PERCEPTIONS OF STAKE HOLDERS ON THE ACADEMIC STAFF DEVELOPMENT PROGRAMMES FOR LABORATORY SKILLS ACQUISITION IN NIGERIAN POLYTECHNICS

BY

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FUFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD) IN CURRICULUM AND INSTRUCTION

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND CURRICULUM,
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MAY, 2017

DECLARATION

I declare that the work in this thesis entitled Impact of Academic Staff Development Programmes on Students' Laboratory Skills acquisition in Nigerian Polytechnics has been carried out by me in the Department of Educational Foundation and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other Institution.

_____ _____

Fatima Kabir Umar Date

CERTIFICATION

This thesis entitled IMPACT OF ACADEMIC STAFF DEVELOPMENT PROGRAMMES ON STUDENTS' LABORATORY SKILLS ACQUISITION IN NIGERIAN POLYTECHNICS by FATIMA KABIR UMAR meets the regulations governing the award of degree of Doctor of Philosophy (Curriculum and Instructions) of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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Dean, School of Post Graduate Studies

DEDICATION

This work is dedicated to my beloved late sister Laraba (Aisha) Yusuf may her soul rest in peace, my husband A. Kabir Umar, my children Khadija, Al-Amin, Umar, Ahamad and Laila. Also, to my nephews and niece Abubakar, Mohammad and Fatima for their prayer of success during the period of my studies.

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ABSTRACT

This study investigated the perceptions of stake holders on the Academic Staff Development Programmes for Laboratory Skills Acquisition in Nigerian Polytechnics. It sought to identify the academic staff development programmes available, ascertain the adequacy of academic staff development programme, determine the accessibility of staff development programmes, ascertain the relevance of staff development programmes to capacity building of staff to teach laboratory skills, and two others. Seven research question and seven hypotheses were formulated to guide the study. The study adopted descriptive survey design. The target population was 2495 academic staff and 74,850 students of Science Laboratory Technology Department in all the eighty seven (87) polytechnics offering Science Laboratory Technology programme in the six geo-political zones of Nigeria. Stratified Sampling technique is used to sample out twelve (12) polytechnics with a total of 398 academic staff and 1866 students. Simple random sampling was employed to select thirty (30) students and Purposive sampling was used to select twenty (20) academic staff from each of the twelve selected polytechnics. Making a total of 240 academic staff and 360 students that are to complete the questionnaires used for the data collection. Out of these, a total of 234 academic staff and 348 students' questionnaire were filled and returned. Data was analyzed using Statistical Package for Social Science (SPSS Version 20). The descriptive statistics of items frequencies, mean and standard deviations, was used to answer the research questions while the seven null hypotheses were tested using Chi-square (X2) contingency Test at 0.05 alpha level of significance. The findings of this study revealed among others, that participation in conferences, seminars, workshops has enhanced academic staff ability to develop students' critical thinking, knowledge of new research developments in his area of specialization. In conclusion, the seven null hypotheses had p values that were lower than the significant value

of 0.05alpha level of significance set for the study. In view of this, the null hypotheses were rejected. Based on the findings from this study, recommendations were made among others that: Federal and state government should set up monitoring team to all state and Federal; Polytechnics for regular inspection of laboratory materials, Staff of polytechnics especially the academic staff be made to acquire adequate skill on laboratory practices. Non governmental agencies and rich individuals should assist in complementing government efforts financially.

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LIST OF ABBREVIATIONS

NBTE	National Board for Technical Education
HND	Higher National Diploma
ND	National Diploma
PHND	Post Higher National Diploma
TVE	Technical Vocational Education
TVET	Technical Vocational Education and Training
NPE	National Policy on Education
NISLT	Nigerian Institute of Science Laboratory Technology
SLT	Science Laboratory Technology
FME	Federal Ministry of Education
TETFund	Tertiary- Education Training Fund
UNESCO	United Nation Educational Scientific and Cultural Organization

OPERATIONAL DEFINITION OF TERMS

Skills Acquisition: A process of attaining skills through physical and mental performance.

