

**IMPACT OF MILLENIUM DEVELOPMENT GOALS RETRAINING  
PROGRAMME ON JOB PERFORMANCE AND INTEREST AMONG  
CHEMISTRY TEACHERS IN DAURA EDUCATIONAL ZONE,  
KATSINA, NIGERIA**

**BY**

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AHMADU BELLO UNIVERSITY,  
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**FEBRUARY, 2020**

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BY

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**DEPARTMENT OF SCIENCE EDUCATION,  
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**FEBRUARY, 2020**

## **DECLARATION**

I, MUHAMMAD, Maiadua Muhammad (P16EDSC8369) declare that this thesis entitled “Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria” is my own work and has never been presented for any degree in any University and that all the sources used or quoted have been indicated and acknowledge by means of complete references.

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**MUHAMMAD, Maiadua Muhammad  
(P16EDSC8369)**

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**Date**

## CERTIFICATION

This thesis entitled “Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria” written by MUHAMMAD, Maiadua Muhammad has been read and approved as meeting the requirement governing the award of the degree of Master of Science Education (M.Ed.) Chemistry in, Department of Science Education in Faculty of Education, Ahmadu Bello University, Zaria and is approved for its contributions to knowledge and literacy presentation.

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## **DEDICATION**

This work is dedicated to my late father, Alhaji Muhammad Lawal Sarkin Fulani Shekiyal and my mother Maryam Muhammad, my two wives, Maryam and Hadiza and my fifteen children for their concern and moral support.

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## LIST OF ABBREVIATIONS

|                |  |
|----------------|--|
| <b>ANCOVA:</b> | Analysis of Correlation of Variance                    |
| <b>ANOVA:</b>  | Analysis of Variance                                   |
| <b>CPT:</b>    | Chemistry Performance Test                             |
| <b>CTIQ:</b>   | Chemistry Teachers Interest Questionnaire              |
| <b>CBT:</b>    | Computer Based Test                                    |
| <b>ETOS:</b>   | Eagglestone Science Teachers Observation Schedule      |
| <b>EDS</b>     | Education in Science                                   |
| <b>FME:</b>    | Federal Ministry of Education                          |
| <b>FRN:</b>    | Federal Republic of Nigeria                            |
| <b>GSP:</b>    | General Studies Paper                                  |
| <b>ICT:</b>    | Information and Communication Technology               |
| <b>JAMB:</b>   | Joint Admission and Matriculation Board                |
| <b>MAP:</b>    | Mean Academic performance                              |
| <b>MDGs:</b>   | Millennium Development Goals                           |
| <b>NECO:</b>   | National Examination Council                           |
| <b>NUC:</b>    | National University Commission                         |
| <b>NERDC:</b>  | Nigerian Educational and Research Development Council  |
| <b>NERC:</b>   | Nigerian Educational Research Council                  |
| <b>SSS:</b>    | Senior Secondary School                                |
| <b>SPSS:</b>   | Statistical Package for Social Sciences                |
| <b>UTME:</b>   | Unified Tertiary Matriculation Examination             |
| <b>UNICEF:</b> | United Nations Children Education Fund                 |
| <b>UBE:</b>    | Universal Basic Education                              |
| <b>WAEC:</b>   | West African Examination Council                       |
| <b>WASSCE:</b> | West African Senior Secondary Certificate Examination. |

## OPERATIONAL DEFINITION OF TERMS

**Staff Development Programme:** A training programme for teachers as an effective method of increasing the knowledge and skills of teachers in order to enable them teach more effectively.

**Job Performance:** Teachers ability to translate the curriculum into classroom situation which has to do with teaching and learning process.

**Interest:** A feeling of having ones attention, concern, or curiosity particularly engaged by something, the power to excite such feeling, quality of being interesting.

**Academic Performance:** It is the art of achieving, attainment or accomplishment of work done.

**Millennium Development Goals:** Millennium Development Goals are eight goals that all 191 UN member states have agreed to try to achieve by the year 2015. The United Nations Millennium Declaration, signed in September 2000 commits world leaders to combat poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women.



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## ABSTRACT

The study was carried out on the impact of millennium development goals retraining programme on job performance and interest among chemistry teachers in daura educational zone, Katsina, Nigeria. It had six objectives, research questions and null hypotheses. Survey research design was used for the study. The population for the study was 79 Chemistry teachers from 36 secondary schools in Daura educational zone which comprises of six Local Governments as sample for the study. These teachers were trained using the Millennium Development Goals retraining programme to form the experimental group, while thirty six (36) teachers who were not exposed to the training formed the control group. The instrument for data collection were adapted version of Egglestone science teachers observation schedule (ETOS), Chemistry Teachers Interest Questionnaire (CTIQ) and Chemistry Performance Test (CPT) for students with reliability coefficients of  $r=0.67$  and  $r=0.87$  respectively were obtained. Mean and standard deviation were used in answering research questions while the PPMC and t-test were used to test the null hypotheses at  $p \leq 0.05$  level of significance. Null hypotheses (1-5) were rejected while hypothesis six was retained. The study showed that Millennium Development Goals retraining programme had significant influence on students academic performance in chemistry in Katsina State, Nigeria ( $p=0.000$ ). The Millennium Development Goals training has impacted positively on the job performance of teachers and the academic achievement of their students as well as verifying the level of the teachers. The study recommended the use of Millennium Development Goals retraining programme in training and retraining of chemistry teachers among others.

## **CHAPTER ONE**

### **THE PROBLEM**

#### **1.1 Introduction**

There is no greater factor for the social economic and political advancement than a good educational system (Afolabi, 2013). For successful schools and educational systems, teachers are very vital. In view of this, Omotayo (2007) opined that teachers are very important to the success of the school system in achieving its goals and objectives. Fasanmi (1996) added that the standard of education in any country cannot be above the standard of its teachers. It is in line with this that the Nigerian Educational Research and Development Council (NERDC, 2008) incorporate teachers in planning and implementation of curriculum especially in secondary schools.

The curriculum of senior secondary schools of Nigeria emphasise on two major subject groups namely core and elective (NERDC, 2008). The core subjects are compulsory subjects that students must offer before graduation. In sciences, the core subjects are Mathematics, Chemistry, Biology, English. The concern of this study is Chemistry as a core subject prescribed by the Federal Republic of Nigeria in its National Policy on Education (FRN, 2014). Chemistry is defined as that branch of science which is concerned with fundamental ideas about nature and attempts to establish relationships between different quantities as precise as possible. Okpala (2001) observed that Chemistry is a physical science subject that is concerned mainly with matter as it relates to energy and it also deals with the study of laws that determine the structure of the universe with reference to the matter and energy in the universe.

Olarinoye (2000) observed that Chemistry is the most utilised basic science subject in most science and technology-related professions which its concepts and techniques result to the studies the composition, structure, properties and change of matter. Chemistry, according to Theodore, Brown, Lemay, Bursten, and Lemay (1999) includes topics such as the properties of individual atoms, how atoms form chemical bonds to create chemical compounds, the interactions of substances through intermolecular forces that give matter its general properties, and the interactions between substances through chemical reactions to form different substances.

Historically, Strodach (2012) stated that the word chemistry comes from the word alchemy which was an earlier set of practices that encompassed elements of chemistry, metallurgy, philosophy, astrology, astronomy, mysticism and medicine. It is often seen as linked to the quest to turn lead or another common starting material into gold. Alchemy, which was practiced around 330BC, is the study of the composition of waters, movement, growth, embodying, disembodying, drawing the spirits from bodies and bonding the spirits within bodies (Zosimos). An alchemist was called a 'chemist' in popular speech, and later the suffix "-ry" was added to this to describe the art of the chemist as "chemistry".

Under the influence of the new empirical methods propounded by Sir Francis Bacon and others, a group of chemists at Oxford, Robert Boyle, Robert Hooke and John Mayow began to reshape the old alchemical traditions into a scientific discipline. Boyle in particular is regarded as the founding father of chemistry due to his most important work, the basic chemistry text *The Sceptical Chymist* where the differentiation is made between the claims of alchemy and the empirical scientific discoveries of the new chemistry. He formulated Boyle's law, rejected the

classical “four elements” and proposed a mechanistic alternative of atoms and chemical reactions that could be subject to rigorous experiment.

Chemistry is typically divided into several major sub-disciplines. There are also several main cross-disciplinary and more specialised fields of chemistry (Reilly, 2007). Analytical chemistry is the analysis of material samples to gain an understanding of their chemical composition and structure. Analytical chemistry incorporates standardised experimental methods in chemistry. These methods may be used in all sub disciplines of chemistry, excluding purely theoretical chemistry. Biochemistry is the study of the chemicals, chemical reactions and chemical interactions that take place in living organisms. Biochemistry and organic chemistry are closely related, as in medicinal chemistry or neurochemistry. Biochemistry is also associated with molecular biology and genetics. Inorganic chemistry is the study of the properties and reactions of inorganic compounds. The distinction between organic and inorganic disciplines is not absolute and there is much overlap, most importantly in the sub-discipline of organometallic chemistry.

In ensuring the attainment of its objective, Chemistry is taught in our schools using varieties of teaching techniques such as lecture method, discussion, demonstration, laboratory techniques among others. It is in line with this that the Federal Ministry of Education as stated on the National Policy On Education (FME, 2014) in its determination to ensure that right knowledge is transmitted to learners, recognise the importance of teacher training programme otherwise termed as staff development programme. Lornah, Sirima and Poipoi (2010) ascertained that staff development programme for teachers entails organised learning experience for teachers to attend in specific areas of interest which equipped them with competency, skills and professionalization

in teaching profession. Such programmes include in-service training, seminars, workshops, conferences among others. Involvement of a teacher in this activity and its success and effectiveness basically depends on the goodwill of the teacher. It is only when he is inclined and willing to take up such an activity that would volunteer him to a training programme and would take interest in drawing benefit out of it and would improve his interest towards his work. “It is widely accepted that many variables contribute to effective education. The most crucial factor is the quality of interaction between the teacher and the students taught. If we accept that the quality of any education system ultimately depends upon the quality of teacher, and that, “no country can rise above the level of their teachers”, then the matter of teacher development is the one which deserve our urgent, careful and continued attention (Zaman, 2004).

Therefore, teachers must be ready to discharge their duties and obligations in order to achieve successful, effective and efficient teaching and learning processes in the educational system. However, these teachers appear to have complained that they were not well motivated on the job and adequate incentives were not given to them on the job. Teachers seem to complain that they did not enjoy adequate in-service training, workshops and seminars. Rewards, incentives and other remunerations appeared not to be enjoyed by them as they should. Teachers also appear to complain of poor welfare packages like loans.

With evolution of human civilisation, Suleman (2014) noted that mankind has demonstrated its ability to conquer and harness natural forces for its development and welfare which resulted in large scale introduction of new scientific concepts and technologies for moulding economic, social and educational systems. “The stock of knowledge of a teacher and his pedagogical skills become obsolete in a short span of time hence requires time to time update. All educational

innovations have, therefore, routed through teachers training programme which, in order to be responsive, have to develop its own constant flow system of feedback through continuous evaluation”. Mohmood (2009) portrays the aspects of teachers training programme as “this may be reiterated here that the intention of teachers training programme has always been to enhance professional as well as personal development of teachers so as to provide its benefits to children they teach, class they deal and schools they serve.

Staff development is the process of providing opportunities for employees to improve their knowledge, skills, and performance. This is necessary in line with the goals and values of the organisation. Staff development is accepted as one of the effective strategy make teachers to teach more effectively.

There are several types of Staff Development Programmes organised for the purpose of improving teachers capacity and professionalism in Nigeria. Some are: Educational Sector Support Programmes in Nigeria (ESSPIN), Japan International Cooperative Agency (JICA), Strengthening Mathematics and Science Education (SMASE), Millennium Development Goals (MDGs) among others. These are the most widely used Staff Development Programmes in Nigeria. The mostly widely used staff development programme is the MDGs. MDGs provided training for both primary and secondary school teachers more especially in the area of Sciences. In this study, the researcher will focus on the Millennium Development Goals retraining programme as a staff development programme for this study.

In Chemistry, Staff Development Programme (SDP) has been accepted as an effective method of increasing the knowledge and skills of teachers in order to enable them teach more effectively. According to Lawal (2014), training programme for teachers are important aspects of education

process that deal with the art of acquiring skills in the teaching profession. They are essential practices that enhance subject mastery, teaching methodology, and classroom management. The objective of Teachers' Training programmes is that it ensures the promotion of professional growth helps to improve pedagogical skills, keeps teachers abreast.

Research report by Hassan (2014) acclaimed that most of the teachers are found wanting in the area of knowledge of subject matter, use of instructional resources, application of pedagogical strategies and use of appropriate evaluation procedure in teaching Chemistry. It should be noted that the West African Examination Council (WAEC, 2015) decries persistent failure among students over the years and points accusing fingers on teachers. Similarly, the Nigerian Universities Commission (NUC) in an attempt to restructure education system to align with challenging demands of digital age introduces Computer Base Examination especially in General Studies programme. More so, the Joint Admission and Matriculation Board (JAMB, 2015) reemphasised the importance of training programme thereby mandating that students wishing to progress to any Nigerian tertiary institution must attempt Unified Tertiary Matriculation Examination (UTME) through computer-based.

It should be noted however, most teachers in secondary schools are analogue possessing less skills required in digital age. Report by James (2013) shows that of the total number of Biology teachers in Southern part of Nigeria, only 9% are computer literate. Similarly, in Northwestern Nigeria, report by Sam (2010) pointed out that less than 20% of science teachers are computer literate. This might be the reason why teachers disseminate negative interest towards modern trend in the teaching of Chemistry and consequently affect their job performance and attainment of curriculum and national objectives of teaching Chemistry.

Job performance in this study reflects teachers' ability to translate the curriculum content into classroom situation which has to do with teaching and learning process. It is determined through teachers' ability to acquire the subject matter of Chemistry, carefully select and utilise teaching method relevant to the topic to be taught, select and organise instructional resources and adequately evaluate learning outcomes of students derived from lesson objectives (Okam, 2014). On the other hand, interest according to Mangal (2010) is predisposition which makes an individual to act or behave in a particular way. In this study, interest is seen as innate factors that make teachers to perceive the acquisition of prerequisite computer-based knowledge as difficult and less important in their teaching. Therefore, there is a need to train teachers on computer technology through conferences, workshops and seminars to tackle the challenges of digital world. It is against this background that this study is set to examine the Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria.

### **1.1.1 Theoretical Framework**

This study was centred on the theory of human resource management advocated by DeCenzo, Robbins and Owens (1987). The central assumption of this theory is that proper management of staff invariably translates into enhance productivity or effectiveness on their part. The key concepts housed by this theory are:

1. acquisition;
2. development;
3. motivation and
4. maintenance of staff.



The personnel function of staff acquisition is carried out on the basis of pre-entry qualifications, that is, pre-service training and other relevant experiences. Staff development however, involves well-planned activities intended to enhance teachers' productivity through the job training programmes. Staff development activities are also well-documented motivators. Besides, well-developed workers (teachers included) are easier to maintain for the overall success of an organisation. Put otherwise, it is not be enough to acquire, deploy and assign tasks to new staff, rather, it is imperative that they are constantly developed among other management practices, to increase their effectiveness as they face the reality and expectation of the teaching profession.

The theory is applicable to science education because no teaching is effective unless the personnel are well trained, motivated and develop desired interest towards attainment of educational objectives. Many scholars used theory of human resource management to developed professionalism in teachers towards teaching profession. Therefore, theory of human resource management of Decenzo, Robbins and Owen (1987); will serve as theoretical framework of this study to examine the Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria.

## **1.2 Statement of the Problem**

The modern trend in teaching and evaluation of learning outcomes demand the use of computer technology and adequate knowledge of ICT. Grace (2013). Report by examination bodies in Nigeria revealed that poor performance among students continue to persist. The Chief Examiner of West African Examination Council (WAEC, 2015) claimed that of the total population of candidates who sat for WASSCE in 2015 in Nigerian secondary schools, only 30% were able to

obtain pass at credit level. Similarly, in the same year, the Chief Examiner of Joint Admission and Matriculation Board were reported to have said that recent introduction of computer-based examination in evaluating students' performance in Nigerian tertiary institution Unified Tertiary Matriculation Examination (UTME) is worrisome. Most of the students cannot manipulate computers to respond to the questions posed by JAMB. As such, low scores were recorded by students depriving them access to admission into Nigerian universities. Furthermore, recent introduction of Computer Based Test (CBT) examination in General Study Paper (GSP) and Education In Science (EDS) courses in Nigerian Universities revealed poor skills mastery and acquisition among students. Most of the scholars attribute this trend to teachers who were also analogue without ICT skills to dispense to students. Most of the recommendations based on research findings recommended the need for Government, agencies and teacher training institutions to organise training programme through workshops, seminars and conference to teachers so that in turn they disseminate the same to their students. National Teachers Institute carried out a study to assess the impact of Millenium Development Goals retraining programme on the job performance of chemistry teachers. However, no study was conducted to assess the interest of chemistry teachers.

Similarly, most of the studies conducted on poor performance among students centred on influence of teaching method on academic performance of students. Relatively, no study was conducted to examine the assessment of staff development programme on teacher's job performance and interest in teaching Chemistry at secondary School level, hence a missing gap in this study. In thrust of this, the study is set to examine the examine the Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria.

### **1.3 Objectives of the Study**

The study is designed to investigate the assessment of staff development programme on teachers' job performance and interest in Chemistry teaching in secondary schools of Katsina State. Specifically, the study has the following objectives to:

1. find out the effectiveness of Millenium Development Goals programme on teachers' job performance in terms of application of appropriate instructional techniques in Chemistry teaching in secondary schools of Katsina State.
2. determine the effectiveness of Millenium Development Goals programme on teachers' job performance in terms of selection and application of instructional materials in Chemistry teaching in secondary schools of Katsina State.
3. find out the effectiveness of Millenium Development Goals programme on teachers' job performance in terms of application of evaluation procedure for the attainment of behavioural objectives in Chemistry teaching in secondary schools of Katsina State.
4. find out the effectiveness of Millenium Development Goals programme on teachers' interest towards Chemistry teaching in secondary schools of Katsina State.
5. determine the effectiveness of Millenium Development Goals programme on male and female teachers' job performance in Chemistry teaching in secondary schools of Katsina State.
6. determine the effectiveness of Millenium Development Goals programme on Chemistry students' academic performance in secondary schools of Katsina State.

