequately use only four methods, (demonstration, experimental, discussion and lecture) during their classroom instructions. All other seven methods were not adequately used. It was also discovered that teachers' qualification and gender have no remarkable influence on the usage of these methods. Recommendations for the usage of other methods were made.*

***Keywords:*** *Teachers assessment, Chemistry, Colleges of Education and Benchmark.*

## I. Introduction

The worldwide constant innovative changes have shown that the future is unpredictable especially as it concerns education, technology, skills acquisition and competencies which were considered the bed-rock of the country's economic mobility and growth. Uzoechi (2007) posited that the problems in many third world countries especially in Africa emanate substantially from lack of concern over the scientific and technological development of the citizenry. He continued to say that in such countries, majority of their populace are scientifically illiterate and lack desired skills and competences. Developed Nations like England, U.S.A., Japan invested in science and technology education and were able to produce scientists, engineers technologists, technicians and generally scientific literate society. Their meaningful production of this cadre of manpowers has translated them into industrial and technological advanced nations which is the hall mark of national and international development (Okobukola; 2002).

This is why Atume (2007) pointed out that science education and its application to real life problem (Technology) is the only most powerful instrument for enabling all members of the society to face new challenges and play roles as productive member of the society. Science education according to Ode Siri-Eruteyan (2008) is a veritable weapon for industrial and technological growth which brings about socio-economic development/empowerment all over the world. It enables according to Brainooh (2002) any nation to meet its aspiration and goal and liberate its citizenry from the culture of victimization, oppression, ignorance and poverty. It is in realization of this important role of science education that virtually all nations of the world including Nigeria accord high priority attention to the provision of functional science education to their citizenry. Of all the science education subjects, chemistry occupies the central position because of its nature and role to man's survival. Chemistry is seen as a bridge of all the sciences subjects and Ibole (2009) maintained that for it to be effectively taught, attention should be focused more on practical acquisition of entrepreneurial skills that will enhance wealth creation, poverty alleviation and employment. He also suggested that chemistry teaching should be made more proactive through use of several innovative teaching methods which promote hands-on-activities.

Teaching of science and in particular chemistry in Nigerian schools has continued to generate tremendous attention among parents, teachers, scholars and policy makers. The attention arose as a result of poor performance of students in science subjects especially chemistry which has continued to deteriorate and no longer impressive over the years (Ekuri & Asim; 2008).

Federal Ministry of Education (FME), professional bodies like STAN, and Scholars of science have taken giant strides towards the improvement of teaching and learning of sciences. Some of the measures taken are: provision of innovative pedagogical method; teaching facilities; training and retraining of science teachers through workshops, seminars and conferences (Ofuegbu; 2003). Consequently, the National Commission for Colleges of Education (NCCE) had also recommended in its Benchmark some innovative pedagogical methods to be used in the colleges for the training of pre-service teachers (teacher trainees in Colleges). These methods include, demonstration experimentation, discussion, computer etc some of these methods have been tried out by scholar and found efficacious in enhancing science especially (chemistry) teaching and learning in schools.

Inspite of all these efforts, studies conducted by (Olorukooba 2007 and Ndioho 2007) still reported poor performance of students in science subjects especially chemistry. This current situation of poor students performance in chemistry and science in general has been attributed by Josiah and Okooboh (2009) among other things to: Lack of teaching resources poorly equipped or complete absence of science laboratories; poor usage teaching methods and non utilization of resource materials during instructions. Little wonder Njoku (2003) pointed out that Nigerian science classroom activities are still dominated by teacher-centred method which have been found to be ineffective in promoting meaningful science teaching and learning at all levels of education system. The training of qualified science teachers who have the content knowledge as well as the methodology of imparting the knowledge is therefore of paramount important. This is because teachers always teach the way they were trained and students perform literally the way they are taught they are play. Hence Promise (2011) made this assertion that if our students are not performing well, it means that the teachers have not taught well. This equally shows that teacher were not well trained. This is why Oburu (2013) posited that the success of any educational system is directly proportional to the quality of its teachers. This means that no educational system can rise above of its teachers. Olerukooba (2007) maintained that the crisis in the science classroom to day, is a direct result of science teachers we have in the classroom. Njoku (2004) suggested that science teacher education should use classroom strategies and methods which they expect the teacher-trainees to use when they go to teach in the classroom. It was for this particular reason that the researcher considered it necessary to assess the current pedagogical methods used by teacher-educators in Colleges of Education. To find out the extent to which they expose pre-service teachers to those methods stipulated by the NCCE in the Benchmarch. The problem underlining this work are to what extent do teacher educators use the stipulated pedagogical methods for the preparation of primary and secondary school teachers (pre-service teachers) and what influence has teaching qualification and gender on the usage of these methods.