Science Laboratory Technology: Science Based Programme comprising of the three basic sciences (chemistry physics and Biology) taught in Polytechnics and similar tertiary institution.

Laboratory: A building set aside for the conduct of scientific research that offers opportunities for observation, practice and experimentation to produce a sets of items used in industries, hospitals etc.

Technical Education: Education given in institutions that provide both scientific knowledge and practical skills required for a specific trade employment or profession as craftsmen, technicians and technologists

Technician: a person employed in the occupational spectrum between the craftsman and the professional engineer yet nearer the craftsman because of his technical knowledge

Technology: the application of scientific principles in research, design, development, production, distribution or service.

Staff Development: the organized training activities (workshops, conferences, seminars, further training for higher studies) arranged within an organization in order to improve performance while still employed on the job.

Job Performance: the degree to which an individual executes his or her roles in an organization in line with specified standard.

Management staff: they include: the Rector, Deputy Rector, Registrar and Deans/Directors of Polytechnics

Federal Polytechnics: Polytechnics owned and managed by Federal Government of Nigeria.

State Polytechnics: Polytechnics owned and managed by State Government of Nigeria.

Private Polytechnics: Polytechnics owned and managed by private individual or group of individuals.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Polytechnic Education is that aspect of educational process involved the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of the social economy and social life. They are also seen as technical formal education offering instruction in industrial arts; engineering and applied sciences at adult level to prepare persons for immediate technical knowledge needed for employment and prepare basis for those who aspire for higher education through technology continued education.

Polytechnic education depends on the quality of academic staff in terms of level of training, exposure, potency and opportunities for professional development. The ability of students to acquire practical skills will therefore depend, on the competence of their teachers to pass on such skills. Polytechnic Education is a veritable means of producing the various levels and kinds of manpower required for the industrial, economic and social development of a nation. No economy of a nation will strive without scientist and other professionals of high, middle and lower cadres. The powerful nations of the world, owe their supremacy, military prowess, technological superiority and economic might to education in particular and technical education in general. Generally, polytechnic education, in its generic sense, is offered at three main levels, namely the high, the middle and the low.

Academic staff in Nigerian polytechnics have received training in their various fields and have been imparting knowledge and skills to students over time.Construction; manufacturing, production industries, and education sectors are in daily need of skilled manpower to carry out

one job or the other, in production and manufacturing processes. The growing concern over globalization among other things has made the acquisition of Lifelong skills imperative for all categories of people. When skills are acquired in any occupation, they provide and improve the standard of living with the insurance against poverty, thereby sustaining national development. Though Polytechnics have striven to achieve their respective goals, since this is the parameter for assessing the success or failure, those objectives cannot be accomplished without human efforts through a good staff development programme. These issues combine to make it imperative for polytechnics' academic staff to have in- service training and professional continued training to acquire the necessary competence to impart knowledge to their students.

It is in recognition of the importance of staff development in educational institutions that Federal Government declared in its National Policy on Education, that Teacher Education and re-training will continue to be given a major emphasis in the nation educational planning, as no nation can rise above its teachers (FGN, 2013:70).Several initiatives have taken place for the development of academic staff in the polytechnics by government, private initiatives, as well as support from other organisations such as Tertiary Education Trust Fund (TETFund) and international organisations such as United Nations Educational Scientific and Cultural Organisation (UNESCO) inventions (Yakubu,2010) through attendants of seminars, conferences, workshops, induction causes, meetings, higher degrees, in-Service training, orientation, refresher courses, mentoring etc. The ability of students to acquire practical skills will therefore depend, on the competence of their teachers to pass on such skills. All these are done because polytechnic Education is regarded as a tool for industrial community and national development, and it is regarded as the bedrock of Nigeria's technological development. Efforts made by these organisations and regulatory agencies have improved the competences of some academic staff,

however, there is still a lot more that can be done to improve the staff development in the polytechnics. This is necessary if students are to acquire practical skills in Science Laboratory Technology Programmes. SLT is a combination of the three basic sciences. Chemistry, which is the chemical science dealing with the composition of substances, their properties and their reactions. Physics is the science of matter and energy and their interactions, while Biology, and is the science that studies the living organisms. Science Laboratory Technology is a prerequisite to many other branches of science, in which, developing appropriate skills in that respect would be an important step to achieving greater height in the field of the Science and Technology programme.