## 1.4 Research Questions

The following research questions guided the study:

1. What is the difference of teachers' job performance between Chemistry teachers exposed to Millenium Development Goals programme and those not so exposed to in terms of application of appropriate instructional techniques in Chemistry teaching in secondary schools of Katsina State?
2. What is the difference of teachers' job performance between Chemistry teachers exposed to Millenium Development Goals programme and those not exposed to in terms of selection and application of instructional materials in Chemistry teaching in secondary schools of Katsina State?
3. What will be the difference in teachers' job performance between Chemistry teachers exposed to Millenium Development Goals programme in terms of application of evaluation procedure for the attainment of behavioural objectives in Chemistry teaching and those who were not?
4. What is the difference in the interest of teachers towards Chemistry teaching between teachers exposed to Millenium Development Goals programme and those not exposed in secondary schools of Katsina State?
5. What is the difference in the job performance of male and female teachers exposed to Millenium Development Goals programme in Chemistry teaching in secondary schools of Katsina State?

6. What is the difference in the academic performance of Chemistry students taught by teachers who were exposed to Millenium Development Goals programme and those not exposed to in secondary schools in Katsina State.

## **1.5 Research Hypotheses**

The following null hypotheses were tested at  $P \leq 0.05$  level of significance:

Ho1: There is no significant difference in the job performance in terms of application of appropriate instructional techniques between chemistry teachers exposed to Millenium Development Goals programme and those not exposed in secondary schools of Katsina State.

Ho2: There is no significant difference in the job performance in terms of selection and application of instructional materials between chemistry teachers exposed to Millenium Development Goals programme and those not exposed in secondary schools of Katsina State.

Ho3: There is no significant difference in the job performance in terms of application of evaluation procedure for the attainment of behavioural objectives in Chemistry between teachers who attended Millenium Development Goals programme and those who did not in secondary schools of Katsina State.

Ho.4: There is no significant difference in the interest of teachers towards Chemistry teaching between chemistry teachers who attended Millenium Development Goals programme and those who did not in secondary schools of Katsina State.

Ho5: There is no significant difference between male and female Chemistry teachers' job performance who attended Millenium Development Goals programme in secondary schools of Katsina State.

Ho6: There is no significant differences in academic performance of Chemistry students taught by chemistry teachers who were exposed to Millenium Development Goals programme and those taught by teachers who were not so exposed to in secondary schools of Katsina State.

### **1.6 Significance of the Study**

This study will hopefully benefit students, teachers, Ministry of Education, curriculum development bodies in Nigeria, textbook authors, NTI and other researchers in the following ways:

- i. **Chemistry Students** will benefit from the outcome of this study when interest and performance of their teachers significantly increase may affect their academic performance.
- ii. **Educational Agencies** such as NTI, NCCE will benefit from the study in the improvement of their future workshops, seminars and conferences.
- iii. **Chemistry Teachers**, will hopefully benefit from this study in enlighten the benefit of staff development programme on their job performance and interest in Chemistry teaching in secondary schools.
- iv. **Ministry of Education** officers will hopefully utilise the outcomes of this study during evaluation, inspection and supervision on professional competence of their teachers.

- v. **Curriculum Planners** such as Nigerian Educational Research and Development Council (NERDC) will use the outcomes of this study to develop, design and implement policies that will help secondary school chemistry teachers to augment their professional fitness.
- vi. **Textbook Publishers** will use the outcome of this study to design and incorporate publications related to staff development programme in their textbooks.
- vii. **Researchers** conducting similar studies in the same field may use the outcomes of the study as source of new information on the existing literature in chemistry education. The study will also serve as a foundation for further research.
- viii. **Professional Bodies** organising seminar, workshops and conferences such as STAN, MAN among others will find the outcome of the research beneficial in improving their workshop organisation.
- ix. National Teachers Institute to investigate the delivery SDG in the light of the success of MDG

## 1.7 Basic Assumptions

In carrying out this research study, it is assumed that:

1. Most chemistry teachers are neither qualified nor competent in teaching chemistry so the programme could have a positive impact on their performance in lesson delivery.
2. The training and the retraining of chemistry teachers is necessary and will expose them to different patterns in lesson delivery.
3. The respondent will be able to utilize adequately the skills acquired during the programme in their lesson delivery.

4. Most chemistry teachers have low interest in the teaching of chemistry.

## **1.8 Scope of the Study**

The study assessed the Impact of Millenium Development Goals Retraining Programme on Job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. The study was delimited to Millenium Development Goals retraining programme. It was also delimited to teachers' job performance in terms of method of teaching, selecting and utilisation of instructional materials, and application of evaluation procedure in teaching as well as teachers interest in the teaching of chemistry.

The study involved Secondary school Chemistry teachers between 2012 -2015 (3 years) who received training through workshop and seminar using Millenium Development Goals teachers retraining programme. The study is further delimited to only secondary school Chemistry teachers in public secondary schools of Daura Educational zone of Katsina State, Nigeria.



## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.1 Introduction**

The study was designed to assess the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. Therefore, this chapter presented the literature reviewed related to this study under the following sub-headings:

- 2.2: Meaning of Development
- 2.3: Staff Development
- 2.4: Staff Development Programmes.
- 2.5: Staff Development Programmes in Science Education
- 2.6: Conferences and Teachers' Job Performance
- 2.7 : Workshops and Teachers' Job Performance
- 2.8 : Seminar and Teachers' Job Performance
- 2.9 : Mentoring and Teachers Job Performance.
- 2.10: Academic Performance in Chemistry
- 2.11: Interest and Teaching of Chemistry
- 2.12: Interest and Academic Performance in Chemistry
- 2.13: Concept and Nature of Impact Assessment
- 2.14: History and Development of National Teachers Institute (NTI)
- 2.15: History and Development of Millennium Development Goals (MDGs)
- 2.16: Review of Empirical Studies on NTI/MDG Teachers Training Workshop
- 2.17: Overview of Similar Studies
- 2.18: Implication of Literature Reviewed for the Present Study

## **2.2 Meaning of Development**

Development is the process that “strives to build the capacity to achieve and sustain a new desired state that benefits the organization or community and the world around them” (Chabra, 2004). Development perspective examines the current environment, the present state, and helps people on a team, in a department and as part of an institution identify effective strategies for improving Job performance. In some situations, there may not be anything “wrong” at the present time; the group or manager may simply be seeking ways to continue to develop and enhance existing relationships and job performance. In other situations, there may be an identifiable issue or problems that may need to be addressed; the development process aims to find ideas and solutions that can effectively return the group to a state of high Job performance. Development implies creating and sustaining change. Marmer, (1999).

According to Obisi (1996) the concept of training and development are used interchangeably. However, it can be differentiated from the other. Training is for specific job purpose while development goes beyond specific development covers not only those activities which improve job performance but also those which bring about growth of personality. In training, you using one stone to kill one bird while in development you use one stone to kill two birds, (Mamoria, 1995).

In the field of human resources management, training and development is the field concerned with organizational activity aimed at bettering the Job performance individuals and groups in an organizational setting. It has been known by several names, including employee development, human resources development, and learning and development. (Harrison, 2005) Training has traditionally been defined as the process by which individuals change their skills, knowledge, attitudes and/or behavior. (Robinson, 1996).

In the context, training involves designing and supporting learning activities that result in a desired level of Job performance. In contrast, development refers to long term growth and learning, directing attention more on what an individual may need to know or to do at some future time. While training focuses more on current job duties or responsibilities, development points to future job responsibilities. However, sometimes these jobs have been used interchangeably or have been denoted by simple term Job performance consulting, which emphasizes either the product of training and development or how individuals perform as a result of what they have learned. (Robinson, 1996). Because of the relevance of development to teachers, this study therefore, investigated the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria.

### **2.3 Staff Development.**

Many researchers such as Fiquin, (2012) have expressed their opinion and views on the concept of staff development. To Wideen (1987) ‘the use of staff development connotes any training activity that helps teachers to improve their teaching skills’ sparks (1984:24). Also south work (1985) Argued that staff development is adult education and as such should be based on sound principles of education and aim at enriching the teachers understanding of his/her tasks activities that go beyond simply improving Job performance.

Staff development according to Pigors and Myer (1981), are efforts, strategies and courses of action deliberately taken to help and facilitate employee to achieve technical academic and psychosocial development to enhance their contribution to the achievements of organizational goals and for mutual benefit. The two author’s content that staff development programs encompass training, promotion, motivation and rewarding staff to them, the process also involve

wide range of situational training forms, attendance at regional conferences and seminars. Although the need of the work unit must be met first.

Tiberodwa (2000) on the other hand pointed out that staff development programs include training attendance of seminars, workshops conference and short courses within and outside the institution they also include sabbatical leave. Promotion which is expected to lead to effective Job performance in activities in primary schools, staff development programs primarily aims at improving teachers competence as to ensure transfer of quantity knowledge, skills are required attitudes of trainee. Others view staff development as the processes, programs and activities, through which every organization develops and enhances and improves the skills competences and overall Job performance of its employers and workers Pigors and Myer (1981), opines that staff development is a process of aiding employers in their present and further work through the development of appropriate habit of thoughts and action skills, knowledge and attitude.

From the above explanation, the researcher view staff development as a short and long term additional process through which employees are thought concepts, general knowledge and skills that are relevant to their duties, for this reason that the State Universal Basic Education Board of Kaduna state embark on sending teachers in primary schools for further training and workshop.

Teachers reported that they participated in staff development programs to acquire more knowledge and skill. Many studies on achievement correlates and indicated a strong relationship between instructional leaders and pupil academic achievement. Wekesa (1993) found out that teachers who provided effective instructional leadership more often register high academic achievement on the part of their students. Staff development program which aims at bolstering instructional leadership prowess of teachers will therefore Evaluation on teachers Job performance. Ngala (1997) also found out that effective teacher management practices including

staff development programs related positively with pupils academic achievement. Staff development programmes aimed at improving teachers' knowledge on human resource management will therefore Evaluation on pupils' academic achievement.

Mastery of content matter of any subject enhances teachers effectiveness on cognitive aspect of education. Fuller (1986) and Nyangarora (1996) concur that mastery of content area facilitates effective teaching and therefore enhances pupils' academic achievement. 98% of respondents reported that they seek staff development programmes so as to widen their knowledge of subject matter. Staff development programmes will therefore Evaluation on teachers Job performance since it will enable teachers to master relevant content areas on which national examinations are based.

Acquiring more knowledge on teaching as a profession motivates teachers into taking their roles seriously. Motivation on the other hand Evaluations on teachers' effectiveness (Ngala, 1997; Fuller, 1982). It has been found out that for effective learning to take place, choice of appropriate teaching methods must be made depending on the topic. Nceeri (1996), Fuller (1982), and Athenga (2002) agree that effective teaching methods Evaluations positively on learning. Staff development programmes, which promotes knowledge on choice and use of effective teaching methods, Evaluation on teachers' role effectively.

Harwell (2003), observed that staff development help teachers to understand the general cognitive and social / emotional characteristics of students in order to provide developmentally appropriate curriculum and instruction. In addition, Tiberodwa (2000) on the other hand, pointed out that staff development programs include training, attendance of seminars, workshops, conferences and short courses within and outside the institution they also include sabbatical leave. Promotion, which is expected to lead to effective Job performance in activities in Primary schools, staff development programs primarily aim at improving teachers competence as to

ensure transfer of quality knowledge, skill are required attitudes of trainee. Other view staff development as he processes, programs and activities through which every organization develops enhances and improves the skills, competences and overall Job performance of its employees and workers. Pigors and Mayer (2015) opined that staff development is a process of aiding employers in their present and further work through the development of appropriate habits of thought and skills, knowledge and attitudes.

### **2.3 Staff Development Programmes.**

In order to ensure teachers perform their tasks diligently, educational administrators and planners identify and utilize various programmes for the training and retraining of teachers for quality service delivery. These includes among others;

**2.4.1 Pre-service Training:** These types of training is conducted at teacher's colleges. Farant (1981) indicates, it has been available to teachers in such institutions as teacher's colleges, advanced teacher's colleges and institutions of education's'. Similarly, institutions such as federal colleges of education, colleges of education technical and so on form the bases of these claims. Professional teachers are trained in these types of institutions with ideas and groomed to teach.

**2.4.2 Correspondence course:** this relates in mode to the conventional teacher training institution but uses a different medium of correspondence to train teachers. it allows those who do not have opportunity to leave their place of or families to acquire additional knowledge and other educational attainment.

**2.4.3 Seminar:** This refers to as a course of intense study relating to students major. Seminar is a topic oriented event designed to educate and inform an audience about subject of interest, Altalib (1993). In another vain, seminar either refers to a general form of

academic instruction, at an academic institution or offered by a commercial or professional organization. The idea is to familiarize students more extensively with the methodology of their chosen subject and allow them to interact with examples of the practical problems that always occur during research work. It involves assign readings and discussions, questions can be raised, and debate can be conducted. It is informal compared to the lecture system of academic instruction. Katewood and Jackson (undated) said that “seminar is an occasion when a teacher or expert and a group of people meet to study and discuss something.”

**2.4.4 Workshop:** A workshop is an office or conference room meeting intended to create or generate plan, analysis or design to support organisational effort. The main aim of workshop is to acquire new knowledge and skills that relates to the work of the participants. They identify needed change in behavior, learn new skills, and practice behavior in simulated work environment. According to Altalib (1993), “ effective work is built around what is practiced and relevant to the needs of the learns perspective. It is specific and focused on its subject matter”. Based on above, workshop is a sort of re-training exercise not to upgrade qualification but to update knowledge and skills. Kate wood and Jackson (undated) added that “workshop is a meeting of people to discuss and or perform practical work in a subject or activity: a drama/poetry/training workshop.

**2.4.5 Conferences:** Another form of teacher re-training programme, which normally takes place like a seminar or workshop, is conference. Skills and experience are acquired especially in teaching and learning activities during conference. Ezenne (1998) said that, “conference are usually used to tackle a single or set of problems”. It may involve session of various types; such as lectures, panel discussions, workshops etc. Example of such is the national conference of principals of secondary schools. According to Kate wood and Jackson (undated) “conference is an event, sometimes lasting a few days, at which there are a group

of talks on a particular subject, or a meeting in which especially business matters are discussed formally”.

**2.4.6 Mentoring:** Mentoring is the act of giving another person help and advice over a period and often teach them how to do their job.

## **2.5 Staff Development in Science Education**

Staff development is defined as the process of providing opportunities for employees to improve their knowledge, skills, and Job performance in line with the goals and values of the organisation and in relation to the interests and needs of the employee. This definition submits that the growth of employee development must be linked to the school district’s strategic plan and to the short and long-range workforce assets. Such a concept requires an ability to anticipate gaps in the knowledge and skills of the workforce and how the changing schools system’s demographics, economic status, and present employee inventory will impact the accomplishment of stated goals and objectives.

Staff development has been accepted as an effective method of increasing the knowledge and skills of teachers in order to enable teachers to teach more effectively. In this sense, staff development places an emphasis on organisational learning and is provided at the identified time of need either by the organisation, by an employee group, or by the individual worker. It emphasises the premise that organisations will progress to the extent that people grow and develop. The term staff development generally is preferred to the term training in professional fields, although definitions of the two terms often are quite similar in the literature. For example, as previously noted, Harris speaks of staff development as having two kinds of training, one of which is in-service training. among the trends in human resources administration today is tying



staff development to the motivation, deployment, and alignment of people within the system to increase the system's productivity is a concept developed (Clifton & Nelson, 1996).

Staff development in science education has come to be viewed as indispensable if the goals of the organisation are to be realised and the need disposition of the employees are to be met. According to studies from management consultants the largest single factor driving job satisfaction is the opportunity for growth and career development (Bathurst, 2007). The staff development process in science education has many facets as evidenced by the numerous terms in the literature that name the process. Such terms include professional growth, in-service education, continuing education, recurrent education, on-the-job staff training, human resources development, staff improvement, renewal, talent management, and other combinations of these terms.

Staff development can also be explained based primarily on the following concepts:

1. The staff development process is developmental in that its emphasis is on a continuously growing individual. In this sense, staff development is an ongoing process as opposed to a one-time project. It focuses on projected needs and objectives that will help the school system remain creative and productive. Individual growth that meets these projected needs provides employees with a personalised opportunity to reach higher levels of self-fulfilment and gratification. Staff development is viewed as an important investment in the school system's future.
2. Effective staff development places greater emphasis on the extension of personal strengths and creative talents that on the remediation of personal weaknesses. The major focus of growth is on what the individual can do and how these strengths can be further developed and used. As mentioned above, effective staff development is

self-development. Growth is personal in the sense that what motivates each individual is a personal matter and each person's self-image is instrumental in determining what incentives will encourage personal growth. Staff development is self-development in that growth begins with a personal need, and individuals develop by being willing to take responsibility for their own personal growth. This concept does not mean that personal development is not to be enhanced through the support of others, but that personal growth is mainly an intrinsic rather than an extrinsic phenomenon.

Several of these practices or trends are noted in the following comparative statements.

Staff development has moved:

1. Away from in-service training toward staff development as talent management.
2. Away from staff development as a single event toward staff development as a continuous process.
3. Away from a focus on remediation toward a process of building on personal strengths.  
Away from sporadic and uncoordinated activities toward the planning and utilisation of systematic strategies that centre on defined objectives.
4. Away from a singular focus toward a multiple approach with varied programs and leadership strategies.
5. Away from a passive approach toward a proactive approach based on personal initiative and professional interests.
6. Away from staff development as an isolated activity toward staff development activities linked with other human resources processes.
7. Away from limited control and evaluation toward both self and system evaluation and control.

Several trends are revealed in the forgoing staff development changes. For example, there is a clear indication that staff development has become an expected, ongoing process. Individual initiative and motivation serve important roles in the determination of successful staff development activities. Therefore, in this study, the researcher investigated impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria

### **Training as a Staff Development Programme in Science Teaching**

Training is considered as the process of improving the existing skills, knowledge, exposure, and abilities in an individual or group of teachers. According to Saleem and Mehwish (2011) training is an organised increase from the know-how skills and sensations needed for staff members to execute efficiently in the offered process, as well as, to operate in underling situation. Moreover, it also enhances the capabilities of panel of employees in very effective way by motivating them and transforming them in to well organise and well-mannered, that ultimately affects the Job performance of organisation. Laing (2009) defines training as an indicator to enhance superior skills, knowledge, capabilities and outlook of the employees that results in effective Job performance of the workers. However, he adds one thing more that it (training) extends the production of the organisation. In their word, Massod (2010) and Khanfar (2011) sees training as an active means to enable individual to make use of his capability and his potential capability. Training is only considered when people of an organisation are looking for promotion of rank. Some employees prefer training to improve professional skills that help them to work more efficiently. Professional training enhances knowledge then otherwise (Kennedy, 2009).