**Research questions**

1. What are the mean rating scores and standard deviation of chemistry teachers on their usage of the eleven methods in their classroom instructions
2. What are the mean rating scores and standard deviation of male and female chemistry teachers on the usage of the methods?
3. What are the mean rating scores and standard deviations of qualified and unqualified chemistry teachers on the usage of these methods.

**Research hypotheses**

1. Mean rating scores and standard deviation of male & female teachers on the usage of the eleven methods will not differ significantly
2. Mean rating scores and standard deviations of qualified and unqualified teachers on their usage of the eleven methods will not differ significantly.

## II. Scores Of Qualified And Unqualified Chemistry Teachers On Their Usage Of The Eleven Methods.

**Methodology**

This study is a descriptive survey one carried out in the five states in south-East zone of Nigeria (Anambra, Abia, Ebonyi, Enugu, Imo). The population of the study was sixty-one (61) chemistry teachers drawn from the seven colleges of education both state and federal. All were used as sample for the study. Instrument for data collection was a questionnaire on teacher instructional practices drawn from the eleven pedagogical methods in the NCCE benchmark. The instrument was made up of two sections. Section A was on biodata of the respondents while section B sought information on teachers' methods usage. The items in the questionnaire were 55 which were characteristics of different methods in the NCCE benchmark. Teachers were expected to respond to the items according to what they actually do in the classroom as they employ different methods. The instrument was validated by two experts in science education (chemistry option) and one expert in measurement and evaluation. Reliability of the instrument was sought through pilot study in a college not part of the study. Date collected were analysed using Cronbach alpha technique and was found to have .83 coefficient

alpha value. These items were close ended with 5-point rating scale of always (5), most often (4), sometimes (3), seldom (2) and never (1). After the administration of the instrument to the respondents, data obtained were analyzed using means and standard deviation for research questions and research hypotheses tested using independent t-test for significant differences at confident level of 0.05. Scores of 3.00 and above indicated usage of the method while scores of 2.99 and below indicated non-usage of the method.

**Table 1:** Means rating scores and standard deviations of chemistry teachers on their usage of each of the eleven pedagogical methods.

| | N | Mean | Std Deviation |
|---|---|---|---|
| **Demonstration method** | 59 | 3.99 | **.63** |
| **Experimental method** | 59 | 3.36 | **.66** |
| **Discovery method** | 59 | 2.55 | **.52** |
| **Discussion method** | 59 | 3.86 | **.44** |
| **Computer method** | 59 | 1.41 | **.37** |
| **Cooperative method** | 59 | 2.16 | **.48** |
| **Concept mapping method** | 59 | 2.82 | **.75** |
| **Analogy method** | 59 | 1.60 | **.43** |
| **Advance organizer** | 59 | 2.94 | **.66** |
| **Individualized method** | 59 | 2.71 | **.53** |
| **Lecture method** | **59** | **3.90** | **.68** |

Table 1 shows that most of the instructional practices on the items on demonstration, experimental, discussion and lecture methods are performed by teachers during their lessons. There was indication that all the other seven methods were not adequately used by teachers during instruction. Their mean values were much below the mud-point

**Table 2:** The mean rating scores, standard deviations and independent t-test for significant difference of qualified and unqualified chemistry teachers on the usage of the eleven methods P<0.05 t-critical 1.96

| Method | Qualification | N | Mean | SD | df | t | Decision |
|---|---|---|---|---|---|---|---|
| **Demonstration method** | qualified | 44 | 4.11 | .56 | 57 | 2.64 | **S** |
| | unqualified | 15 | 3.63 | .69 | | | |
| **Experiment method** | qualified | 44 | 3.35 | .64 | 57 | .094 | **NS** |
| | unqualified | 15 | 3.37 | .75 | | | |
| **Discovery method** | qualified | 44 | 2.56 | .51 | 57 | .165 | **NS** |
| | unqualified | 15 | 2.53 | .56 | | | |
| **Discussion method** | qualified | 44 | 3.92 | .43 | 57 | 1.75 | **NS** |
| | unqualified | 15 | 3.69 | .44 | | | |
| **Computer method** | qualified | 44 | 1.47 | .40 | 57 | 1.97 | |
| | unqualified | 15 | 1.25 | .23 | | | **S** |
| **Cooperative method** | qualified | 44 | 2.21 | .49 | 57 | 1.47 | **NS** |
| | unqualified | 15 | 2.00 | .43 | | | |
| **Concept mapping method** | qualified | 44 | 2.86 | .74 | 57 | .69 | **NS** |
| | unqualified | 15 | 2.70 | .79 | | | |
| **Analogy method** | qualified | 44 | 1.63 | .47 | 57 | .70 | **NS** |
| | unqualified | 15 | 1.53 | .33 | | | |
| **Advance organizer** | qualified | 44 | 2.89 | .68 | 57 | .99 | **NS** |
| | unqualified | 15 | 3.09 | .57 | | | |
| **Individualized method** | qualified | 44 | 2.66 | .48 | 57 | 1.14 | **NS** |
| | unqualified | 15 | 2.84 | .66 | | | |
| **Lecture method** | **qualified** | **44** | **3.89** | **.75** | **57** | **.12** | **NS** |
| | **unqualified** | **15** | **3.92** | **.45** | | | |

Table 2 indicates that at 0.05 significant level, there was no significant difference in the mean rating scores of qualified and unqualified chemistry teachers on the usage of the methods except for demonstration and computer methods whose t-calculated is quite above t-critical (1.96). this shows that only in these two methods that qualification exact some influence in the rating.