The curriculum of Science Laboratory Technology are developed for the purpose of imparting the right skills needed, using the right human and material resources, to be a major driver in economic developments, that are expected to produce graduates that can skilfully used their hands to perform all forms of task using the scientific process skills. Diplomats that would not only be job creators, but transformers and reformers of the society where they belongs, who are the beneficiaries of the skills acquired. Diplomats that can are active and confident players in the global and competitive economy. Practical skills in relation to the Science Laboratory Technology are carried out in the Laboratories to reinforce learning and acquisition of skills (Yakubu, 2005). These laboratories are called Basic Science Laboratories.

The questions to ask is, what is the perception of stake holders on the suitability of Science Laboratory Technology Curriculum in teaching laboratory skills, how has it impart the desired knowledge in the graduates of the Programme and how well are the academic staff trained to teach the skills acquisition needed in the programme. Since the goal of staff development is to assist each employee to improve performance in her or his present position

and to acquire personal and professional abilities that maximize the possibility of career advancement and professionalism.

It is in the light of these, the researcher, intends to examine the perceptions of stake holders on academic staff development programme on students' ability to acquire skills using the right laboratory with appropriate human and material resources.

1.2 **Statement of the Problem**

Stake holders viewed staff development as means of equipping employees with the necessary skills and knowledge to enable them perform their job better and as a way of solving employee problem of self-improvement, advancement and better placement. The efficiency of any organization depends directly on how well its members are trained. Newly employees usually need some training before they take up their work: Older employees require training to keep alert to the demands on their present jobs and to prepare for transfer, and promotion (Rashid, 2008). Stake holders should recognize staff development as an on-going continuous process because new knowledge and new jobs are constantly creating the need for staff to be developed.

Development cannot be achieve unless stake holders of Polytechnic education open more access to in the production of high quality of academic staff in terms of level of training, exposure, potency and opportunities through attendance of In-Service Training, Conferences, Seminars, Workshops, Induction Courses, Orientation, Refresher Courses, and Mentoring etc of professional development. The ability of students to acquire practical skills will therefore depend, on the competence of their teachers to pass on such skills. Polytechnic Education should be seen as a veritable means of producing the various levels and kinds of manpower required for the industrial, economic and social development of the nation.

Many literatures have certified the claim that effective staff development is essential for success of a good educational reform. This implies that academic staff development is critical for the improvement of educational standard. (Nassari, 2013; Aslam, 2011). The National Policy on Education (FGN, 2013: 68) states that continuous training of staff in all educational institutions shall be encouraged. The training and development of these academic staff in the polytechnics would enable them to perform their duties of teaching the practical skills that would turn around the National Economy in a positive way in Nigeria.

It is also recognized by educational planners in Nigeria that no educational system can rise above quality of its academic staff. This then implies that academic staff development is critical for the improvement of educational standard. The quality of academic staff has a direct impact on the learning outcomes of students and the quality of education. In educational training, investing in development of academic staff through continuous exposure to development processes by inductions, mentoring, conferences, seminars, workshops and higher educational trainings are imperative for promoting quality of education in the world. Failure to do these to staff, knowledge acquired could become obsolete, which eventually would lead to ineffectiveness in discharge of duties. However, these efforts are not reflected in staff performance, to the extent that teacher's productivity is at the lower end. These in turn has a lot of consequences on students' learning efforts. Students passed through the system with very little knowledge and skills that would enable them perform effectively in the larger society.

With the stated problems, the researcher finds it appropriate and imperative to examine the impact of staff development programme on students' skills acquisitions in Nigerian Polytechnics, with a view to provide solution to the problems that have been highlighted. Also considering the

fact that, it is generally believed that the more effective academic staff are, the better the performance and the better the students they produce.