Teachers' Training Programme has been accepted as an effective method of increasing the knowledge and skills of teachers in order to enable teachers to teach more effectively. According

to Lawal (2004), training programme for teachers are important aspects of education process that deal with the art of acquiring skills in the teaching profession. They are essential practices that enhance subject mastery, teaching methodology, and classroom management. The objective of Teachers' Training programmes is that it ensures the promotion of professional growth, helps to improve pedagogical skills, keeps teachers abreast. In Katsina State, the Ministry of Education is responsible for organising Teachers' Training through In-service training, seminars, workshop, conference, induction training among others.

Teacher training is very important for development of student's knowledge and learning. Education is backbone within the development of a new society and teacher incorporates a pivotal role within the education system. Every community invests inside the teacher schooling by creating the teachers' prospective in training methodologies and ways of ensuring maximum outcomes through the system. Undoubtedly good quality connected with education can be directly related to the improvement connected with instructional aims, training applications, curricula, services, tools in addition to management design nonetheless it is merely the teacher whom put life straight into the frame (Shah &Rehana, 2011).

Olaniyan and Ojo (2008) identify training as important because it increases productiveness, improves the good quality of work, increases skills, knowledge, develop the interest, enhance using tools, reduces waste, mishaps, turnover, lateness, absenteeism and also other overhead costs, eradicates obsolesce in knowledge, technologies, methods, items, capital management and so forth. It brings incumbents to that level of effectiveness which needs the Job performance with the job; enhance your implementation of brand new policies and regulations; prepares people for achievement, improves the employees' growth and ensures survival and growth of the organisation.

Bowra (2011) has found successful organisations tend to progressively know that there are volume of factors which contribute to Job performance of organisation but human resource is definitely the most essential one. According to Brum (2007) training is probably the hardest strategy to improve employee's determination towards the organisation Job performance. Khanfar (2011) claimed that training has an optimistic association between motivations along with job engagement involving personnel doing work in organisations. Muzaffar et al. (2012) indicates that, to increase the employee's Job performance, it is crucial to inspire the employees by means of satisfying the space in between skills necessary and the owned or operated by means of staff through delivering applicable training. Farooq and Khan (2011) concluded that the role of valuable training is to improve the quality of task process that brings improvement in the Job performance of employees.

Ahmed (2011) outlined employee as a key element of the organisation. Success or failure of every organisation depends on employee Job performance. Employee Job performance ultimately affects the organisational Job performance. High Job performance organisation is the role model for the other. Some of the staff development programmes in science education include seminar, workshop, conference, in-service training, on the job training, induction training among others. For the purpose of this study, the researcher reviewed literature based on workshop and seminar. In this study, the researcher investigated the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria.

### **2.5.1 Training Process**

Mainly, there are two methods of training used by educational organization, which are on-the job training and off-the-job training:

**2.5.1.1 On-the-job training:** is training given at a work place by superior within short period. It is cheaper and less time consuming. The training can be Evaluated by coaching. The superior guides his sub-ordinates and gives him job instructions. The superior points out the mistakes and gives suggestions for improvement. Also, job to another, so that they may acquire different job experiences. This enables the employees to perform any type of job within the organization. A teacher in this regard can acquire various techniques of teaching in various subject areas. Dajur C I K and co (2010) stated that, “usually executive training is done on-the-job. An executive is supposed to learn his work while working. This type of training has so many advantages. The trainee learns the job in the actual work place. He can size up his subordinates and in turn, be appraised by them, without artificial support. He can demonstrate independently his potentials leadership questions. It is argued that the best executives will rise to their opportunities without the support of formal training.

**2.5.1.2 Off-the-job Training:** Is a training method given outside the actual work place such as lecture and conferences, films, simulation exercises, vestibule training, role-play, in-basket exercise and management games. Simulation exercise is a training activity that explicitly places the trainees in an artificial environment that closely mirrors actual working conditions. The activities include; case experiences, experiential exercises, vestibule training, management games and role-play. According to Dajur and co (2010) Training can be given through this method. The most commonly used off-the-job training through this methods are problem solving, conference and the case study methods.

### **2.5.1.3 In-service Training on the Job Performance of Staff in Organization**

Training of teachers is an essential means through which they can improve on their previous knowledge thereby making them more productive. It also enables them to perform effectively as well versatile in skills utilization. Ojo (1998) stated that, it provides opportunities to retain employed workers to perform new and changed jobs. This may be necessitated by technological changes or introduction of new products (in-service training). . In-service refers to periodic upgrading and additional professional development received on the job, during employment. (Ingersoll. R & M. Gold, 2011)

No matter the quality of the type of training initially acquired by a teacher additional knowledge is necessary to improve and enhance his Job performance. Pauline (2013) said, “All teachers require continuing support once they reach the classrooms to enable them to reflect teaching practices, to foster motivation and to help them adapt to change, such as using a new curriculum or language of instruction. Ongoing training can also provide teachers with new ideas about how to support weak learners.

Teacher who have received some in-service training are generally, found to teach better than those who have not, although it demands on the purpose and quality of the training. According to Tahir (2005) “the-service training and professional development of teachers cannot and should not be glossed over nor handled with levity”. In addition to the above assertion, NPE (1989) in Tahir (2005) put in that, “no matter the efficiency of the pre-service education of teachers will continue to fill these gaps... and will be systematically planned so that successful attendance at a number of such courses will attract incremental credits and or count towards future advancement.

#### **2.5.1.4 Mandate of In-Service Training in Katsina State**

Due to the realization that training of teachers is the main doorstep towards the development of the students, the communities and the nation at large, both states and national bodies that are educational stakeholders have done a lot. Fafunwa (2004) states that “the National Policy on Education re-affirmed that, teacher education will continue to be given major emphasis in all educational planning, because no education system can rise above the quality of its teachers”. Baikie, 2002 in Ciwar (2005) stated that; teaching profession in Nigeria has over the years acquired a character of its own.

The profession is clouded with teachers with multifarious background, training, and qualifications, standards vary from one category of teachers to the other, and there was hardly any common ground on which can be built a well-coordinated approach to confirm profession status on teaching. He went further to say, teacher is more directly related to development of the future of any nation than any member of other profession is. Thus for future development of the nation, the teachers will need greater depth of knowledge, increased skills in teaching, broad knowledge of the contemporary civilization, right attitudes, ideas and improved human characteristics and relationship.

Sharefu (2012) indicated that, in a bid to widen access to higher education and strengthen its programmes, the institute (NTI) became a member of the consortium of e-learning institutions, which is spearheaded by the Hamdan bin Muhammad e-uni in Dubai United Arab Emirates, amongst other countries in the world. This is aimed at improving the quality of teachers on training at the institute. Wugo a representative of the president at world Teachers Day 2012 stated that, “Federal Government has pledge to accord priority to the training of teachers and their welfare in a bid to improve the quality of education in the country. He added, “His



administration knows fully well that educational system was only as good as the quality of the teachers in service”.

On the other hand, “His administration had conducted a National Teachers Development needs Assessment to determine the skills of teachers and that it would introduce incentive-based career structure in the profession”. Moreover, Government would intensify its capacity development programmes to enhance the competence of teachers and managers in the sector to make them more effective. In a remark, Rukayat said, “teachers are critical to the actualization of government policies geared towards quality education at all levels”. Bello (2012) said according to Director NTI (Sharefu) the institute has mapped out strategies to use mobile technologies to update the knowledge of Nigerian teachers and strengthen their ‘mobile technologies will be used to help teachers in and out of classrooms through provision of access to useful curricular material, strengthened the collaborations among educators, and encourage exchanges about pedagogical approaches.

Sharefu, 2012 in Abdullahi (2012) stated that under this important national assignment, the institute successfully organized nationwide training and re-training workshops for 120,000 teachers in 2009, 140,000 in 2010. We also trained 125,000 teachers in 2011 on innovative techniques of teaching in four core subjects. This institute also conducted special training on Educational Needs, Disabilities, and Faith Based Hiv/Aids Awareness on train the trainer’s basis. He added, “we also have a special training package called continuing professional Development (CPD). Under this scheme, the institute successfully conducted training for teachers in 24 states of the federation in the areas of pedagogical skills, mastery of subjects matter, and general improvement of teachers’ professional academic skills. Ciwar (2005) indicated that, “by visionary initiative of the NCCE, the federal Executive council has approved the proposal to the effect that NCE teachers be posted for a two year service scheme. This measure is to balance the

lopsidedness in teacher-utilization and turn over patterns”. Sharefu (2012) stated that, “our goals as contained in the institutes vision is to enhance the professional skills of serving teachers for high quality education delivery at primary and secondary education levels with a view to uplifting the standard of the education system of the country”.

Moreover, he said, “our mission is to ensure the continuous upgrading of teachers’ knowledge and skills in curriculum implementation, while instilling in them the virtues of education, loyalty, commitment, discipline and resourcefulness”. For an enviable education system in Nigeria, programmes must be directed at appraising the Nigerian teachers to meet the challenges of current globalization. Staff development programme for teachers is therefore inevitable. According to NPE in Owodummi (2009), “there is no educational system may rise to above the quality of its teachers. It therefore becomes pertinent that special attention should be given to the training of the teachers to equip them with various skills required in the teaching profession.

According to Abdulhalim & Mozahar (2005), training is the process of acquiring skills to perform a job better. Van Dersal, 1962 in Abdulhalim & Mozahar (2005) defines training as “the process of teaching, informing, or educating people so that (1) they may become as well qualified as possible to do their job, and (2) they become qualified to perform in positions of greater difficulty and responsibility. Ofor, 1991 in Ehiozuwa (2005) gives meaning of teacher education thus; teacher education refers to institutionalized educational procedures which aim at the purposeful organized preparation of further education of teachers who are engaged directly on indirectly in educational activities as their life work”. Scholars use staff development and training interchangeably. Jones, George, and Hill (2000) in Okotoni & John (2005) believe that “training primarily focuses on teaching organizational members how to perform their current jobs and helping them acquire the knowledge and skills they need to be effective performers”.

To this end, training teachers aims primarily to perform their current jobs and helping them acquire the knowledge and skills they need to be effective performers will facilitate the process of the needed type of crops of youth the nation needs for sustainable development. They went further to say that “development on the other focuses on building the knowledge and skills of organizational members so that they will be prepared to take on new responsibilities and challenges. Adamolekun (1983) in Okotoni & John. (2005) said, “staff development involves the training, education, and career development of staff members’.

## **2.6 Conferences and Teachers’ Job performance**

Staff development programmes can by far influence the Job performance of teachers in many spheres, most especially where technocrats share ideas on new development. To the fact that dare (lecture note on school plant) opined that “nothing is permanent except change”. This signifies that, over time things may change as such researches must be conducted and new ideas be generated and shared. Okotoni and John (2005) believe that “training primarily focuses on teaching organizational members how to perform their current jobs and helping them acquire the knowledge and skills they need to be effective performers”.

Conference of teachers, aims primarily to enable the perform their current jobs and helps them acquire the knowledge and skills they need to be effective performers, which will facilitate the process grooming the needed type of crops of youth the nation needs for sustainable development. They went further to say that “development on the other focuses on building the knowledge and skills of organizational members so that they will be prepared to take on new responsibilities and challenges. Ezenne (1998) said that, “conferences are usually used to tackle a single or set of problems”. It may involve session of various types; such as lectures, panel discussions, workshops, etc.

Conference mostly comprises of different personalities in the field of education with bountiful of ideas. Robinson (1996) discussing the from and used of conferences, which the researcher adopted as one of the elements under training recognized its strength for conveying a message to a large audience, while seeking opportunity to hear and comment of view of recognized authorities. Teachers have access to a board range of ideas through conference which lead to enhanced Job performance. Kirsten (2007), emphasis that, generic professional development run with the school does not assist teachers to gain new ideas and resources to better support them in their roles as teachers of physical education. Attending a conference allows teachers to better demonstrate their professionalism, their understanding of the ongoing need for professional learning and the broader role of educators.

### **2.6.1 Attributes of Conference on Teachers' Job Performance**

There are many opportunities derivable through conference attendance by teachers. As such Kirsten (2007) Stated that conference attendance can also support teachers to better meet the need of their student consistently design to meet the needs of teachers in primary, secondary and tertiary sectors. It provides those in the profession with a range of learning opportunities, including:

1. Access to, and experience of, a range of innovative games and activities for use in a physical education programme;
2. Theory/practice sessions that assist in the developing knowledge of physical health education content, planning and delivery, relevant to curriculum and the needs of learners;
3. Ideas about ways to challenge, excite, and engage students in all areas of a Physical Education Program, including non-traditional aspects;

4. Keynote, presenters, and discussion forums that explore broader educational issues  
Evaluation of schools, teachers, curriculum and physical programme;
5. The latest information relating to national policy initiatives and developments;
6. Access to the wealth of knowledge etc.

## **2.7 Workshops and Teachers' Job Performance**

For many educators, staff development is synonymous with training, workshops, courses, and large group presentations. They are unaware that teachers and administrator learning can occur through means as diverse as collaborative lesson design, the examination of the student work, curriculum development, immersion in the work of mathematicians and scientists, case studies, action research, study groups and professional networks, to name a few such processes.

Through workshops, teachers are exposed to new skills which they may not necessarily acquire in the school. Herwell (2003) indicated that, "I will describe the characteristics of high quality-professional development and make a case for an unconventional approach to professional development that, all like "one short" workshops and in-service days, allows teachers to acquire and practice new skills over time".

Workshop can assist teachers acquire skills in various aspect of teaching and learning. Harwell (2003) Affirm that, for many educators, staff development is synonymous with training, workshops, courses, and large group presentations. They are unaware that teacher and administrator learning can occur through means as diverse as collaborative lesson design, the examination of student work, curriculum development, immersion in the work of mathematicians and scientist, case studies, action research, study groups, and professional networks, to name a few such progress.

Although staff development programmes are beneficial to teachers, there is little opportunities. Harwell (2003) stated that the problem to date has not been a lack of professional development opportunities per se. To the country, professional development for teachers has been included in every major initiative designed to improve student Job performance. The problem is that the quality of those programs has been inconsistent, and there has been no consensus on what constitutes quality. Many professional development activities stop short of producing their intended results; they point out problem with traditional teaching but offer little help in changing what happens in the classroom and provide no opportunities for participants to practice what they learn.

In order to ascertain the claim in the above paragraph, Harwell (2003) proffers that, professional development should; (1) deepen teachers' knowledge of the subjects being taught; (2) Sharpen teaching skills in the classroom; (3) keep up with developments in the individual fields, and in education generally; (4) generate and contribute new knowledge to the profession; and (5) increase the ability to monitor students' work, in order to provide constructive feedback to students and appropriately redirect teaching.

Workshop is a period of discussion and practical work on a particular topic/subject, when groups of people share their knowledge and experiences (Fazalur, Nabi, Ysmin, Saeed & Chisthi, 2013). The members of the workshop discuss and exchange views on a certain issue. The duration of the workshop may be from three to ten days depending upon the gravity of the problem.

According to scholars (Fazalur, Nabi, Ysmin, Saeed & Chisthi, 2013) there are various ways through which workshop can help individuals and groups improve professionally. Such ways include; consultants, mentors, and coaches. Consultants focus on answering the question, "what do you need to know?" A consultant could be an internal or external specialist called upon to

impart needed skills or knowledge that will move the school's program toward a particular goal. Generally the consultant is trained in a relatively narrow field of expertise and sees his/her role as a teacher who has a specific method or special knowledge, which can be taught, applied, and tested. Consultants frequently offer diagnostic tests following the consultancy that serve to measure one's level of professional proficiency in a particular field. For example, a consultant might be used to develop qualified teacher performance evaluators. Following the training experience, the knowledge and skills gained by each participant might be tested by having them evaluate the performance of a practicing teacher and then having their completed performance evaluation report compared with those of other experienced, qualified evaluators.

Coaches serve to help answer the question, "Where do you want to go?" Through the use of key listening techniques, coaches help guide the individual as he/she focuses on a desired career direction. By listening and asking key questions and encouraging action toward the individual's goal, the coach acts as a cheerleader by focusing on the present and future rather than on the past. Although coaches most often work with individuals on a one-to-one basis, there are team coaches who work with school teams such as assistant principals or teams of support personnel. An individual might work with a coach for a few months and find success or might choose to work with the coach over a longer period of time to gain ongoing insight into the individual's career.

### **2.7.1 Mandate of Training through Workshop in Katsina State**

Staff development programmes for teachers has been considered of paramount importance, which necessitated the establishment of college of Education Katsina and other teacher training colleges. However, due to the abolishing of grade II certificates and upgrading of teaching

qualification to NCE there is the absence of grassroots training that gives adequate training to teachers. That made it necessary for other staff development programmes.

Based on policy, the state government made several pronouncements as well as processes of upgrading teacher education. This led to the upgrading the college of Education Katsina from NCE to degree awarding institution in collaboration with Bayero University of Kano. Aminu (2012) said, “The ministry of (ministry of education Katsina) also recommended to the office of the head of civil service for sponsorship of 340 teaching staff to further their education in various institutions of higher learning in the country”.

On the other hand Aminu (2012) said, “the ministry procured 20 global positioning systems for mapping exercise at the cost of 1.4 million Naira and sponsored the training of 25 chemistry teachers at National Research and Chemical Technology Institute Zaria”. Such a gesture will definitely go a long way in repositioning as well as acquiring teachers with technical knowhow to groom good teachers as well as future generations. Dabo (2012) indicated, “Capacity building for teachers gained prominence under the Yuguda administration as 435 teachers received training on inclusive education” He again said, “As effort to improve girl child education, the board sponsored 530 female candidates for NCE training at the College of Education Daura at the cost of 15.7 million naira”.

These have indicated how the Katsina state has made commitments to resuscitate the educational system in order to remediate the lapses of educational backwardness the state suffered. Dabo (2009) stated that, “The Yuguda administration had at the onset, a priority to tackle head-on these challenges through the registration of teachers throughout the state, the recruitment of qualified teachers, general infrastructural development, the training, and re-training of teachers in



the education sub sector, immediate provision of teaching and learning materials and the revival of regular promotion of teaching and”.

In another vein, he said, “SUBEB is collaborating with the National Teachers Institute (NTI), through its NCE distance learning as well as NCE under the special teacher upgrading programme, to achieve the objective”. He went ahead to say that, “Having noted some lapses in the teachers attitude to work, inferior quality standards, the board engaged the services of some retired but not tired qualified teachers to serve as monitoring and evaluation officers across the state. This has drastically reduced the incidence of absenteeism and improved the quality of teaching in schools. The teams also advised the board on the training needs of teachers and other supervisory officials”.

Dabo (2010) indicated that, “A total of 524 junior secondary school teachers drawn” from across the number of Local Government in the state, will be receiving this unique training on Inclusive Education, the first of its kind since the introduction and implementation of the new 9- year basic education curriculum”.