**Table 3:** Means, standard deviation and independent t-test for significant difference of male and female teachers rating on the usage of the eleven methods.

| Method | Sex | N | Mean | Std. Deviation | t | df | Sig |
|---|---|---|---|---|---|---|---|
| **Demonstration method** | Male | 29 | 4.03 | .65 | .58 | 57 | **NS** |
| | Female | 30 | 3.94 | .62 | | | |
| **Experiment method** | Male | 29 | 3.33 | .75 | .32 | 57 | **NS** |
| | Female | 30 | 3.39 | .58 | | | |
| **Discovery method** | Male | 29 | 2.48 | .57 | 1.02 | 57 | **NS** |
| | Female | 30 | 2.62 | .46 | | | |
| **Discussion method** | Male | 29 | 3.93 | .42 | 1.14 | 57 | **NS** |
| | Female | 30 | 3.79 | .46 | | | |
| **Computer method** | Male | 29 | 1.49 | .43 | 1.56 | 57 | **NS** |
| | Female | 30 | 1.34 | .30 | | | |
| **Cooperative method** | Male | 29 | 2.21 | .53 | .80 | 57 | **NS** |
| | Female | 30 | 2.11 | .43 | | | |
| **Concept mapping method** | Male | 29 | 2.83 | .89 | 1.72 | 57 | **NS** |
| | Female | 30 | 2.80 | .60 | | | |
| **Analogy method** | Male | 29 | 1.75 | .41 | 2.17 | 57 | **S** |
| | Female | 30 | 1.46 | .41 | | | |
| **Advance method** | Male | 29 | 2.97 | .69 | .25 | 57 | **NS** |
| | Female | 30 | 2.92 | .64 | | | |
| **Individualized method** | Male | 29 | 2.70 | .58 | .02 | 57 | **NS** |
| | Female | 30 | 2.71 | .49 | | | |
| **Lecture method** | Male | 29 | 4.11 | .75 | 2.47 | 57 | **S** |
| | **Female** | **30** | **3.69** | **.54** | | | |

Table 3 shows that the observed difference in the mean rating scores of male and female teachers on their usage of the eleven method were not significant for all the methods except for Analogy and lecture method. This is an indication that gender has influence on only these two methods.

## III. Discussion Of Findings

The findings from the study showed that most of the instructional methods stipulated in the Benchmark were not adequately used by teachers during instructions. Only four methods: demonstration, experimental, discussion, and lecture were mostly used during instruction. This comes to nullify the assertion by Njoku (2003) that Nigerian science classroom activities are still dominated by teacher-centred methods. And that science teacher educators only theorise about effective methods that have been discovered by researchers, tried out and recommended for usage by science teachers. With is this, blame should not be apportioned to teacher educators in the colleges as regarding the failure of students in external examinations since they actually expose pre-service teachers to some extent to innovative pedagogical methods in the benchmark.

The problem behind teaching of sciences in Nigeria secondary schools remaining too didactic and expository is that secondary school chemistry teachers simply did not want to use methods they were exposed to during their training period in their classroom instructions. Results also indicated that qualification has no remarkable influence on the teachers' method usage. Since method usage of qualified and unqualified chemistry teachers did not differ significantly for all the methods excepts for demonstration and computer methods. In this vein, gender has no remarkable influence on method usage by teachers.

## IV. Conclusion

According to Ukeje (1999), the quality of education provided in any society and nature of change effected by the education are both dependent on the quality of teacher and the effectiveness of their teaching in the classroom. This means that secondary school teachers must be properly prepared by their educators in the colleges through proper exposure to all the available pedagogical methods in the Benchmark: this is also quite necessary because teachers teach the way they were trained and students perform the way they were taught.

## V. Recommendations

1. The NCCE and NUC should ensure that in their teacher education programmes, more emphases are laid on the usage of these pedagogical methods stipulated in the benchmark for effective teaching in the classroom.
2. Principals of school should sponsor science teachers and in particular chemistry teachers to workshops, seminars and conferences to enable them develop them selves.
3. The teachers' guide should be provided for all the chemistry textbooks by publishers.
4. Provision of instructional materials for teaching all the chemistry concepts by government and other stakeholders.

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