1.3 **Objectives of the Study**

This study was carried out with the following objectives to:

1. assess the perceptions of stake holders on academic staff development programmes in Nigerian Polytechnics;
2. assess the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;
3. ascertain the adequacy of resources in funding academic staff development programme in Nigerian Polytechnics;
4. determine the role of stakeholders in accessibility of staff development programmes in Nigerian Polytechnics;
5. ascertain the relevance of staff training and development programmes to capacity building of staff to teach laboratory skills in Nigerian Polytechnics;
6. determine the potency of staff development in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics.
7. find out student's opinion about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics..

1.4 **Research Questions**

This study aimed at finding answers to the following questions, based on the objectives stated:

1. What is the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;
2. What is the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;
3. How adequate is the resources provided for funding academic staff development programme in Nigerian Polytechnics;
4. What is the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;
5. What is the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;
6. What is the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics?
7. What is the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

1.5 Research Hypotheses

The following hypotheses were formulated in line with the objectives and research questions formulated for the study:

1 There is no significant difference in the opinions of respondents concerning the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;

2 There is no significant difference in the opinions of respondents concerning the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;

3 There is no significant difference in the opinions of respondents concerning the adequacy of resources provided for funding academic staff development programme in Nigerian Polytechnics;

4 There is no significant difference in the opinions of respondents concerning the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;

5 There is no significant difference in the opinions of respondents concerning the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;

6 There is no significant difference in the opinions of respondents concerning the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics.

7 There is no significant difference in the opinions of respondents concerning the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

1.6 Basic Assumptions

This study is based on the following assumptions:

1. Academic Staff Development are inadequate, unplanned, unstructured to make any significant impact on the skills acquisition of students in Science Laboratory Technology Programmes;

2. The participation of Academic Staff of Science Technology Programmes in seminars and workshops does not have any significant impact on the skills acquisition of students in Nigerian polytechnics and
3. Adequate teaching facilities, equipment and other teaching resources does not have any significant impact on Science Laboratory Programmes in Nigerian Polytechnics.

1.7 Significance of the Study

The study is significant to the following:

Federal Government, management of polytechnics, regulatory of polytechnics (NBTE), Curriculum planners, developers, staff and students.

The Federal Government being the owner of the Federal polytechnics has spent billions of naira on staff development programmes but the effectiveness of this investment is yet to be determined. Therefore, this study will provide the data which will be useful for evaluating the various staff development programmes and help to determine whether the programmes are accomplishing their objectives. The management of state and private polytechnics will also benefit from this research in the sense that it will help to determine the effectiveness of staff training and development programmes in producing the expected outcomes and whether or not anything needs to be changed or improved. It will thereby help the polytechnics to come up with effective plans for staff development. In addition the study will help them understand that it is very necessary to provide all academic staff with training so that they could perform their assigned tasks in an efficient way.

The National Board for Technical Education (NBTE), will also benefit from the research because, it will have concrete information on the efficacy of their staff development initiatives in order to design better programmes where and when necessary. Lecturers, in order to deal with changing technological environment, need to keep their skills up to date. The findings of this study will help lecturers evaluate their job performance with regards to the developmental programmes they have been exposed to. It might encourage polytechnic academic staff to seek for self-improvement so that the goals of the polytechnic can be achieved. In particular, the lecturers will find the study useful as it will expose them to the expected outcomes of staff development programmes in furnishing them with knowledge and skills about new ideas, new teaching methods and varieties of equipment and instructional materials. It will also reveal whether management support for their development is adequate. The staff of the polytechnics will also be interested in the study as it will highlight the different opportunities available for their development. The study would benefit students and researchers in determining issues relating to development and training on SLT programmes. It is hoped that the recommendations of this research will benefit all the stakeholders in the polytechnics and allied.

It will help the Curriculum Planners to incorporate the Philosophical, Psychological and Sociological needs of the society in the curriculum of the Science Laboratory Technology programmes. Similarly, it will help the curriculum developers to build up the curriculum contents in terms of structures, contents, objectives, methodology and evaluation. Yet, in another way, it would help the curriculum implementers (lecturers) who are the "heart beat" of the curriculum, to teach the required skills and knowledge of the programme of SLT. The study will help the non-governmental organizations, international donor agencies such as United Nations Educational Scientific and Cultural Organization (UNESCO), African Development Bank

(ADB) to make adequate planning on the manpower and material resources needed for the skills acquisitions in Science Laboratory Technology Programmes, for both learners and the implementers of the curriculum.