He concluded by saying that, “I would also like to assure you that many and more re-training opportunities lie ahead for you”. The falling standard of education attributed to the northeastern part of the country was due to the decay in the educational system of the region. Dabo affirm thus, “Let me state that the falling standard of education in Nigeria as a whole can be attributed partly, to the total decay in the basic foundation of our educational system”. To enable the education system regains its lost glory concerted effort deliberately must be put in place through the utilization of various types of staff development programmes such as workshop, mentoring, conferences, seminars, in-service training etc.

Dabo (2010) states that, “The Bayero University Kano therefore, is saddled with the responsibility of improving the lot of the participants at this significant workshop by equipping them with the necessary knowledge and skills needed for proper teaching/learning of phonics”. He further stated that, “One of the ways to tackle this itching problem that bedevilled the education sector is the engagement of reputable training institutions with track record like Bayero University Kano which received the mandate to train the Federal Teachers Scheme (FTS) participants in the teaching and learning of phonics and oral English”. He concluded that, “Hence, relentless efforts are being made to support the UBE commission in addressing the shortage and inadequacy of qualified teachers in our basic education schools”.

## **2.8 Seminar and Teachers’ Job Performance**

Hornby (2014) defined seminar as any meeting for discussion or training. according to Lawal (2004), seminar for teachers is important aspects of education process that deal with the art of acquiring skills in the teaching profession. They are essential practices that enhance subject mastery, teaching methodology and classroom management. In seminars, small group of people meet to discuss a topic and each participant has the opportunity to gain knowledge and experience.

Studies conducted by Ntukidem and Etudor (2003) revealed great disparity between the job performance of teachers who participate in seminar and those who do not, in terms of lesson planning, classroom management, teaching methods and evaluation of students work. Teachers who were exposed to seminar were more effective in their job performance than those who were not. Implied in this finding is the fact that staff development plays a very important role in raising teachers’ teaching performance, raising the interest of the teachers towards the subject they are teaching and the teaching profession, as well as, raising their self confidence.

Similarly, researches conducted by Ntukidem and Etudor (2003), Garet (2001), Darling-Hammond (2000) and Zatta (2000) indicated that staff who were exposed to seminar performed more effectively in their classroom job than those who were not. Similarly, earlier finding by Cohen and Hill (2001) revealed that teachers whose training programmes focused on the curriculum taught well when what was learnt were applied in the classroom. Esu (1997) pointed out that the 2-3 years teacher preparation programmes are inadequate to prepare teachers for teaching job.

Provision of seminar is imperative in enhancing teachers' effectiveness in the discharge of their duties in the secondary school system. Teachers need to be regularly provided with opportunities for them to improve their knowledge of the subject they teach and the teaching skills they had acquired in the pre-service courses they offered. This is based on the recognition that we are living in a rapidly changing world such that whatever knowledge and skills teachers learnt in their pre-service training becomes stale very fast, just as new challenges and realities emerge in the socio-economic and political environment (Mohammed, 2006). To meet the needs of the changing world, there is need for continuous staff development programme. A well packaged staff development programme with current issues in education is likely to further equip teachers with more techniques and competences to discharge their duties effectively.

The important purposes of seminar as staff development process can be summarised as follows to:

1. provide planned staff development opportunities that provide the learning necessary to enable the employee to perform at the level of competency required in current and future position assignments. Staff development, from the foregoing perspectives, can be illustrated through the concepts of the Getzels-Guba (1957) social systems model. Each individual

employee has unique need dispositions based on personality factors. The institution has certain expectations for the purposes of the organisation and what it desires from each employee. The areas of agreement between personal needs and institutional expectations for the employee constitute areas of high potential for progress. Through the use of effective motivation and a system of rewards related to improved performance, personal development becomes an ongoing, continuous process.

2. foster a climate that facilitates personal self-fulfilment, institutional effectiveness, human creativity, and system renewal.
3. serve the school system's primary goals: enhancing and achieving quality teaching and learning for students.
4. safe money. It is costly to hire and then dismiss employees who do not work out. Its also costly to lose good employees because they are frustrated by the lack of opportunity for professional growth. It is wasteful to accept barely satisfactory work as the norm (NSBA, 1996). It is also wasteful not to provide opportunities that lead toward the objective of optimal development on the part of each individual.
5. establish viable and meaningful programmes that enable system personnel to work cooperatively toward achieving the system's goals and their own personal goals in the areas of achievement, satisfaction, and self-fulfilment. From the foregoing the researcher assessed the impact of Millennium Development Goals retraining programme on Chemistry teachers Job performance and Interest.

Seminar is a more rigorous activity that facilitates learning through presentations about a subject that a teacher teaches or interested in.. A seminar being a topic-oriented event is designed to educate, inform an audience about subject of interest, (Abutalib, 1993). A workshop or seminar may be for one, two or three weeks.

In such a programme, professionals (resources person from outside especially from universities and or ministries of education), come to present papers and answer questions posed by participants. Such a programme may allow time to the organizers of such programme give pre-programme test or questionnaires to participants to assess their entry knowledge or skill, and at the end of the programme, a post-test to assess what they have gained as a result of their participation in the training exercise.

### **2.8.1 The Need for Teachers' Seminar and Development**

It is evident that due to the situation the education system find itself; teachers Job performance has drastically reduced and teacher education is the hub of the education enterprise and the pivot of national development. Dajur and co (2010) identified the following needs for training and development:

- **Technology Advances:** The first four decades have witnessed unparalleled developments in industrial technology. The average company today is likely to be mechanizing or automating many of its processes. Many unskilled jobs are disappearing. If employees are to remain employed, they must engage in training programmes to upgrade themselves with the new processes and production techniques. In addition, as new management techniques and technical developments appear, highly-level employees need refresher courses.
- **Organizational Complexity:** Big organizations deal with extremely complex problems of coordination and integration of activities. Recent developments in information technology, especially the use of computers-promise to alleviate many of these problems, but require that training and re-training must be continuous at all levels in such organizations. When men are placed in unfamiliar situations, new supervisory and managerial skills are needed as they are

forced to coordinate their efforts with those of other men whose training, background and interests may be very different from their own.

- **Organizational Tenure:** college graduates are hired not because of their present management skills but for their potentials to become capable managers. All big companies have management development programme for qualified prospects. Trainee who are successful move on to higher levels of responsibility in the organization.

Nigeria as Ukeje (1995) posits that, can make use of the tremendous power of education, through quality teacher education, to tackle her numerous problems such ethnicity, indiscipline, corruption and greed, and by so doing achieve rapid national development. The quality and quantum of reforms that they can inculcate in a nations youths.

In Tahir (2005) words , “the revelation of UBE Monitoring and National Assessment Report of 2003 indicated that the in-service training and professional development of teachers cannot and should not be glossed over nor handled with levity”. He added that, “the rate and growth of unqualified teachers in the education sector portents great trouble for the country, if not tacked head-on. This means conscious effort have to be taken to tackle the problem”. This is why the in-service professional development programme should be of utmost importance in any education programme targeting quality. Training in education will give the secondary school teachers the viability to explore skills and competencies and utilize it optimally and maximally to enable them mould their students effectively.

Pauline (2013) indicated, “teachers need not only sound subject knowledge but also training on how to teach, particularly at early grades”.

The training programmes will give them the versatility to address and focus their experiences depending on the needs of the students as well as that of the society, which will in getting quality

education. Staff development programme will build confidence in the teacher and be gingered towards frequent challenged that the teacher may encounter. As a result of inadequate training, including over emphasis on theory rather than practice, many newly qualified teachers are not confident that they have the skills necessary to support children with more challenging learning need'. (Pauline, 2013)

In addition to that, Pauline (2013) said, “all teachers require continuing support once they reach the classrooms to enable them to reflect teaching practices, to foster motivation and to help them adapt to change, such as using a new curriculum or language of instruction. Ongoing training can also provide teachers with new ideas about how to support weak learners. Teachers who have received some in-service training are generally, found to teach better than those who have not, although it demands on the purpose and quality of the training.

In addition to the above assertion, NPE (1989) in Tahir (2005) put in that, “no matter the efficiency of the pre-service training we give to teachers, there will necessarily be areas of inadequacies. In-service education of teachers will continue to fill these gaps... and will be systematically planned so that successful attendance at a number of such courses will attract incremental credits and or count towards future advancement. USAID/NEI (2010) reveals that, availability of teachers is necessary but not a sufficient condition for the attainment of an educational objective. Training and refresher training is a major factor in ensuring that the teachers posses and polish their skills to enable them deliver quality education.

Lesly (1998) emphasized that, “increasing professional development is being recognized as crucial not only to the individual but also to the promotion of effective and efficient organization”. Beach, (1980) and Flippo, (1984) in Ojo, (1998) enumerated benefits of seminar training and development thus:

- a- it provides initial training for new employees, professional, technical, and other skills and some skilled personnel (induction training).
- b- It helps in training new employees without specific skills i.e. in form of apprenticeship training) remedial training).
- c- It helps in fulfilling specific work force needs. Example cover areas where there are difficulties in recruiting sufficient personnel e.g. computer programmes tool makers, machinist etc. Such shortages may lead an enterprise to establish its own training programme or sponsor training in other establishment.
- d- It provides opportunities to retain employed workers to perform new and changed jobs. This may be necessitated by technological changes or introduction of new products (in-service training).
- e- Training helps to acquire correct operation skills as such, it will solve operational problems viz: to reduce accidents e.g. training in proper use of equipments and in safety attitudes, inept supervision, poor customer service, and poor work methods,
- f- It keeps supervisors and managers up to date on the techniques of management and supervision.
- g- It encourages the professional development of workers and improves their benefits. Promotion training is an example of employee's knowledge and job skills gained through training increase their marketability and earning capacity, enhance their job security, poor Job performance if not affected by problems such as alcoholism, poor training received when recruited of supervisor's unwillingness to show the way in the inter case, transfer and training might turn poor Job performances good performers, and



- h- Increasing organizational flexibility and stability is another advantage of training. Flexibility relates to ability to adjust to short-run variations in volume of work while stability can sustain cooperativeness despite loss of some key personnel.

Through seminars and other development programmes above, the Katsina State Government has been doing a lot in order to ensure teachers are both up to date and possess the necessary skills to meet the challenges before them.

## **2.9 Mentoring and Teachers Job performance.**

As it is, training on the job is of paramount importance, this is mainly because many teachers learnt the art through senior colleagues without which they might face numerous challenges. OECD (2009), stated that, the main challenges facing beginning teachers are remarkably similar across countries, such as motivating students to learn, classroom management, and assessing student work. Induction and mentoring programmes may help new teachers cope with these challenges and combat early dropout from the profession. Mentoring is generally used to describe a relationship between a less experienced individual called a mentee or protégé and a more experienced individual known as a mentor. Mentoring is defined as a one-to-one relationship in which an expert or a senior person voluntarily gives time to teach, support and encourage another (Santamaria, 2003).

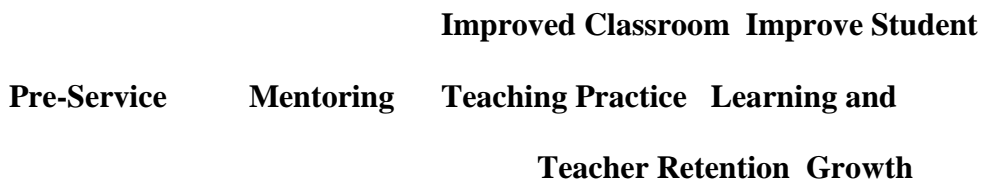
Thus, Mentoring passes on knowledge of subjects, facilitates personal development, encourages wise choice, and help the protégé to make transitions. In other research it is stated that most of the literature primarily examines mentoring in relation to individual career development, with the mentor as a friend, career guide, information source, and intellectual guide. This review promotes mentoring with peers where those in the mentoring relationship are colleagues. Both

participants in peer mentoring have been known to achieve a level of mutual expertise, quality and empathy frequently absent from traditional mentoring relationships (Zachary (2002).

In trying to indicate how mentoring and induction support the teacher, Gold, 1999; Hegsted, 1999; Feiman-Nemser 2001; Ganser, 2002, in Ingersoll R. and M. Gold (2011) Hence, this perspective continues, there is a necessary role for schools in providing an environment where novices are able to learn the craft and service and succeed as teachers. Another broader definition of mentoring is someone who helps a protégé learn something that he or she would have learned less well, more slowly, or not at all if left alone (Bell 2000). “All mentors are not supervisors or managers. But all effective supervisors and managers should be mentors. Mentoring must become that part of every leader’s role that has growth as its primary component” (Bell, 2000 p.2).

The goal of these support programs is to improve the Job performance and retention of beginning teachers, that is, to both enhance, and prevent the loss of, teachers’ human capital, with the ultimate aim of improving the growth and learning of students (see figure 1).

**Figure 1-theory of Teacher Development Preparation**



Every organization has its own tradition of inculcating knowledge its students. Harwell (2003), stressed that, collaborative, face-to-face professional learning and work are the hallmarks of a school culture that assumes collective responsibility for student learning. Dunst (1991) has suggested that mentoring consists of two elements: provide the experiences that increase self-

determination, freedom, making decision, and responsibility in the work place, and giving opportunity to the employees to show their abilities as well as learning skills that foster their functioning (Dunst, 1991). In the strategic Job performance mentoring model, the necessary elements for employees' mentoring in the organization includes: supervisor of colleagues modelling, mentoring of subordinates, and organizational development (Geroy, Wright, & Anderson, 1998).

Bowen & Lawler (1992) define mentoring as "Sharing with frontline employee's four organizational ingredients: information about organization's Job performance, knowledge that enables employees to understand and contributes to organizational Job performance" (p.32). Short and Rinehart (1992) identify six dimensions to mentoring to mentoring: decision making, Professional growth, Status, self-efficacy, autonomy, and Evaluation.

Many people may not have the opportunity to develop a mentoring relationship in an informal way. The organization has an investment in all its members and must develop each employee to the greatest extent possible. This is why formal mentoring programs are developed and operated within organizations. Formal mentoring is not as powerful as informal mentoring in some ways, but it is a process the organization should still pursue. The benefits are too important to pass up. The organization should develop a mentoring program that is well thought out implemented, with adequate resources.

There are benefits of mentoring for the protégé the mentor and the organization. Mentored individuals tend to enjoy more advancement opportunities and higher wages than their non-mentored counterparts (Nemanick, 2000). For the protégé one paper noted a number of positive factors. People tend to relate more readily and positively to peer assistance than to supervisory direction. Mentoring provides a non-threatening environment for learning and growth to occur,

Also, mentors and mentoring have a positive and powerful Evaluation on professional growth, career advancement, and career mobility for the protégé. Mentoring promotes six things a person moving into a management or leadership role must learn: (a) politics of organization, (b) norms, (c) Standards, (d) Values, (e) Ideology, and (f) History of the organization. This leads to increased job satisfaction (Williams, 2000).

There are also benefits for the mentor. Mentors share and take pride in their protégé's accomplishments, mentoring invigorates and renews their commitment to their job and their profession, and a legacy of the mentor is left (Williams, 2000). The benefits for the organization are both tangible and intangible. The organization benefits with more employees successfully completing their probationary periods. The mentoring creates enthusiasm, camaraderie, and professionalism, and Evaluations positively the entire culture of the organization, promoting organizational values, norms, and standards (Williams, 2000). Perrone (2003) states that mentoring should be seen as a critical element in helping the organization achieve its strategic goals. The reason for establishing a mentoring program must be linked to an organization's business goals. A benefit for the organization is that it gets a leadership team ready to accomplish its objectives (Benabou & Benabou, 2000). Mentoring improves employee Job performance, increases commitment to the organization, improves flow of organizational information, and supports leadership and management development.

## **2.10 Academic Performance in Chemistry**

Academic performance has been defined by various authors: Afuwape (2002) defined the term academic performance as the scholastics standing of a student at a given moment. It refers to how an individual is able to determine achievement in term of subject as a result of teaching and learning encountered. Academic performance is the outcome of education the extent to which a student teacher performed. Oxford English Dictionary (1989) defines academic performance as

“accomplishment, execution or working out of anything ordered or undertaking, doing of any action or work that could be mechanical either be poor or good and this can be ‘known in schools through examination or tests’ score. Student academic performance either positively or negatively has been known to, be a product of many factor such as intelligent, background, student ability, teachers’ personality among others.

Spinney believes that a learner whose academic performance fail to measure up to his support potential is regarded to have emotional black, a personal conflict or that his failure is due to social class factor have to get used to having their student (Suraj, 2002). Busari (2000) defined Academic Performance as the display of knowledge attained by students in the school subject. Poopola (2010), stated that, Academic Performance is an expression used to present students' scholastic standing and which is a function of a various factors such as method of teaching, teachers' qualifications, child's home background, school environment, interest, among others.

According to Okafor (2000), Academic Performance is based on the degree of intellectual simulation that the child could receive from learning situations. Obeka (2010) observed that the teacher plays a very crucial role in the development of achievement motive of the learners by providing a conducive environment for learning in and outside the class. The researcher added that, in a classroom environment where the standard are too low, boredom, poor morale, idleness and noisy behavior leading to poor Academic Performance can set in. WAEC, (2013); NECO, (2013), indicated that students' performance in chemistry is somewhat poor over the years. This has become a source of concern to stakeholders in education. According to previous studies, factors attributed to this poor Academic Performance includes, unsatisfactory man power, poor interest of students, utilization of inappropriate and uninspiring teaching methods in schools, poor quality school science teachers and school location (Akpan, 2001).

On relationship between gender and academic performance, Alpha (2007), in his research on Gender Disparity on Achievement in Mathematics of Senior Secondary School, revealed significant difference in the Academic Performance of boys and girls in mathematical concepts in favour of boys. Also, Usman (2007), conducted a study "relationship between students' Academic Performance and their Academic Performance in Biology using NISTEP mode of teaching. The researcher found that senior secondary male biology students perform well in any rigorous work than their female counterparts. In Obeka (2008), revealed that male students performed better than females in environmental education concepts of geography due to exposure to teaching. Contrarily, Mari, (2010) study on entry qualification and Academic Performance revealed that male and female students admitted with the same entry qualification have no difference in their Academic Performance. This study is related to the previous studies as it seeks to determine the effectiveness of staff development programme on students' academic performance. The study therefore assess if Millennium Development Goals retraining programme given to chemistry teachers has effect and their students' academic performance in Chemistry at secondary schools.