1.8 Scope of the Study

The study is on the impact of staff development programmes on students' Laboratory Skills Acquisition in Nigerian Polytechnics, it comprised of all staff and students of the eighty seven (87) polytechnics offering Science Laboratory Technology Programme, recognized and accredited by the National Board for Technical Education (NBTE) in Nigeria. The Polytechnics are located in the six geo-political zones of Nigeria, namely North-West, North-Central, North-East, South-South, South-West, and South-East. However, due to the large size of the country, the researcher selected two polytechnics, from each zone. Descriptive survey design was employed in the study to seek the opinions of academic staff and students on the impact of academic staff on laboratory skills acquisition by students, the availability and adequacy of staff development in Nigerian Polytechnics. It also set to determine the relevance of staff development to capacity to teach and professional training on job performance of staff of Science Laboratory Technology Programme in the polytechnics. The frame for the study was limited to the years 2005 to 2015.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

The literature review in this study was organized under the following sub-headings: The theoretical framework for the study, staff development theories, Conceptual Framework, Concept of Staff Development programme, Concept of Laboratory Technology Programme, Concept of Laboratory Skills, Nigerian Polytechnics Staff Development policy, Types of staff development process, Staff Development Programmes attended by Academic Staff of Polytechnics, **Nature and scope of Science Laboratory Technology Programme, Curriculum contents of Science Laboratory Technology Programmes,** Resources for the Implementation of Laboratory Technology programmes, Constraints in the implementation of Science Laboratory Technology Curriculum, Impact of Evaluation in the outcome of staff development programmes, Empirical Studies and summary.

2.2 Theoretical Framework

Theoretical framework employed in this study is centered on all the theories of staff development. This is because they are cyclical; one is depending on the other to function, as none of them can exist alone except the theory of change. Theory of change is said to be permanent as a result of the experiences of other theories. All the theories are therefore discussed along with their relationships as they exist. The theories guide the result and discussion which provide different activities carried out on staff development.

The goal of any academic staff development is to provide the highest quality staff development programmes possible, with an emphasis on teaching and learning strategies and teacher-tested techniques of the implementation of Science Laboratory Technology curriculum. It is the researcher's sincere goal that the information you gain in this study will directly benefit you as an institution of learning offering SLT Programme, the academic staff of institutions taking the programme, the employers in the industries, the curriculum planners, developers/designers and the implementers of curriculum. This section focused mainly on theories and issues that are related to learning as it connect to staff development programmes, and its implication to curriculum. This section therefore formed the basis for the theoretical framework of this study.

2.2.2 Theories of staff development

There are five types of theories of staff development as identified by Suzan (2006), they are as follows:

1. *Age and Stage*
2. *Cognitive development theory*
3. *Functional theory*
4. *Theory of change*
5. *Theory of action*

According to the founder of these theories, all the five theories linked to one another. In the case of training and development of staff, all the five theories are used together, as no one can exist alone. It was further explained that the theories of staff development speaks to one another, therefore making them integrated, interrelated and interwoven. Most staff developers would

agree that the goal of staff development is change in individual's knowledge, understanding, behaviours, and skills - and in values and beliefs. Too often, it appears this fundamental view of staff development is unheeded or forgotten. However, if change of some understanding, skill, or behavior is the desired outcome of staff development, it seems reasonable to explore the relationship. For the purpose of this study, all the theories would form the frame- work.

1. Age and Stage

Ericson (1994) asserts that everyone must pass through a series of eight interrelated stages over the entire life circle. The sixth, seventh and eighth are the adult's stages. The stage explains that, young adults seek deep intimacy and satisfying relationships with marital partners and friends. Career and work are the most important things at this stage, along with family. It is at this stage people can take on greater responsibilities and control. At this stage, workers attempt to established stability, they attempt to produce something that makes a difference to society. Major life shifts may occur during this stage e.g. changing career, workplace, and relationships. The theorist believe that much of life is preparing for the middle adulthood stage, and the last stage involves much reflection for feeling integrity by contentment and fulfillment, having led a meaningful life and valuable contribution to society. Some may have opposite of Sense of despair reflection upon their experiences and failures.

Age and stage theory according to Suzan (2006), in Conferences and seminars, people with different age range and stage unite and share common interests and values. A number of people in similar professions; anywhere from a few dozen to a few thousand people may attend. Some conferences and seminars are meetings of individuals within a company; others are for professional groups or industry specialists. These large meetings aid in staff development by allowing peers to communicate fresh ideas, discuss new policies and describe innovative

procedures. Conferences and seminars often offer classes in smaller group settings; sometimes these meetings are provided in conjunction with university or consulting firm advancements, professional associations' and staff from the polytechnics. Others are drawn from places such as, industries, research organizations, government organizations/ parastatals, education institutions and so on. In polytechnics, these are done through variety of learning formats, (classroom, on-site, online, and independent or group study) which many polytechnics have benefitted from. Some are sponsored by ETF now TETFUNDS, some by their institutions, while some by self - sponsored. Conferences, seminars, workshops and all other forms of staff development that involved several people are attended by different age group range. Staff would be associated with his class of experts, those above him as his superior and as well as his subordinates. They all gain by shearing experiences from each other.

There are ways by which training and developments are carried out in these situation. Joyce and Showers (2007) identified that, one-way observation is the first component, the delivery is one-way and no audience action is required. It is purely observation and assessment. Instructional practices are improved if a colleague or other person observes a teacher's classroom and provides feedback. Having someone else in the classroom to view instruction and provide feedback or reflection is a powerful way to impact laboratory skills behaviour. The person is observing acts as another set of "eyes and ears" for the teacher. Observers also learn as they view their colleagues in action as they train their students.

2. Cognitive development theory

Cognitive development theory was most influence by Jean Piaget, (1896-1980), he was mainly interested in the Biological influences on how we come to know. He believes that what distinguishes human beings from other animals is our ability to do. He was interested on how an

organism adapt to his environment. Infants, as they are born uses reflexes to think, as they grows, reflexes are quickly replaced with constructed schemes, which control behaviours throughout life piaget describe two processes of using or transforming the environment so that it can be placed in preexisting cognitive structures. These are "Assimilation" which is a process of using or transforming the environment so that it can be placed in preexisting cognitive structures and "Accommodation" is the process of changing cognitive structures in order to accept something from the environment. Both of these processes are used throughout life as the person increasingly adapts to the environment in a more complex manner. Both processes are used simultaneously and alternatively throughout life.

Cognitive development theory was initiated by Constructions, using case studies for development that seeks real-life examples of teachable situations in skills acquisition processes. For example, a company undergoing a merger might develop staff by requiring employees to study other constructions for mergers. Staff learns useful information from studying successful cases, and they learn what to avoid by studying failed scenarios. Coaching and Mentoring are activities meant for the development of academic staff. Coaching is the traditional practice of assigning a less experienced staff to work under the watchful eye of a superior and more experienced staff. Similarly, mentoring is a process of using a staff with a lot of knowledge and experience on the job, to advice and guide in a most relevant way. For instance, senior staff who has been working for many years and have acquire higher degrees needed for a sabbatical leave is encouraged to go for sabbatical leave to a sister institution where he will exhibit his knowledge to coach and serve as mentor to less experience staff. Sparks and Loucks-Horsley, says, this component involve a development or improvement process: Systemic school-improvement processes typically involve assessing current practices and determining a problem whose

solution will improve student's outcomes. The solution might include developing curricula, designing programmes, or changing laboratory/classroom practices. New skills or knowledge may be required and can be attained through reading, discussion, observation, training, and experimentation. Consequently, involvement in the improvement process can result in many new ways of skill acquisition, skills formations, attitudes, and behaviours.

3. Functional theory

Functional theory has been seen by philosopher as a frame work for building theory that sees society as a complex system whose parts work together to promote solidarity and stability. It looks at society through a macro- level orientation, which is a broad focus on the social structure that shape society as a whole, and believes that society has evolved like organisms. The theory looks at both social structures and social functions.