### **2.11 Interest and Teaching of Chemistry**

Interest is a state of mind or feeling of curiosity by an individual towards thing. Alibirni (2006) refers interest as feelings and beliefs held by an individual towards an object, event or a person or could be seen as a tendency to positively or negatively react in regards to an object. However, Erdemir and Bakirci (2009), sees interest as predisposition for individuals who organize thought, emotions, and behaviors towards psychological object. According to Sefereglu (2004) and Maio and Haddock, (2010) stated that Interests are related to coping with and management of the emotions occurring during learning process, and they play an important role in directing human

behavior. Koballa and Glynn (2007) define interests as a general expression of feelings towards something and include concepts such as opinions. In psychology, Kim and Song, (2009) stressed that interests composed of three components: cognitive, affective and behavioral which are set of beliefs about attributes of the interests object and its assessment is performed using Paper and pencil tests. The affective component includes feelings about the object and its assessment is performed by using psychological indices. Finally the behavioral component pertains two the way in which people ac toward the object and its assessment is performed with directly observed behavior. Studies examined the factors that are likely to enhances students' interests towards science and scientific literacy' which include teachers factor, school environment, availability and functionality of scientific instructional resources among others. Scholars such as Thompson and Soyibo, (2002) reported that hands-on activities have the potential to enhance positive interests and cognitive growth among students.

Gender is a determinant of interest as revealed by Osborne, Simon, and Collins, (2003). The researchers show that boys show more positive interests toward science than girls. And more negative interests are associated with the physical sciences rather than biological sciences (Dickson&Boyes, 2003). Rua (2000) showed that, unlike chemistry or physics, girls showed more positive interests toward biology than boys. This study also seeks to determine the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria

## **2.12 Interest and Academic Performance in Chemistry.**

The growing public anxiety about basic standard in schools especially in science subjects, though, has brought a steady increase in the number of students offering science subjects over the years. Academic and professional qualifications of teachers in science are among variables

that affect students' academic performance in sciences. Okebukola (2000) reiterated that the quality of any educational programme is a function of the quality of those who teach it. It was observed that teachers' effectiveness is measured by how successful a teacher can impart knowledge and how much the students achieve.

Akin (2006), also noted that any performance that expects excellence and high performance requires qualified and committed teachers. Ayodele (2009) suggested some factors that can contribute to the level of students' academic performance in science as follows: class size which he saw as a problem in the teaching of science, especially in biology class (Ayodele, 2009). The limitation on the provision of facilities for the effective teaching of science, also lowers the students performance every year. The problem also becomes critical in the attempt to expose students to laboratory practice work. Hence, it is important that science teachers should be sufficiently educated to face challenges and competition in learning techniques, to enable them interact fluently with the students and at the same time diagnose their difficulties easily, and manage the limited resources available in the laboratory for the large number of students. To these effect, students have carried out studies to investigate and elucidate the factors that may be responsible for the unfortunate situation.

Bajah (2006) traced some variables to the teachers and students; the learners' variables, being physical environments, intelligence and classroom behaviour. He pointed out that the degree at which they affect the students varies. The teachers' variables include training, experience, personality, ability to motivate, social class of the teachers, age, intelligence, sex and teaching methods. Akale (2000) founded that the implementation of science , technology and mathematics curriculum objectives in Nigeria depend on a strong arm of science and curriculum objectives. Akale further stated that the new instructional materials, no matter how attractive or soundly, it has to be based on psychological theory, however detailed or supportive cannot be effective



without the teacher. It is through an effective science teaching that students could be endowed with sound science culture. He went further to mention that the development of science culture in the society begins in the classroom, and teachers are key factors of these qualities. Effort should therefore be directed towards improving the training of teachers for better performance in science teaching.

Ayodele (2003) went further to talk about the approaches to science teachers, which he emphasis on the methods used by them in science teaching. He said that the ultimate aim of curriculum innovation and improvement is to implement and to impart the innovation to the users Namely: the teachers and students. However, considering the emphasis placed on educational changes nowadays, it is necessary to re-examine the potential factors that can affect the effectiveness, acceptability and favourable students' outcome of innovative science curricula of educational programme. Such factors could provide the necessary re-orientation for an intelligent approach to the task of improving and implementing curriculum in science teaching.

Shuaibu (2002) found that in a classroom practice, a science teacher needs to use one or more philosophy of science. That the basic ingredient of the philosophical basis of science teaching in this respect can be broadly viewed along this dimension. That is, teachers should understand the meaning and nature of science. Shuaibu further explained that the meaningful teaching of science is partly based on a clear understanding of the meaning and nature of science the teachers have; as effective teaching involves interaction between teachers and the students through practical and theoretical context.

Omotayo (2004) viewed attitude as mental and neutral state of readiness organized through experience of dynamic influence upon the individual, its response to all objects and situation with which it is related. He defines attitude as a state of preparedness or predisposition to learn or not to learn. Nwosu (2008) defines attitude as the sum total of man's feelings, prejudice or bias

ideas, fears, threats and conviction about any specific topic. He explained it as a state of readiness upon an individual's behaviour. These show that one's attitude towards a particular concept or idea reflects his feelings either positively or negatively towards that concept or idea. What teachers do in the classroom affects students' attitudes and performance levels of different abilities which when studied would cause a positive change in students' perception as highlighted by Davis (2004).

The National Policy on Education guidelines (FGN, 2004) for optional teaching of science and students' stated that science education is widely acknowledged as progressive and relevant to the changing needs of the 21<sup>st</sup> century. And that it is a training and in-service programmes which have contributed to a huge disparity between intended curriculum and its implementation. Students often feel class content is irrelevant and uninteresting with insufficient hands on activities, which in turns contribute to teachers' and students' dissatisfaction, thereby reducing the learning out-put and diminishing the interest of students in sciences. Ayodele (2005) emphasized that inter-relationships between the intended curriculum, its implementation and the teacher-students relationships are key factors accounting for changes in students attitudes towards science. He stressed that all factors need positive adjustment in attempts to improve students' reception of science education.

### **2.13 Concept and Nature of Impact Assessment**

Impact assessment has been variously defined by several authors, Robin (2005) defines impact assessment as a process aimed at structuring and supporting the development of policies. Also, Glen (2005) saw it as a term used to describe methods and processes when comprehensively describing advantages and disadvantages (pros and cons) from different actions and projects. Similarly, International Association for Impact Assessment (IAIA) (2011) saw impact

assessment as a process of identifying the future or present consequences or effects of a current or proposed action (which could be a programme, policy, project or a product).

From the forgoing, Impact Assessment (AI henceforth) could be defined as a systematic practice where assumptions, methods and results are presented in such a way that they can be tested. AI identifies and assesses the problems at stake and the objectives pursued. It also identifies the main options for achieving the objectives and analysis of their likely impacts (effects)in the teaching learning process.

In conducting impact assessment, the advantages and disadvantages of each option is outlined and possible synergies and trade-offs (AIAI, 2011). In view of Saddler (1996), as many elements as possible are to be included in an impact assessment, also those that are not quantified in monetary terms. However, Ridgway (2008) asserted that AI can be conducted in different fields or disciplines like Education, Environmental, Health and Psychology among others. No matter the discipline, the ultimate aim of AI is to determine or evaluate the effects of the program, projects or products on the target audience. The main aim of AI remains the same but the specific objectives of AI may vary depending on the discipline.

Maequis (2011) contended that AI is a fairly mature and formal activity in most organizations. Continuity, Marquis asserted that if AI is used effectively, it can proactively manage risks. Effectively and easily implemented, AI is not a panacea and does not totally replace existing procedures but tries to improve existing process. The overall goal of AI is to identify whether projects, products or policies have effectively achieved their planned goals. Results from AI will explain the overall effect (impact) on the target audience or group. Impact assessment remains crucial for increasing our understanding of what type of interventions perform well in various contexts in order to improve effectiveness (Wassenich & Whiteside, 2004). In assessing

the impact of a programme or a product, the following questions need to be answered:

- Who are to be reached, that is what is the target audience?
- What needs to be changed?
- To what extent is the change needed?
- How many people are to be reached?

In conducting impact assessment, the inputs which includes money, materials, time and personnel invested or needed to undertake the policy or project were weighed vis-à-vis the outputs which were the goods and services produced through such activities. Impact or effects of a programme or projects is determined in terms of the effects of the programme or projects on the target audience. In the context of impact assessment; effects referred to the changes in human behavior, practice and system, system changes can include institutional competency (like improved pedagogical skills in education system), policy change like new or revised policies or change of enforcement (Caldwell, 2002).

Similarly, Caldwell (2002) asserted that there were three fundamental components that can substantially improve any effort to assess programme impacts. They are:

- a. Inclusion of comparison group
- b. Collection of baseline data and
- c. Incorporation of mixed qualitative and quantitative methods in collection and analysis of data.

## **2.14 History and Development of National Teachers Institute (NTI)**

The National Teachers Institute Kaduna was established in 1976 by the Federal Government to aid teachers meet the requirement of the Universal Primary Education (UPE) (Okwo, Udo and Inyang, 2009). The NTI remains a key institute in the production of professional and functional, intermediate and lower level teaching workforce required for the nations educational system. It was the first institution formally established in Nigeria to offer courses via open Distance Learning Methods. According to Salim (2001), the Act No. 7 April 1978 establishing the institute is charged with the responsibility of providing course of institution leading to the development, upgrading and certification of teachers as specified in the relevant syllabus using distance education techniques.

The National Teachers Institute is a training as well as an examination body which currently runs three programmes in training, retraining and upgrading of unqualified and underqualified primary school teachers. In the words of Salim (2001) these programmes are the:

- i. Teachers Grade Two Certificate by Distance Learning (TC by DLS) leading to the award of Teachers Grade Two Certificate.
- ii. Nigeria Certificate in Education by Distance Learning System, leading to the award of Nigeria Certificate in Education (NCE) and
- iii. Pivotal Teachers Training Programme (PTTP) designed to produce teachers in the short term to meet the teacher-demand of the Universal Basic Education (UBE) Programme.

In addition to the aforementioned programmes, the institute equally runs a postgraduate Diploma in Education programme via distance learning method. This programme is aimed at training, retraining and upgrading of unqualified secondary school teachers who are graduates

or Higher National Diploma (HND) holders of other disciplines other than education.

The training programme is to meet the demand for secondary school teachers in the nations educational system to cater for the increasing students population. To achieve this laudable objectives, study centers across the country were established which were saddled with the responsibility of giving pedagogical training to the individuals who found themselves in the classroom without teaching qualification.

In the light of the above, it is clear that the NTI functions as a capacity building institute for teachers at the lower level of our educational system as amply demonstrated by the range of ongoing retraining programmes. Iliya (2005) indicated that the NTI was the only single mode institute (Distance Education Institute) in Nigeria, established to provide in-service education for teachers of different categories using Distance Learning System (DLS). According to Iliya, a single mode institute is an institution that is solely devoted to teaching at a distance.

### **2.15 History and Development of Millennium Development Goals (MDGs)**

In September 2000, 189 countries gathered at the United Nations in New York to conceive and sign the millennium declaration, a consensus agreement built around eight development targets to be met worldwide by 2015 (Sweet Land & mohammed, 2011). The Millennium Development Goals are a set of eight (8) time-bound, measurable targets that are meant to address extreme poverty in the world. The Millennium Development Goals aim to by 2015 substantially mitigate the effects of absolute poverty , in its various manifestations, including income poverty and hunger, poor access to education, gender inequality, child and maternal mortality, diseases like HIV/AIDS, tuberculosis and malaria, lack of adequate shelter, promoting environmental sustainability, and a global arena for development (Feese, 2006). Furthermore, the commitment

of the development efforts of poor countries through increased aid, debt relief and fair trade.

The Millennium Development Goals emphasize among others to drastically address issues of gender equality in education and improvement in access to education and health. However, despite the millennium declaration in the year 2000, observation shows that girl-child education in Nigeria is still receiving cold attention from government and some societies.

However, it is glaring that girls education is seen as the best investment in a country's development. Educated girls develop essential life skills, including self-confidence, the ability to participate effectively in the society and protect themselves from HIV/AIDS and sexual exploitation. Girls education also helps in reducing children and maternal mortality rates, contributes to national wealth and controls disease and health status. Children of educated women are more likely to go to school and consequently, this has experiential positive effects on education. (Idumange, 2011).

It is worth mentioning that all the eight (8) Millennium Development Goals objectives are interrelated and education is a cross-cutting issue without which the goals would not be attained (Mohammed, 2007). It is in response to the above assertion that the then President of the Federal Republic of Nigeria, Chief Olusegun Obasanjo directed that all gains from the Debt Relief grant from the Paris Club should be invested in MDGs related projects. The NTI was then mandated to implement a capacity-building programme for primary school teachers under the MDGs project for 2006. Hence, a total of 145,000 primary school teachers were trained nationwide with each state including FCT (Abuja) nominating between 2,500 and 4000 teachers for the training (Mohammed, 2007). The major objective of this training was to keep primary school teachers abreast with the innovative techniques required for their optimum conditions for effective classroom transactions.

The training focused on the innovative techniques of teaching the four core subjects of English Language, Mathematics, Science and Social Studies including school-based Assessment and improvisation of instructional materials within a period of six days. In the words of Nwifo (2009), the Millennium Development Goals have become a central focus of Nigeria's development strategy.

## **2.16 Review off Empirical Studies on NTI/MDG Teacher Training Workshop**

This subsection is devoted to reviewing some empirical studies conducted by other scholars who are related to the present study. Bulus (2010) studied the perception of facilitators and participants on NTI/MDG teachers training workshop in Mathematics. The study was aimed at ascertaining the opinions of facilitators and participants about the MDG training workshop. The study used a survey design. The study sampled 3 mathematics facilitators and 108 participants (who are mathematics teachers in their various schools) from one of the MDG training workshop centers in Bauchi State. The sample was selected based on convenience (that is those who were willing and ready to participate in the study). Data obtained were analysed using the mean and the chi-square for the research questions and the hypothesis. Results obtained showed that facilitators and participants have similar perceptions about MDG teachers training workshop in mathematics. The facilitators and participants perceived the training workshop to be worthwhile and necessary in improving the competence of mathematics teachers after the training. Some of the perceived constraints to effective MDG teacher training includes poor training environment, lack of zeal on the part of participants and inadequate remuneration for facilitators. The study recommended that the Federal Government should continue to introduce capacity building projects that will help upgrade Mathematics teachers professional competence as nation builders. The study therefore concluded that both the facilitators and participants see



the MDG teacher training workshop in mathematics at a worthwhile venture.

Similarly, Madumere (2011) appraised the NTI/MDG teacher training workshop for English language in Jos, Plateau State. The study was a descriptive survey; which aimed at appraising the role of NTI/MDG workshop in improving the teaching proficiency of English language teachers. Respondents to the interview were drawn from the 2011 MDG training workshop in Township School Center Jos. The Township School Center is one of three centers of the MDG workshop in Plateau state. The study sampled 50 participants and 4 facilitators randomly and used for the study. Data were collected using a performance checklist which was designed by the researcher and were responded to by the selected sample. They responded to the checklist by a tick at the appropriate columns of the checklist.

Sample percentage was used to analyse the data, Results showed that 80% of the selected samples were optimistic about the improvements in the pedagogical skills of teachers after the MDG training workshop. Again, 88% were affirmative that the NTI/MDG training workshop should be a continuous exercise even after 2015. The study based on the findings concluded that NTI/MDG teachers training workshop is a welcome development in Nigeria.

Moreover, Bienose (2011) worked on the impact of MDG training workshop on the pedagogical skills of Social Studies teachers. The study aimed at identifying how participation in the 2011 August MDG training workshop has improved the pedagogical skills of selected participants in Social Studies. The study sampled 20 MDG participants who were Social Studies teachers in their various schools in Benin City. Observation checklist consisted of six criteria which were used by the researcher to check their pedagogical skills as a means of obtaining data for the study. The criteria are set induction technique, lesson delivery, use of adequate instructional materials at the right time, connectedness to the different segments of the lesson and evaluation

of lesson. Each of the 20 participants was observed by the researcher and was rated (scored) based on the six criteria. The scores were converted to percentages. Result obtained showed that 17 (85%) out of the 20 teachers rated high in the checklist while only 3(15%) out of 20 were found to be on the average performance. In essence, the majority, (85%) of the participants of the MDG teacher training workshop were found to display improved pedagogical skills in social studies after exposure to MDG teacher training workshop. The study therefore recommended that other practicing teachers who have not been participating in the MDG teacher training workshops should be given an opportunity to participate. The study concluded that the MDGs teacher training workshop was effective in improving the pedagogical skills of social studies teacher. Looking at the three (3) empirical studies reviewed, it can be seen that they are very well related to the present study because each of them is on the NTI/MDG teacher training workshops as they affected the subject specialization of the teachers who participated in them.

### **2.17 Overview of Similar Studies**

The study focused on assessing the impact of Millennium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. To that effect, a study titled “Staff development programmes and secondary school teachers’ Job performance in Uyo metropolis, Nigeria” was conducted by Ekpo et al (2001). The study used 2,250 as a sample for the study, out of which 450 were teachers and 1,800 were students. The researcher adopted descriptive survey research design and collected the data using two types of questionnaires; Staff Development Programmes Questionnaire (SDPQ) for teachers and Teachers Job Job performance Questionnaire (TJPQ) for students. The study examined an issue related to staff development programmes in Nigerian Secondary Schools, And

the finding showed that teachers who were exposed to staff development programmes such as seminars, workshops, educational conferences, symposiums etc., were more effective in their jobs. Relatively, a research was conducted by Fredrick, Ngala & Stephen (2009) titled: "Teachers Perceptions of staff development as it relates to teachers' effectiveness; A study of rural primary schools in Kenya" the research used descriptive survey design with a sample of 100 secondary school teachers. The Linkert Scale questionnaire was used for the collection of data; and t-test at 0.05 level of significance was used to test hypotheses. The result has shown that; participation in staff development programmes such as seminars, workshops, educational conferences, symposiums etc. have evaluationed positively on teacher's effectiveness.

Afolabi (2013), examined the influence of gender, age, training and experience of secondary school teachers on their motivation in Ado and Efon Local Government Areas in Ekiti State. The descriptive research design of the survey type was used for study. The population consisted of all the teachers in Ado and Efon Local Government Areas in Ekiti State. The sample comprises 500 teachers from 18 secondary schools in the two local government areas. Stratified proportional random sampling was used to select the sample for the study. A selfdesigned questionnaire tagged "Questionnaire on Teachers' Gender, Age , Training and Experience and Conditions of Service" (QTGATECS) was used to collect the data for the study. The data were analyzed using frequency counts, percentage scores, t-test. The hypotheses were tested at 0.05 level of significance. The result shows that there was no significant difference in the motivation of male and female, untrained and trained, experienced and inexperienced teachers. However, there was a significant difference between young and old teachers in their motivation. Afolabi carried out this study in Ado Ekiti, this study was carried out in Daura Katsina state.

Khan (2008) conducted a study to examine the impact of training through Secondary Science

Education Project (SEP II) in Tehsil Sawabi, Islamabad. The study was aimed to evaluate the effectiveness of in-service teacher training programme of secondary science education project for secondary school teachers using a sample of 120 teachers. Survey design was adopted for the study. Data were gathered using questionnaire and analyzed with frequency count. Result of the study revealed that this training resulted in an improvement in the content knowledge, delivery skills, laboratory management skills and professional interest of in-service secondary school teachers. This study will be carried out in Daura Katsina state to determine the effectiveness of workshop and seminar on teachers job performance in chemistry.