To exemplify the Functional Theory as it relates to development, is a practically training design that includes an expert presenter who selects the objectives, learning activities, and outcomes. Usually the outcomes involve awareness, knowledge, or skills development, but changes in attitude transfer of training, and "executive control" needs to be addressed as well. In a workshop session, the audience is allowed to participate, trying out new skills, promptly providing structured and open-ended feedback about performance of the practice. The improvement of academic staff' thinking and actualizing it should be a critical outcome of any training programme in skills acquisition. The most effective training programmes include exploration of theory, demonstrations of practice, supervised trial of new skills with feedback on performance within the institution.

Similarly, staffs of the Polytechnics, all over the six geo-political zones are drawn to participate in the Accreditation processes of all programmes offered including science laboratory

technology. Administratively, Management staff are also drawn in the same manner to participate in the Institutional Administration of other similar institutions. The idea behind these is to use the knowledge gained in correcting what is faulty in their own institution and copy what is right from the institution visited. The equipment and other facilities used in SLT programmes are of different types and makes. Such facilities will be shown at that point, and sharing of knowledge takes place as the accreditation is carried out. These cut across all the parameters that are checked during the Accreditation processes: for Programmes of studies, the parameters are Academic Matters, Physical Facilities, Staffing (teaching and Non- teaching Staff) and Funding.

Administratively, all aspect of administration of the institution are checked, ranging from, Staff Development , Employment and Deployments of staff, Admission processes, Record of staff and students keeping, Environment and relationships between the Parents, Host Community and the institution. All invited Resource Persons are expected to use what he or she has learn to adjudge their own institutions in order to effect changes if there is any need to do so.

4. Theory of change

A theory of change is a diagram that explains how programme has an impact on its beneficiaries. It outlines all the things that a programme does for its beneficiaries, the ultimate impact that aims to have on them, and all the separate outcomes that lead or contribute to that impact. A theory of change should not refer to the scale, growth plan or operational details of the organization itself. It should effectively describe and explain the impact of the programme from a beneficiary's point of view.

Theory of change, Conscious practice results in some development on the job. Joyce and Showers (2007), the natural experiences that cause employees to acquire work skills and

knowledge become a development through conscious practice in the laboratory. Using working methods of development, ensures minimum disruption of the academic staff on his job and duties. Before students can benefit from new and more effective Science Laboratory Technology Programmes, or other curriculum and instruction, it will be necessary for teachers to adopt the new classroom practices that are required. Changing into the new science teacher role and implementing its attendant practices are very demanding on academic staff. In that an effective staff development and a successful change effort contain highly similar components, it may not matter greatly whether those designing and encouraging "new" science classrooms support their goals through employing an effective staff development approach or a change effort approach. It just may be, however, that the title or label of change, and what it implies may put a different spin on the process of changing teachers practices and thus their implementation of new programmes. In Sciences, many science process skills is not implemented because of the lack of a clear vision, or mental image, of what it would look like when fully implemented in a high quality way. If lectures, teachers do not know their change destination, the journey may take them anywhere.

5. Theory of Action

Schereiber and Mosses (2012), posit that their beliefs are the best predictors of our actions in any situation. Each of us has our own mental map, a theory of action that directs our behavior in any situation. Learning involves detecting and eliminating errors. When something isn't working, our first reaction is to look for new strategies to fix the problem. A meaningful student learning happens when students know their learning target, understand what quality work looks like, and engage in thought-provoking and challenging performances of understand what quality work looks like, and engage in thought –provoking and challenging performance of

understanding. Developing a shared vision among all, including students, ensures a common set of goals and expectations. Continuing to remind people of the vision through its regular articulation and communication are important actions to be taken. For non-teaching staff, such as departmental clerk, typist and secretary, they may require additional qualifications in their areas of specialization and activities such as conferences, workshops, seminars that are aimed at improving staff's competence on the job, more because they support the academic staff to achieve the objectives of teaching and learning of skills in their various laboratories.