Hussain, (2004) conducted a similar research to study the performance of trained primary school teachers with and without in-service training in Hazara Division in Islamabad. The main focus of the study was to evaluate the effectiveness of in-service training programmes using a sample of 220 teachers. Survey design was adopted for the study. Data were gathered using through observation of the performance of both, trained and untrained teachers and analyzed with percentage score. Result of the study revealed that primary teachers, trained through different in-service teacher training programmes, were better in performance, then the untrained teachers. The study assessed the performance of primary school teachers; however, the present study is set to evaluate the job performance of secondary school Chemistry teachers in Katsina state.

Kheyrollah and Ebrahim, (2012) investigated the influence of in-service training among employees of Universities of Bilesavar and Parsabad. In the, study research method is cause-comparison which aims to measure the effect of in-service training on improving staff performance in the universities of Bilesavar and Parsabad. The research population in focus is all employees of universities of Bilesavar and Parsabad from which 140 people have been chosen using random sampling in accordance with Morgan table. In order to collect data a researcher-

made questionnaire form based on Likert five-alternative scale has been used. Data collected were analyzed in both descriptive and inferential methods (F test) using SPSS 18 software. The results show that in-service training has influential effect on employees' personal abilities and organizational abilities, their knowledge level, their professional knowledge, and their promotion. Kheyrollah and Ebrahim, (2012)'s study assessed the performance of employees of Universities exposed to in-service training; however, the present study is set to assess the job performance of secondary school teachers exposed to workshop and in-service training in Katsina state.

Muhammad, and Tariq (2013) conducted study to evaluate the impact of in-service training on the professional competence of science teachers at secondary level in New Delhi. All the science teachers of secondary schools constituted the population of this study. A questionnaire for science teachers was developed to explore the nature of in-service training and its effect on professional competence of science teachers. Data analyses revealed that the in-service training has a significant impact on the professional competence of science teachers at secondary level. However, the present study is set to assess the job performance of secondary school chemistry teachers exposed to workshop and in-service training in Katsina state.

## **2.18 Implication of Literature Reviewed for the Present Study**

Hammond (2006) investigated the methods employed in training programme and include the following; Case Study Method, Consultation, Coaching, Communities of Practice, Lesson Study, Mentoring, Reflective Supervision and Technical Assistance. This study has some implication to the present study as it used seminar and conferences as training programme.

Uduak, Aniefiok and Inyang (2013) conducted a study to investigate the influence of staff

development programmes on secondary school teachers' job performance in Uyo Metropolis, Nigeria. A single hypothesis guided the study. Findings showed that teachers who participated in staff development programmes were more effective in their job performance than those who did not, in terms of knowledge of subject matter, classroom management, teaching methods and evaluation of student's work. This study is set to either confirm or disprove the earlier findings.

Alabi (2014) investigated the relevance of staff development programmes to staff performance in the school system and indicated that the different methods used in developing staff in schools include induction, conferences workshops and seminars. Others are staff meetings, visits and demonstrations, professional training and higher studies. Development programmes need to be organised for teachers - to improve their instructional methodology; school heads to acquire skills relating to their job of overseeing and directing; and support staff to acquire necessary skills for improved performance at work. Based on the highlighted relevance of staff development programmes as prime vehicles for improving staff performance in schools, some relevant suggestions were made. These suggestions relate to the responsibility of the individual staff to seek self-improvement, and that of the school authority and the employing body to make such improvements possible.

Paul and Silas (2015) investigate the effects of staff development programs on the job performance of lecturers of Plateau State Polytechnic Barkin-Ladi. The study objectives were: to examine the influence of training on the job performance of lecturers of Plateau State Polytechnic Barkin-Ladi and to establish the effect of promotion on the job performance of lecturers of Plateau State Polytechnic Barkin-Ladi. A sample of one hundred and fifty two respondents was randomly chosen from the six schools to take part in the study. It had been presumed that in spite of the staff development programs which have been on-going, the

performance of lecturers has not been satisfactory and thereby making it difficult for the institution to achieve its goals for which it was set in 2014. The results of the study were analyzed using the Pearson linear correlation method in SPSS. The analysis showed that there is very significant relationship between job performance and staff development programs. Promotion was found to be very significantly related to job performance and so was the number of training programs attended by the lecturers. The findings and conclusions were that training has a positive effect on job performance and that promotion, followed by a clear promotion criterion enhances job performance of lecturers.

Of all the literatures cited, none of the study was set to analyse the importance of MDG workshop and seminar on gender, job performance in terms of application of appropriate teaching method, selection and utilisation of instructional resources such as ICT as well as evaluation procedure for the attainment of behavioral objectives in teaching Chemistry in Daura Educationa Zone, Katsina State,

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This study aimed at evaluating the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. In this chapter, the methodology is presented under the following subheadings:

#### 3.2 Research Design

#### 3.3 Population of the Study

#### 3.4 Sample and Sampling Procedure

#### 3.5 Instrumentation

##### 3.5.1 Validity of Instruments

##### 3.5.2 Pilot Testing

##### 3.5.3 Reliability of Instruments

#### 3.6 Data Collection Procedure

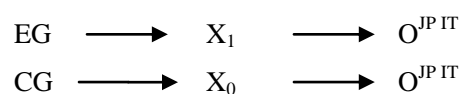
#### 3.7 Procedure for Data Analysis.

#### **3.2 Research Design**

This study employed one-shot case quasi-experimental research design involving two groups. The first group are teachers exposed to Millennium Development Goals retraining programme (EG) while the second group comprises teachers who were not exposed to any Millennium



Development Goals retraining programme (CG) prior to this study. The two groups were allowed to teach Chemistry students for five week period. An observation of their performance were made using adopted version of Egglestone science Teachers' Observation Schedule (ETOS) developed by Eggleston in 1975 used by Usman (2012). A questionnaire was administered to determine the effectiveness of training on Chemistry teachers' interest towards Chemistry teaching. Similarly, students were tested to examine whether the training programme had impact on their academic achievement in Chemistry. The design was prescribed by Kerlinger (1973) and used by scholars such as Usman (2012) and Musa (2013). The research design of the study is represented in Figure 3.1:



**Figure 3.1: Research Design**

**Source:** Adapted from Musa (2013)

**Key:**

1<sup>st</sup> group EG = Experimental Group

2<sup>nd</sup> group CG = Control group

$X_1$  = Exposure To MDGs Training

$X_0$  = Non Exposure to MDGs Training

$O^{\text{JP IT}}$  = Job Performance and Interest

JP = Job Performance

IT = Interest

### 3.3. Population of the Study

The population for this study covered all Chemistry teachers in public Senior Secondary Schools of Daura educational Zone. The zone comprises six local governments with population of 79 Chemistry teachers (50 male 29 female), 36 secondary schools. The schools

are public, owned by government and operate similar curriculum. Detail is presented in Table 3.1

**Table 3.1: Population of the Study**

| S/N          | LGA     | No. of Schools | No. of Chemistry Teachers |           |           |
|--------------|---------|----------------|---------------------------|-----------|-----------|
|              |         |                | Male                      | Female    | Total     |
| 1            | Baure   | 5              | 9                         | 6         | 15        |
| 2            | Daura   | 10             | 14                        | 6         | 20        |
| 3            | Ingawa  | 5              | 8                         | 3         | 11        |
| 4            | Maiadua | 5              | 7                         | 3         | 10        |
| 5            | Sandamu | 6              | 6                         | 7         | 13        |
| 6            | Zango   | 5              | 6                         | 4         | 10        |
| <b>Total</b> |         | <b>36</b>      | <b>50</b>                 | <b>29</b> | <b>79</b> |

**Source:** (Katsina State Ministry of Education, 2017)

### 3.4 Sample and Sampling Technique

The sample of this study consists of all the 79 Chemistry teachers in Daura Education zone. Kerlinger (1973) stated that when the population is not much, the researcher is free to select the entire population to form the study sample. This is reinforced by Usman (2016) who suggested that researcher can use the whole population in his sample. Similarly, purposive sampling technique was used in determining who should form the experimental and control group. The detail of the sample selected is presented in Table 3.2

**Table 3.2: Sample of the Study**

| S/No         | LGA     | Teachers Exposed to Training |           |           | Teachers Not Exposed to Teaching |           |           | Total     |
|--------------|---------|------------------------------|-----------|-----------|----------------------------------|-----------|-----------|-----------|
|              |         | Male                         | Female    | Total     | Male                             | Female    | Total     |           |
| 1            | Baure   | 4                            | 3         | 7         | 5                                | 3         | 8         | 15        |
| 2            | Daura   | 9                            | 4         | 13        | 5                                | 2         | 7         | 20        |
| 3            | Ingawa  | 5                            | 2         | 7         | 3                                | 1         | 4         | 11        |
| 4            | Maiadua | 3                            | 2         | 5         | 4                                | 1         | 5         | 10        |
| 5            | Sandamu | 3                            | 3         | 6         | 3                                | 4         | 7         | 13        |
| 6            | Zango . | 3                            | 2         | 5         | 3                                | 2         | 5         | 10        |
| <b>Total</b> |         | <b>27</b>                    | <b>16</b> | <b>43</b> | <b>23</b>                        | <b>13</b> | <b>36</b> | <b>79</b> |

### 3.5 Instrumentation

This study used three instruments namely; Adapted version of Egglestone Science Teachers' Observation Schedule (ETOS) developed by Eggleston in 1975 and Usman (2012) to assess the Job Performance of Chemistry teachers, Chemistry Teachers' Interest Questionnaire and the Chemistry for students. The Egglestone Science Teachers' Observation Schedule (ETOS) is Performance Test an instrument adopted for use in this study consisting of 22 items covering teaching methodology, selection of instructional resources and evaluation procedure. The instrument is in form of Likert scale with four points namely; poor, well, good and excellent. On the other hand, Chemistry Teachers Interest Questionnaire (CTIQ) consisted of 15 items regarding issues at stake in the teachers' interest towards teaching of Chemistry. The questionnaire is in Likert five point scale form consisting Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagree. Similarly, Chemistry Performance Test (CPT) consisting of 30 multiple choice test items to determine the academic performance of the students in Chemistry was used.

### **3.5.1 Validity of the Instruments**

The two instruments (ETOS), (CTIQ) and (CPT) were presented to three lecturers in the Department Of Science Education, Faculty of Education, Ahmadu Bello University, Zaria for validation. The experts are Ph.D holders with minimum rank of senior lecturers. A copy of the developed instrument each was submitted to each lecturer requesting him to study the instrument and certify if the questions were considered to be testing the study subject; language use based on the ability level of chemistry teachers; content selected based on the objectives of the study; and clarity and unambiguosness of the statement.

### **3.5.2. Pilot Testing**

Pilot-testing of the three instruments, Egglestone Science Teachers Observation Schedule(ETOS) adopted from Egglestone (1975), Usman (2008), Chemistry Teachers Interest to Chemistry Teaching Questionnaire (CTIQ) and Chemistry Performance Test (CPT) was conducted using Chemistry Teachers 20 in number from two secondary schools in Mani Educational Zone which was not part of the study sample. The schools are Government Day Secondary School Mani and Pilot Secondary School Mani. The principle of the pilot test is to find out the reliability of the instruments. The teachers were given the instruments to respond to freely.

### **3.5.3. Reliability of the Instruments (ETOS), (CTIQ) and CPT**

The three instruments for data collection in this study i.e. Egglestone Science Teachers Observation Schedule (ETOS), Chemistry Teachers Interest to Chemistry Teaching Questionnaire (CTIQ) and Chemistry Performance Test (CPT) were subjected for reliability

test. The method used for the first two was split-half employing odd-even number procedure and analysed using Spearman's Rank Brown Correlation Coefficient Statistic. The r-values recorded are  $r=0.79$  for (ETOS) and  $r= 0.67$  for (CTIQ). While for the third instrument CPT, the reliability test used was test-retest and analyzed using Pearson Product-Moment Correlation Coefficient (PPMCC). The r-value recorded was 0.87. These show that the instruments are reliable for data collection for study.

### **3.6 Data Collection Procedure**

The administration and collection of data were carried out by the researcher and with the help of research assistants. The research assistants are of two categories. Second, categories are trained research assistants who monitor the conduct of teaching. Distribution of the instruments were done by the researcher without the help of any research assistants in each of the schools selected for the study. The results were collated and recorded based on trained teachers and untrained teachers' scores.

### **3.7 Procedure for Data Analysis**

This section focus on application of appropriate statistical technique and procedure for answering research questions and testing of hypotheses.

#### **3.7.1 Answering Research Questions**

Descriptive statistics of mean and standard deviation, sum of rank and mean rank were used in answering all the research questions as follows:

1. What was the difference in the teachers' job performance between Chemistry teachers

exposed to and those not so exposed to Millennium Development Goal programme in terms of application of instructional techniques in Senior Secondary School Chemistry?

Mean and standard deviation of teachers' performance in terms of application of appropriate instructional techniques in Chemistry teaching helped in answering this research question.

2. What was the difference in teachers' job performance between Chemistry teachers exposed to and those not so exposed to Millennium Development Goal programme on application of instructional materials in Chemistry teaching in secondary schools of Katsina state?

Mean and standard deviation of teachers' job performance in terms of application of appropriate instructional materials in Chemistry teaching helped in answering this research question.

3. What was the difference between teachers' job performance exposed to Millennium Development Goal programme on application of evaluation procedure for the attainment of behavioral objectives in Chemistry teaching and those who were not exposed in secondary schools of Katsina state?

Mean and standard deviation of teachers' job performance exposed to Millennium Development Goal programme in terms of application of evaluation procedure for the attainment of behavioral objectives in Chemistry teaching and those who were not in

secondary schools was used in answering this research question.

4. What was the Difference in the interest of teachers towards Chemistry teaching between those exposed to Millennium Development Goal programme and those not exposed in secondary schools of Katsina state?

Mean rank and sum of rank of interest of teachers' towards Chemistry teaching was used in answering this research question.

5. What is the difference between male and female teachers' job performance exposed to Millennium Development Goal programme in Chemistry teaching in secondary schools of Katsina state?

Mean and standard deviation of male and female teachers' job performance in Chemistry teaching was used in answering this research question.

6. What is the difference in the academic performance of chemistry students taught by teachers who were exposed to Millennium Development Goal programme and those taught by teachers who were not exposed to in secondary schools of Katsina state?

Mean and standard deviation of academic performance of chemistry students taught by teachers who were exposed to Millennium Development Goal programme and those taught by teachers not exposed in secondary schools of Katsina state were used in answering this research question.

### 3.7.2 Testing Research Hypotheses

The null hypotheses stated for this study were analysed as follows:

**H<sub>01</sub>:** There is no significant difference in the job performance in terms of application of appropriate instructional techniques between teachers who attended Millennium Development Goal programme and those who did not in secondary schools of Katsina state.

t-test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

**H<sub>02</sub>:** There is no significant difference in the job performance in terms of selection and application of instructional materials between teachers who attended Millennium Development Goal programme and those who did not in secondary schools of Katsina state.

t-test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

**H<sub>03</sub>:** There is no significant difference in the job performance in terms of application of evaluation procedure for the attainment of behavioral objectives between teachers who attended Millennium Development Goal programme and those who did not in secondary schools of Katsina state.

t-test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

**H<sub>04</sub>:** There is no significant difference in the interest of teachers' towards Chemistry teaching between teachers who attended Millennium Development Goal programme and those



who did not in secondary schools of Katsina state. Wilcoxon Sign test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

**H<sub>05</sub>:** There is no significant difference between male and female teachers' job performance who attended Millennium Development Goal programme in secondary schools of Katsina state.

t-test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

**H<sub>06</sub>:** There is no significant difference in the academic achievement of chemistry students taught by teachers exposed to Millennium Development Goal programme and those taught by teachers not exposed in secondary schools of Katsina state.

Wilcoxon Sign test statistics at  $p \leq 0.05$  was used in testing null hypothesis formulated.

## **CHAPTER FOUR**

### **DATA ANALYSIS, RESULT PRESENTATION AND DISCUSSION**

#### **4.1 Introduction**

In this chapter, the result obtained from the analysis of the data collected and presented.

The chapter is presented under the following sub-headings.

4.2 Data Analysis and Result Presentation.

4.3 Summary of Findings

4.4 Discussion of the Findings

#### **4.2 Data Analysis and Result Presentation**

The study Assesses the impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 20. A total of 79 Chemistry teachers, of which 43 were exposed to the training while 36 were not exposed to the training. A total of six research questions were answered using descriptive mean statistic, and six research hypotheses were tested using t-test, the Non Parametric testWilcoxon sign test. All hypotheses were tested at  $P \leq 0.05$  level of significance. Summary of findings were drawn from the results of the study also as well as the recommendations.

The data collected were analysed as follows:

#### 4.2.1 Demographic Characteristics

Demographic data analysis is presented as follows:

**Table 4.1.1: Distribution of Respondents by their Treatment Groups**

| Group                            | Frequency | Percentages   |
|----------------------------------|-----------|---------------|
| Teachers Exposed to Training     | 43        | 54.43         |
| Teachers not Exposed to Training | 36        | 45.57         |
| <b>Total</b>                     | <b>79</b> | <b>100.00</b> |

Table 4.2.1.1 shows the teachers distribution on the basis of their treatment groups in the study. A total of 43 or 54.43 % of the chemistry teachers were exposed to the training, while 36 or 45.57 % were not exposed to the training.

**Table 4.1.2: Distribution of Teachers by Gender.**

| Groups       | Gender (%) | Male (%)      | Female (%)    | Total          |
|--------------|------------|---------------|---------------|----------------|
| Experimental |            | 26<br>(52.5%) | 17<br>(47.5%) | 43<br>(100.0%) |
|              |            | (31.3%)       | (57.6%)       | (40.0%)        |
| Control      |            | 23<br>(53.3%) | 13<br>(46.7%) | 36<br>(100.0%) |
|              |            | (23.9%)       | (42.4%)       | (30.0%)        |

Table 4.1.2 shows that among the chemistry teachers exposed to the training, male teachers were 26 or 52.5% while the remaining 17 or 47.5% were females. Among the teachers not exposed to the training Control, male teachers were 23 or 53.3% while the remaining 13 or 46.7% were females.

#### 4.2.2 Answering Research Questions

**4.2.2.1 Research Question One:** What is the difference between teachers' job performance of Chemistry teachers exposed to Millennium Development Goals

programme and those not so exposed to in terms of selection and application of instructional techniques in Chemistry teaching in secondary schools of Katsina state?

For answering research question one, a descriptive statistics of mean and standard deviation of teachers Performance in terms of application of appropriate instructional techniques in Chemistry teaching were used. The result is presented in Table 4.2.1

**Table 4.2.1: Descriptive Statistic of Mean Difference in Chemistry Teachers' Job Performance among chemistry teachers Exposed Millennium Development retraining programme and the not Exposed Groups.**

| Teachers (Group)     | N  | Mean  | Std. Deviation | Mean Diff. |
|----------------------|----|-------|----------------|------------|
| Teachers Exposed     | 43 | 65.61 | 7.67           | 15.00      |
| Teachers not Exposed | 36 | 50.61 | 7.42           |            |

Table 4.2.1 revealed that differences existed in the selection and application of instructional materials in Chemistry teaching in secondary schools among teachers exposed to the training with their counter parts not exposed to the training, their calculated mean job performance scores were 65.61, and 50.61 respectively with mean difference of 15.00 in favour of those exposed to Millennium Development Goals (MDGs) programme.

**4.2.2.2 Research Question Two:** What is the difference of teachers' job Performance on Chemistry teachers exposed to Millennium Development Goals (MDGs) programme and those not so exposed to in terms of selection and application of ICT instructional materials in Chemistry teaching in secondary schools of Katsina state?

**Table 4.2.2: Descriptive Statistic of Mean Difference in Chemistry Teachers' Job Performance on Application of ICT Materials among the Groups**

| <b>Teachers (Group)</b> | <b>N</b>  | <b>Mean</b>  | <b>Std. Deviation</b> | <b>Mean Diff.</b> |
|-------------------------|-----------|--------------|-----------------------|-------------------|
| Teachers Exposed        | 43        | 63.61        | 7.67                  |                   |
| Teachers not Exposed    | 36        | 48.61        | 7.42                  | 15.00             |
| <b>Total</b>            | <b>79</b> | <b>53.68</b> | <b>12.93</b>          |                   |

Table 4.2.2 shows that differences existed in the selection and application of ICT instructional materials in Chemistry teaching in secondary schools among teachers exposed to the training with their counter parts not exposed to the training with calculated mean job performance scores of 63.61, and 48.61 respectively. The mean difference of the two is 15.00 in favour of those exposed to the Millennium Development Goals (MDGs) programme.

**4.2.2.3 Research Question Three:** What will be the difference between teachers' job performance exposed to Millennium Development Goals (MDGs) programme in terms of application of evaluation procedure for the attainment of behavioral objectives in Chemistry teaching and those who were not in secondary schools of Katsina state?

To answer research question three, the mean and standard deviation of teachers' job performance exposed to Millennium Development Goals retraining programme in terms of application of evaluation procedure for the attainment of behavioral objectives in Chemistry teaching and those who were not in secondary schools were used.

**Table 4.2.3: Descriptive Statistic of Mean Difference in Teachers' Job Performance on Evaluation Procedure among the Groups**

| Teachers (Group)     | N  | Mean  | Std. Deviation | Mean Diff. |
|----------------------|----|-------|----------------|------------|
| Teachers Exposed     | 43 | 53.16 | 7.76           | 13.00      |
| Teachers not Exposed | 36 | 40.16 | 7.24           |            |

Table 4.2.3 indicates that differences existed in the Millennium Development Goals retraining programme of staff on instructional materials in Chemistry teaching in secondary schools among teachers exposed to the training with their counter parts not exposed to the training, their calculated mean job performance scores were 53.16, and 40.16 respectively with a mean difference of 13.00 in favour of those exposed to MDG.

**4.2.2.4 Research Question Four:** How did the interest of teachers towards Chemistry teaching differ due to exposure to Millennium Development Goals (MDGs) programme in secondary schools of Katsina state?

To answer research question four, the mean rank and sum of rank of interest of teachers towards Chemistry teaching were used.

**Table 4.2.4: Mean Ranking Analysis of Difference of Interest among Teachers Exposed and those not Exposed Group**

| Teachers (Group)     | N         | Mean Rank | Mean Rank Diff. |
|----------------------|-----------|-----------|-----------------|
| Teachers Exposed     | 43        | 69.46     | 7.33            |
| Teachers not Exposed | 36        | 62.13     |                 |
| <b>Total</b>         | <b>79</b> |           |                 |

The result in Table 4.2.4 Shows that differences existed in the interest level of teachers exposed to MDG training towards towards Chemistry teaching in secondary schools. The calculated mean ranking level of teachers interest were 69.46, and 62.13 for teachers exposed to the training and those not exposed respectively with mean rank difference of

7.33. This implies that the experimental group teachers possess significantly higher interest level than their counterparts not exposed to the training.

**4.2.2.5 Research Question Five:** What is the difference between male and female teachers' job Performance exposed to Millennium Development Goals (MDGs) programme and those not exposed in Chemistry teaching in secondary schools of Katsina State?

To answer research question five, the mean and standard deviation of male and female teachers' job Performance in Chemistry teaching were used.

**Table 4.2.5 Descriptive Statistic of Mean Difference among the Experimental and Control Groups by Gender**

| <b>Strategy Group</b> | <b>Sex</b> | <b>N</b> | <b>Mean</b> | <b>Mean Difference</b> | <b>Mean Diff.</b> |
|-----------------------|------------|----------|-------------|------------------------|-------------------|
| Teachers Exposed      | Males      | 26       | 64.14       | 23.29                  | 3.09              |
|                       | Females    | 17       | 67.23       | 26.38                  |                   |

Table 4.2.5 revealed that there existed a significant difference in the scores of teachers exposed to the MDGs programme with the mean score of 64.14 for males and 67.23 for females with a mean difference of 3.09 in favour of the females. This shows that the females have a higher job performance than their male counterparts.

**4.2.2.6 Research Question Six:** What is the differences in the academic performance of chemistry students taught by teachers who were exposed to MDGs programme and those taught by teachers not exposed in secondary schools of Katsina state?

To answer research question six, the mean and standard deviation of academic performance of chemistry students taught by teachers who were exposed to MDGs programme and those taught by teachers not exposed in secondary schools of Katsina State were used.

**Table 4.2.6: Mean Ranking Statistics on the Mean Ranking of Students Achievement Taught by chemistry Teachers Exposed to MDGs Programme and those Taught by Teachers not Exposed.**

| <b>Group</b>         | <b>N</b> | <b>Mean</b> | <b>Sum of Score</b> | <b>Mean Diff.</b> |
|----------------------|----------|-------------|---------------------|-------------------|
| Teachers Exposed     | 43       | 36.36       | 1478.50             | 1.56              |
| Teachers not Exposed | 36       | 34.88       | 1306.50             |                   |

The result in the Table 4.2.6 revealed that there is difference in the mean ranking of students taught by teachers who were exposed to Millennium Development Goals retraining programme as staff development programmes and those taught by teachers who were not exposed. Their calculated mean rankings are 36.36 and 34.88 respectively. Their calculated mean rank difference is 1.56 in favour of students taught by teachers exposed.

### **4.2.3 Testing of Null Hypotheses**

**Hypothesis One Ho<sub>1</sub>.** There is no significant difference in the job Performance in terms of application of appropriate instructional techniques between chemistry teachers who attended Millennium Development Goals retraining programme and those who did not in secondary schools of Katsina state.

To test null hypotheses one, the t-test statistics at  $p \leq 0.05$  was used.



**Table 4.3.1 t-test Analysis of Difference in the Teachers' Job Performance in Terms of Application of Appropriate Instructional Techniques between chemistry Teachers Exposed to MDGs Programme and those not Exposed**

| Variable             | N  | Mean  | St. Deviation | Df | p-value | Decision              |
|----------------------|----|-------|---------------|----|---------|-----------------------|
| Teachers Exposed     | 36 | 42.86 | 12.49         | 77 | .000    | Reject H <sub>0</sub> |
| Teachers not Exposed | 43 | 54.80 | 12.97         |    |         |                       |

Significance at  $P \leq 0.05$

Table 4.3.1 presents the result-of t-test in respect of hypothesis 1 (H<sub>01</sub>). The degree of freedom stood at 77 for the two groups at probability value of .000 at 0.05 alpha-value

Going by the decision rule, with p-value calculated 0.00 being less than alpha-value of  $P \leq 0.05$ , the hypothesis under question is rejected. Therefore, hypothesis 1 (H<sub>01</sub>) was rejected which implies that there is significant difference in the job Performance in terms of application of appropriate instructional techniques between teachers who attended Millennium Development Goals retraining programme and those who did not.

**Hypothesis Two Ho:2:** There is no significant difference in the job Performance in terms of selection and application of instructional materials between Chemistry teachers exposed to Millennium Development Goal chemistry teachers retraining programmes and those who not exposed in secondary schools of Katsina State.

To test null hypotheses two, the t-test statistics at  $p \leq 0.05$  was used. The result is presented in Table 4.3.2.

**Table 4.3.2 t-test Analysis for difference in the job Performance of Teachers in Terms of Selection and Application Instructional Techniques between Teachers Exposed to Millennium Development Goals retraining programme and those not Exposed.**

| Variable             | N  | Mean  | St. Deviation | Df | p-value | Decision              |
|----------------------|----|-------|---------------|----|---------|-----------------------|
| Teachers Exposed     | 36 | 42.86 | 12.49         | 77 | 0.000   | Reject H <sub>0</sub> |
| Teachers not Exposed | 43 | 54.87 | 13.30         |    |         |                       |

Significant at  $p \leq 0.05$

Table 4.3.2 presents the result of t-test in respect of hypothesis 2 (H<sub>02</sub>). The degree of freedom stood at 77 for the two groups, the probability value of .000 at 0.05 alpha-value, Going by the decision rule, with p-value being less than alpha-value, the hypothesis under question is rejected. Therefore, hypothesis 2 (H<sub>02</sub>) was rejected which implies that there is significant difference in the job Performance in terms of selection and application of appropriate instructional techniques between teachers who attended MDGs programmes and those who did not.

**Hypothesis Three H<sub>0:3</sub>** There is no significant difference in the job Performance in terms of application of evaluation procedure for the attainment of behavioral objectives between Chemistry teachers who were exposed to MDGs programme and those not exposed in secondary schools of Katsina state.

To test null hypotheses three, the t-test statistics at  $p \leq 0.05$  was used.

**Table 4.3.3 t-test Analysis for Difference in the Job Performance in Terms of Application of Evaluation Procedure for the Attainment of Behavioral Objectives between teachers exposed to Millennium Development Goals retraining programme and those not exposed to.**

| Variable             | N  | Mean  | St. Deviation | Df | p-value | Decision              |
|----------------------|----|-------|---------------|----|---------|-----------------------|
| Teachers Exposed     | 36 | 42.86 | 12.49         |    |         |                       |
| Teachers not Exposed | 43 | 56.79 | 9.33          | 77 | 0.000   | Reject H <sub>0</sub> |

Significant at  $p \leq 0.05$

Table 4.3.3 presents the result oft-test in respect of hypothesis 3 (Hos). The degree of freedom stood at 77 for the two groups, the probability value is0.000 at  $p \leq 0.05$  alpha-value

Going by the decision rule, with p-value of 0.000 being less than alpha-value of  $p \leq 0.05$ , the hypothesis is rejected. Therefore, hypothesis 3 (Ho3) was rejected which implies that there is significant difference in the job Performance in terms of application of evaluation procedure for the attainment of behavioral objectives between teachers exposed to Millennium Development Goals retraining programme and those not exposed to.

**Hypothesis four Ho:4**There is no significant difference in the interest of teachers' towards Chemistry teaching between chemistry teachers exposed to Millennium Development Goal chemistry teachers retraining programmes and those not exposed in secondary schools of Katsina state.

To test null hypotheses four, the Wilcoxon Sign test statistics at  $p < 0.05$  was used.

**Table 4.3.4: Wilcoxon test Analysis of Difference in the Attitude of Teachers' towards Chemistry teaching between those exposed and those not Exposed.**

| Groups               | N  | Mean Rank | Df | P     | Remark |
|----------------------|----|-----------|----|-------|--------|
| Teachers Exposed     | 43 | 695457.48 |    |       |        |
|                      |    |           | 77 | 0.001 | S      |
| Teachers not Exposed | 36 | 58.14     |    |       |        |

Significant at  $p \leq 0.05$

Tables 4.3.4 revealed that significant differences existed in the attitude of teachers' towards Chemistry teaching between teachers who attended Millennium Development Goals retraining programme and those who did not, since the calculated p value of 0.001 was found to be less than the  $p \leq 0.05$  alpha level of significance. Hence, the hypothesis is rejected. This implies that significant difference existed in the interest of teachers towards Chemistry teaching between those exposed to MDGs programme and those not exposed.

**Hypothesis five  $H_{05}$ :** There is no significant difference between male and female chemistry teachers' job performance who attended Millennium Development Goal chemistry teachers retraining programmes in secondary schools of Katsina state.

To test null hypotheses five, the t-test statistics at  $p \leq 0.05$  was used.

**Table 4.3.5: t-test Analysis for Difference between Male and Female Teachers' JobPerformance of those Exposed to MDGs Programme**

| Variable       | N  | Mean  | St. Deviation | Df | p-value | Decision              |
|----------------|----|-------|---------------|----|---------|-----------------------|
| <b>Males</b>   | 26 | 64.14 | 12.49         | 77 | .000    | Reject H <sub>0</sub> |
| <b>Females</b> | 19 | 67.23 | 12.97         |    |         |                       |

Significant at  $p \leq 0.05$

Table 4.3.5 presents the result of t-test in respect of hypothesis 5 (H<sub>05</sub>). The degree of freedom stood at 77 for the two groups, the probability value is 0.00 at 0.05 alpha-value. Going by the decision rule, with p-value being less than alpha-value, the hypothesis under question is rejected. Therefore, hypothesis 5 (H<sub>05</sub>) was rejected which implies that there is significant difference between male and female teachers' job performance who attended Millennium Development Goal chemistry teachers retraining programmes and those who did not. Female teachers gained in the MDG more than the male teachers.

**Hypothesis Six H<sub>06</sub>:** There is no significant differences in the academic performance of chemistry students taught by chemistry teachers who were exposed to Millennium Development Goal chemistry teachers retraining programmes and those taught by teachers who were not exposed to in secondary schools of Katsina state. To test null hypotheses six, was tested using t-test statistics at  $p \leq 0.05$ .

**Table 4.3.6: t-test Analysis of Mean Academic Performance Scores of Students Taught by Teachers Exposed to MDGs Programme and those not Exposed.**

|        | <b>Teacher groups</b>            | <b>N</b> | <b>Mean Rank</b> | <b>Df</b> | <b>P</b> | <b>Remark</b> |
|--------|----------------------------------|----------|------------------|-----------|----------|---------------|
| Groups | Students of Teachers Exposed     | 43       | 62.13            | 77        | 0.001    | S             |
|        | Students of Teachers not Exposed | 36       | 59.46            |           |          |               |

Significant at  $p \leq 0.05$

The outcome of the t test analysis in Table 4.3.6 shows that significant mean difference exist in the Academic Performance of students taught by teachers who were exposed to Millennium Development Goal chemistry teachers retraining programmes and those taught by teachers not exposed. Since the calculated p value of 0.001 was found to be less than the  $p \leq 0.05$  alpha level of significance the null hypothesis six which states that there is no significant difference in the academic performance of chemistry students taught by teachers who were exposed to Millennium Development Goal chemistry teachers retraining programmes and those taught by teachers not exposed was rejected. This means that the Chemistry students taught by teachers exposed to Millennium Development Goal chemistry teachers retraining programmes performed significantly better than the Chemistry students of teachers not exposed in favour of the Chemistry students whose teachers were exposed to Millennium Development Goal chemistry teachers retraining programmes.

#### 4.2.4 Summary of the Findings

At the end of data analysis, the following Major findings were obtained.

1. The analysis of the post test revealed that the experimental group chemistry students taught by teachers who were exposed to Millennium Development Goal chemistry teachers retraining programmes performed significantly better than those taught by chemistry teachers who were not exposed.
2. The result obtained revealed a significant difference' between male and female chemistry teachers' job Performance who attended Millennium Development Goal chemistry teachers retraining programmes and those who did not in terms of their performance.
3. The result obtained revealed a significant change in the interest of chemistry teachers' towards Chemistry teaching between chemistry teachers who attended Millennium Development Goal chemistry teachers retraining programmes and those who did not.
4. The analysis of the job Performance in terms of application of evaluation procedure for the attainment of behavioral objectives between chemistry teachers who attended Millennium Development Goal chemistry teachers retraining programmes improved significantly than those who were not exposed to the training.
5. The analysis revealed that chemistry teachers' job performance exposed to Millennium Development Goal chemistry teachers retraining programmes in terms of application of evaluation procedure for the attainment of behavioral objectives in

Chemistry teaching improved significantly than those who were not exposed to the training.

6. The analysis revealed that chemistry teachers' job Performance in terms of application of appropriate instructional techniques between teachers who attended Millennium Development Goal chemistry teachers retraining programmes significantly improved more than those who were not exposed to the training.

#### **4.5 Discussion of Results**

The study generated primary data with the aid of Chemistry Teachers' Interest in Teaching Chemistry Questionnaire (CTIQ) and adopted Egglestone Science Teachers Observation Schedule (ETOS) while the secondary data were obtained from Chemistry Performance Test (CPT).

From the findings, in Table 4.3.1 the experimental group performed significantly better than the control group at 0.05 in their post test scores. This showed chemistry teachers who were exposed to Millennium Development Goals retraining programme performed better than teachers who were not exposed to the Millennium Development Goals retraining programme in terms of application of instructional techniques. This result supports the observation by Anderson (2007), that academic performance can be enhanced through effective teaching strategies. Lawson (2000) had shown that time spent on teaching students the scientific skills result in gains in their academic performance. The strategies encourage, students to independently state hypothesis, design testable experiments, identify and control variables, collect and interpret data. These require thinking skills which did positively affect the students' academic performance. This is consistent with the



findings of Pardhan and Wheeler (2008), Ashraf and Rarieya (2008), Soonye and Oliver (2008) and Ashang (2012) which in separate studies supported the view that SDGs retraining of teachers improved development of teachers' pedagogical skills in basic science teachers.

The findings in Table 4.3.2 showed that, there is a significant difference at 0.05 confidence level between the mean scores of the teachers that attended the Millennium Development Goal chemistry teachers retraining programmes and those who did not in terms of the application of instructional materials. This is supported by Aksela (2005) who explained that a method that directly involves the students as active participants enable them take responsibility for their learning and thus effectively construct their own knowledge. Lavonen (2004) states that the teaching of chemistry is potentially effective in the teaching and learning process by making it more relevant and more attractive to the science student. The method emphasizes that the planning, teaching and assessment are focused on the need and abilities of the learners. Ezeliora (2010) says that each learner is active in the class. Also the findings of Gandu (2006) and Iliya 2001) who both found out in their studies that students exposed to teaching of sciences employing an appropriate instructional method could enhance ability and learning chemistry.

The findings in Table 4.3.3 also indicated a significant difference in the mean scores of the job performance of the chemistry teachers exposed to Millennium Development Goal chemistry teachers retraining programmes and those not exposed to the Millennium Development Goals retraining programme in terms of application of evaluation procedure for the attainment of behavioral objectives. This agrees with Zohar (2002) that the use of

appropriate evaluation process enhances teaching learning process and consequent learning. The findings agree with the findings of Etiubon and Udeme (2013) and Appollonia, Ebere and Oyetola (2013) who in similar study reported that retraining of teachers conducted by sustainable development goals has positive influence on teachers' attitude in upper basic science.

Table 4.3.4 revealed that significant difference existed in the interest of chemistry teachers towards the teaching of chemistry between those exposed to Millennium Development Goals retraining programme and those not in favour of those exposed. The finding is in agreement with the finding of Etiubon and Udeme (2013) and Apollonia, Ebere and Oyofela (2013) who in similar studies reported that retraining of teachers conducted by SDG had positive influence on teachers' attitude. The study agrees with the findings of Dhindsa and Cheung (2009), Dawson, (2007), Salta and Tzougraki (2004), Osborne and Collins (2000), Simpson and Oliver (2004), Neathery (2005) whose studies showed that the teachers who have more positive attitude towards teaching basic science would be more successful pupils in science classrooms.

Table 4.3.5 shows that there is difference in the score of the male and female chemistry teachers that attended the Millennium Development Goals retraining programme in favour of the female. This agrees with the studies of Bilesanmi-Awoderu (2002), and Erinoosho (2005) that the issue of gender is an important one in science education especially with increasing emphasis on ways of boosting manpower for technological development as well as increasing the population of females in science and technology fields. The findings of this study does not agree with the finding agree with the findings of

researchers such as Bilesanmi-Awoderu (2002), Erinoshio (1997a & 1997b), Erinoshio (2005), Kennedy (2000) who said there is a strong association between gender and response to science education.

Table 4.3.6 shows that students taught by chemistry teachers exposed performed better than those not exposed. This result is supported by Santillan (2008) that the effect of teachers' pedagogical skill is positive on pupils' academic achievement.

## CHAPTER FIVE

### SUMMARY, CONCLUSION, AND RECOMMENDATIONS

#### 5.1 Introduction

The study Impact of Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. This chapter is presented as follows

5.2 Summary

5.3 Major Findings

5.4 Conclusions

5.5 Contribution to Knowledge

5.6 Recommendations

5.7 Limitations of the Study

5.8 Suggestions for Further Studies

#### 5.2 Summary

The study assessed Millenium Development Goals Retraining Programme on job Performance and Interest among Chemistry Teachers in Daura Educational Zone, Katsina, Nigeria. It investigated the effects of gender-related differences on teacher job performance in Chemistry concepts of teachers exposed to Millenium Development Goals Retraining Programme and those not exposed to the training. The sample of this study consisted of all the 79 Chemistry teachers in Daura Education zone from 36 secondary schools comprising 50 male and 29 female of which 43 were exposed to the Millenium

Development Goals Retraining Programme while 36 were not exposed to the training. A total of six research questions were answered using descriptive mean statistic, and six research hypotheses were tested using t-test and the Non Parametric test of Wilcoxon sign test. All hypotheses were tested at  $P \leq 0.05$  alpha levels of significance. The schools are public, owned by government and operate similar curriculum. This study used three instruments namely; Adapted version of Egglestone Science Teachers' Observation Schedule (ETOS) developed by Eggleston in Usman (2012) to assess the Job Performance of Chemistry teachers, Chemistry Teachers' Interest Questionnaire for data collection and the Chemistry Performance Test for students. The Egglestone Science Teachers' Observation Schedule (ETOS) is an instrument adopted for use in this study consisting of 22 items covering teaching methodology, selection of instructional resources and evaluation procedure. The instrument is in form of Likert scale with four points namely; poor, well, good and excellent. On the other hand, Chemistry Teachers Interest Questionnaire (CTIQ) consisted of 15 items regarding issues at stake in the teachers' interest towards teaching of Chemistry. The results indicated that the experimental group who were taught Chemistry by the teachers exposed to the MDG training achieved significantly higher and had better retention of learned concepts than the students of teachers not exposed to MDGs programme. Using the t-test statistical package at  $p \leq 0.05$ , Wilcoxon Test, the results obtained were presented and discussed. This study has the following major findings.

### 5.3 Major Findings

The followings are the summary of the major findings

1. Significant differences exist in the job performance in terms of application of appropriate instructional techniques between chemistry teachers who attended Millennium Development Goals Retraining Programme and those who did not in favour of those exposed to the programme.
2. Significant difference exist in performance between male and female chemistry teachers that there is significant difference in the job Performance in terms of selection and application of appropriate instructional techniques between teachers who attended Millennium Development Goals Retraining Programme and those who did not in favour of those who attended.
3. Significant differences exist in the job performance in terms of application of evaluation procedure for the attainment of behavioral objectives between chemistry teachers who attended Millennium Development Goals Retraining Programme and those who did not in favour of those who attended.
4. Significant difference exist in the interest of chemistry teachers' towards Chemistry teaching between teachers who attended Millennium Development Goals Retraining Programme and those who did not as those who attended the Millennium Development Goals retraining programme performed significantly better than those who did not in favour of those who attended.
5. Significant difference exist between male and female chemistry teachers' job performance who attended Millennium Development Goals Retraining Programme in favour of the female teachers.
6. There is significant difference in the academic performance of chemistry students taught by chemistry teachers who were exposed to Millennium Development Goals Retraining Programme and those taught by teachers not exposed in favour of students taught teachers exposed to the programme.

## **5.4 Conclusion**

From the findings of this study, the following conclusions were drawn

1. Staff exposed to the Millennium Development Goals Retraining Programme performed better than their counterpart that were not exposed to the training in term of selection of instructional techniques.
2. Staff exposed to the Millennium Development Goals Retraining Programme performed better than their counterpart that were not exposed to the training in terms of selection and application of appropriate instructional materials for teaching Chemistry concept.
3. Staff exposed to the Millennium Development Goals Retraining Programme performed better than their counterpart that were not exposed to the training in terms of application of evaluation procedure for the attainment of behavioral objectives.
4. Staff exposed to the Millennium Development Goals Retraining Programme performed better than their counterpart that were not exposed to the training in the interest of teachers' towards Chemistry teaching.
5. Female staff exposed to the Millennium Development Goals Retraining Programme performed better than their male counterparts that were exposed to the training based on the male and female chemistry teachers' job Performance.
6. Academic performance of chemistry students taught by teachers who were exposed to Millennium Development Goals Retraining Programme was better than those taught by chemistry teachers not exposed.

## **5.5 Contribution to knowledge**

The following are contribution to knowledge for this study:

1. The research was able to establish empirical sciences on credibility of Millennium Development Goals Retraining Programme as it affect teaching of Chemistry at

secondary schools in Katsina State. The product of the Millennium Development Goals Retraining Programme is followed into the classroom after the training.

2. The research also provided highlight on the measuring specific objectives to be achieved by the Chemistry teachers exposed to Millennium Development Goals Retraining Programme such as skill of introduction teaching strategy.
3. The research was able to establish the present situation of conducting Millennium Development Goals Retraining Programme as it affects Chemistry teachers' performance and also as it affects the chemistry students' performance.
4. Also interest of teachers towards teaching of Chemistry when exposed to Millennium Development Goals Retraining Programme was investigated which was done by the stake holders at the Millennium Development Goals retraining programme. But this study was able to carry out a product evaluation of chemistry students exposed to the Millennium Development Goals retraining programme in a classroom situation.
5. Also follow-up investigation of teachers inside the classroom by making on-the-spot observation on assessing how the implementation of those skills they were trained upon is another break through. This will allow stake holders to have empirical evidences to see whether the chemistry teachers were able to implement what they were exposed to in the training in the actual classroom practice.



## **5.6 Recommendations**

Based on the findings of this study, the following recommendations were made:

1. Science teaching especially in Chemistry should adopt Millennium Development Goals Retraining Programme.
2. Seminars, workshops and conferences should be organized by federal, states and local government councils, on how to use the best strategies in teaching Chemistry concepts.
3. Chemistry teachers in Katsina state should be given priority to teaching methods that will increase the attitude to their academic performance like the Millennium Development Goals (MDGs) retraining programme.
4. Adequate equipments should be provided by the federal and state government for sciences most especially Chemistry department for teaching and learning of practical activities in the subject.
5. Curriculum planners like Nigerian Educational Research and Development Council (NERDC) and the other body of curriculum, should take this into consideration.
6. Stakeholders in the Millennium Development Goals (MDGs) programme should utilize the findings of the study for improvement of the programme.

## **5.7 Limitations of the Study:**

The following limitations were noted in the course of this study

1. The study was restricted to Science students particularly Chemistry in government owned school; the geographical coverage was Daura Education Zones of Katsina state, this limiting generalization made from the study.
2. Ability to contact teachers clearly teachers exposed to staff development programme was a tedious task, this research had found out those trackers and able to meet some of them.

## 5.8 Suggestions for Further Studies

The following suggestions are put forward in this study.

1. Similar study should be carried out on senior secondary schools and science subjects like mathematics, Basic science, physics and biology.
2. Similar study could be carried out at the tertiary institutions such as Colleges of Education (C.O.E.), Polytechnics, Mono techniques and Universities.
3. There is need for further investigation on the role of gender difference play, in the interaction between applications and selections of appropriate instructional materials and attitude of teachers on Millennium Development Goals retraining programme.
4. The mode of instruction should therefore, be predominantly activity oriented, learner-centered and process-based teaching" that would aid effective transition from low to achievers, promote retention and its potential to enhance achievement in Chemistry as reveled in the study among other Science subjects.

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## APPENDICES

### Appendix A CHEMISTRY TEACHERS INTEREST CHEMISTRY TEACHING QUESTIONNAIRE (CTAQ)

| S/N  | Items on attitude of Chemistry   | S | A | U | D | SD |
|------|--|---|---|---|---|----|
| 1.   | I found teaching chemistry easier after my training  |   |   |   |   |    |
| 2.   | After my training Chemistry teaching is interesting to me  |   |   |   |   |    |
| 3.   | Some students found chemistry easier, after my training  |   |   |   |   |    |
| 4.   | I used a lot of teaching materials to teach chemistry due to my  |   |   |   |   |    |
| 5.   | Based on my training I was able to understand learning needs of  |   |   |   |   |    |
| 6.   | After the training my teaching strategies were based on activity-                                      |   |   |   |   |    |
| 7.   | [ cater for individual differences in teaching chemistry after the                                     |   |   |   |   |    |
| 8.   | [ understand and use improvised materials in teaching chemistry<br>Dased on the training received      |   |   |   |   |    |
| 9.   | My mode of students evaluation in chemistry has improved due to  |   |   |   |   |    |
| 10.  | Questioning techniques I used make the students better in learning<br>chemistry due to my training     |   |   |   |   |    |
| 11.  | My students are motivated in learning chemistry after my training                                      |   |   |   |   |    |
| 12.  | Due to my training I was able to explain chemistry concept in a  |   |   |   |   |    |
| 13.  | [ used more activity based methods in teaching chemistry after the                                     |   |   |   |   |    |
| 14.  | My students performance was improved after the training  |   |   |   |   |    |
| 15.  | After the training my students find it free to ask questions during                                    |   |   |   |   |    |
| 16.  | My skill of explanation in teaching chemistry after the training                                       |   |   |   |   |    |
| 17.  | After the training my technique of introduction in teaching<br>chemistry was improved                  |   |   |   |   |    |
| 18.  | My subjects content mastery teaching chemistry has improved  |   |   |   |   |    |
| 19.  | My skill of variation of the lesson procedure in teaching chemistry                                    |   |   |   |   |    |
| 20.  | My logical arrangement of the lesson was enhanced in teaching<br>chemistry after the training received |   |   |   |   |    |
| *21. | 3ased on the training received, I can construct and use improvise<br>materials in teaching chemistry   |   |   |   |   |    |
| 22.  | My training received made me happy in teaching chemistry   |   |   |   |   |    |

## Appendix B

### Egglestone Science Teachers Observation Schedule (ETOS)

| S/N | Period interval | Teaching skills e.g. application of instructional materials |              |
|-----|-----------------|---|--------------|
|     |                 | Observed  | Not observed |
| 1.  | 0-3             |   |              |
| 2.  | 4-7             |   |              |
| 3.  | 8-11            |   |              |
| 4.  | 12- 15          |   |              |
| 5.  | 16-19           |   |              |
| 6.  | 20-23           |   |              |
| 7.  | 24-27           |   |              |
| 8.  | 28-31           |   |              |
| 9.  | 32-35           |   |              |
| 10. | 36-39           |   |              |
|     | <b>Total</b>    |   |              |

Adapted: Kherlinger, 1973 and Usman, 2002

## Appendix C

### Chemistry Performance Test (CPT)

1. The nucleus of an atom consists of
  - A. electrons and neutrons
  - B. electrons and protons
  - C. protons and neutrons
  - D. All of the above
2. The number of moles of solute present in 1 kg of a solvent is called its
  - A - Molality
  - B - Molarity
  - C - Normality
  - D. – Formality
3. The most electronegative element among the following is
  - A. Sodium
  - B. Bromine
  - C. Fluorine
  - D. Oxygen
3. The metal used to recover copper from a solution of copper sulphate is
  - A. Na
  - B. Ag
  - C. Hg
  - D. Fe
5. The number of d-electrons in  $\text{Fe}^{2+}$  ( $Z = 26$ ) is not equal to that of
  - A. p-electrons in Ne ( $Z = 10$ )
  - B. s-electrons in Mg ( $Z = 12$ )
  - C. d-electrons in Fe ( $Z = 26$ )
  - D. p-electrons in Cl ( $Z = 17$ )
6. The metallurgical process in which a metal is obtained in a fused state is called
  - A. Smelting
  - B. Roasting
  - C. Calcinations
  - D. froth floatation

7. The molecules of which gas have highest speed?
- A.  $\text{H}_2$  at  $-73^\circ\text{C}$
  - B.  $\text{CH}_4$  at  $300\text{K}$
  - C.  $\text{N}_2$  at  $1,027^\circ\text{C}$
  - D.  $\text{O}_2$  at  $0^\circ\text{C}$
8. The oldest rocks in the earth's crust were once molten, and came from deep inside the earth. The molten rock, called magma, spewed out in volcanic eruptions during the earth's early life and solidified into hard rock's called
- A. Granite
  - B. Basalt
  - C. igneous rocks
  - D. sedimentary rocks
9. The law which states that the amount of gas dissolved in a liquid is proportional to its partial pressure is
- A. Dalton's law
  - B. Gay Lussac's law
  - C. Henry's law
  - D. Raoult's law
10. The main buffer system of the human blood is
- A.  $\text{H}_2\text{CO}_3 - \text{HCO}_3^-$
  - B.  $\text{H}_2\text{CO}_3 - \text{CO}_3^{2-}$
  - C.  $\text{CH}_3\text{COOH} - \text{CH}_3\text{COO}^-$
  - D.  $\text{NH}_2\text{CONH}_2 - \text{NH}_2\text{CONH}^+$
11. The gas present in the stratosphere which filters out some of the sun's ultraviolet light and provides an effective shield against radiation damage to living things is
- A. Helium
  - B. Ozone
  - C. Oxygen
  - D. Methane
12. The most commonly used bleaching agent is
- A. Alcohol
  - B. carbon dioxide
  - C. Chlorine
  - D. Sodium chlorine
13. The nucleus of a hydrogen atom consists of
- A. 1 proton only
  - B. 1 proton + 2 neutron
  - C. 1 neutron only
  - D. 1 electron only
14. The heat required to raise the temperature of body by 1 K is called

- A. specific heat
  - B. thermal capacity
  - C. water equivalent
  - D. None of the above
15. The nuclear particles which are assumed to hold the nucleons together are
- A. Electrons
  - B. Positrons
  - C. Neutrons
  - D. Mesons
16. The mass of  $P_4O_{10}$  that will be obtained from the reaction of 1.353 gram of  $P_4$  and 5.07 of oxygen is
- A. 2.05 gram
  - B. 3.05 gram
  - C. 4.05 gram
  - D. 5.05 gram
17. The octane number of zero is assigned to
- A. 2-methyl octane
  - B. n-heptane
  - C. iso-octane
  - D. 3-methyl octane
18. The metal that is used as a catalyst in the hydrogenation of oils is
- A. Ni
  - B. Pb
  - C. Cu
  - D. Pt
19. The most abundant rare gas in the atmosphere is
- A. He
  - B. Ne
  - C. Ar
  - D. Xe
20. The Latin word *formica* means ant. The name formic acid is derived from this Latin word because
- A. this acid, in ancient times, was used to eliminate ant-hills
  - B. this corrosive acid is secreted by ants to drive away their enemies
  - C. this acid was first obtained by the distillation of ants
  - D. ants are attracted by the odour of this acid
21. The ore which is found in abundance in India is
- A. Monazite
  - B. Fluorspar

- C. Bauxite  
D. Magnetite
22. The inherited traits of an organism are controlled by  
A. RNA molecules  
B. Nucleotides  
C. DNA molecules  
D. Enzymes
23. The heat energy produced when the human body metabolises 1 gram of fat is  
A. 30 KJ  
B. 1 KJ  
C. 39 KJ  
D. 29 KJ
24. What are the number of moles of CO<sub>2</sub> which contains 16 g of oxygen?  
A. 0.5 mole  
B. 0.2 mole  
C. 0.4 mole  
D. 0.25 mole
25. The main use of salt in the diet is to  
A. make the taste of food better  
B. produce in small amounts the hydrochloric acid required for the digestion of food  
C. ease the process of cooking  
D. increase the solubility of food particles in water
26. The monomer of polythene is  
A. vinyl chloride  
B. Ethylene  
C. ethyl alcohol  
D. None of the above
27. The luster of a metal is due to  
A. its high density  
B. its high polishing  
C. its chemical inertness  
D. presence of free electrons
28. The number of water molecules present in a drop of water (volume 0.0018 ml) at room temperature is  
A.  $1.568 \times 10^3$   
B.  $6.023 \times 10^{19}$   
C.  $4.84 \times 10^{17}$   
D.  $6.023 \times 10^{23}$



29. The most malleable metal is
- A. Platinum
  - B. Silver
  - C. iron
  - D. Gold
30. The oil used in the froth floatation process is
- A. coconut oil
  - B. olive oil
  - C. kerosene oil
  - D. pine oil