One of the studies that tested the efficacy of the five available theories was conducted by Bush (2008). Bush examined the effect that the components contributed toward transfer of skills or new behaviors into laboratory practice. He found that when participants were given only the first component to observe and give a description of the new skill, 10% of the persons could transfer or use the new skill in the laboratory. When the second component, modeling or demonstration of the skill, was included, 2-3% more persons could perform the skill in the laboratory. When practice, the third component, was added, 2-3% more transfer occurred; similarly, when the fourth component, feedback, was included, another 2-3% transfer occurred. Thus, four components resulted in 16-19 persons out of one hundred able to perform the new skill in the laboratory. However, when coaching, the fifth component, was part of the staff development process, up to 95% of the participants transferred the skill into laboratory practice. In a word, the coaching component was a critical one in effecting a change which is one of the most effective theories used for staff development. In life, there is a say, that, the only thing that is permanent in life is ‘’change’’ and in the field of learning, according to Bush (2008), none of the theories and its components can exist alone, they are cyclical, no one exists alone. All are

dependents of each other, except the component of coaching and the theory of change, which all other components and theories are used to achieve them.

The effectiveness of the staff development theories discussed above is indicated by the cumulative percentage of transfer of skills into laboratory or classrooms by academic staff who received all the components and translated the five theories into function. Similarly, in research on change, implementation success of academic staff increased co relational with the increased number of interventions in the categories that were supplied to the teachers. Exhibits of the components of effective staff development and categories of interventions are successful change. For instance, Science Laboratory Technology Curriculum and Instruction have been the focus of much local, state, and national attention, with abundant funding, in some cases, to support the interest. Constructivist approaches to teaching and learning emphasize students' critical thinking and problem solving skills, as well as student-generated knowledge, wherein students plan for, direct, and create their own learning. Such classrooms demand a very different role and practice of academic staff. Study reconfirmed that students in these kinds of programmes exceeded the learning of their peers in traditional programmes; the programmes were decreasing in frequency and disappearing.

Comparing the status of the implementation effort to the vision is a means for assessing progress and helping people to understand the progress made and what is yet to be done. This suggests, of course, an interaction with another strategy below. This strategy would seem obvious, but many potentially effective science teachers are working with inadequate plans and woefully insufficient science materials and equipment. Asking teachers to spend precious time in scavenging for what is needed cuts painfully into more productive tasks for teaching. Those responsible for assisting teachers have a responsibility to supply the resources and allocate the

time needed. It is at this point that change efforts typically fall apart. Regular checking with implementers to assess their progress and needs while implementing the new behaviors required is not well understood. Leaders and leadership teams are frequently uncomfortable in executing this strategy. However, the intervention study results, presented above, reported that the frequency of the monitoring interventions correlated significantly with a higher degree of implementation. As a monitoring example, assessing by "walking around" communicates to teachers the importance of the new programme and increases their feeling of being supported in the effort.

This strategy by any other name - coaching, consultation, and follow up - is the same. It is the provision of help and assistance based on information gleaned through assessing. In the intervention study, a high correlation was found between continuous assistance interventions and implementation quality. Lectures/Teachers are more comfortable with the leader's assessing progress strategy when they observe that it is coupled/ followed by assistance. While the order of these five theories may seem linear, and some of necessity follows the other, they are more cyclical in operation. The context/culture strategy is akin to a fine net spread over an entire change effort and influences all the other strategies. And all strategies, of course, are highly interactive. In addition to the five strategies identified above, there is a remaining, and highly important factor to be considered: who will plan, manage, coordinate - in short - direct and deliver the five strategies?

The answer is the facilitative leader, who is the lecturer, instructor or the technologist in the laboratory. This person (or a team of persons) takes on the responsibility to provide the five strategies that will "translate intentions into reality" (Suzan, P. K. 2006). Meaning, the leadership team will work to move the vision of lecturing/teaching and learning into operational

in the laboratory. Block's definition spells out the leader's role; the five strategies identify the five non-negotiable functions of the role. In polytechnics, some persons must be in this role. The literature is unremittingly clear about the imperative of the facilitative leadership function for change. We know a great deal about how to conduct effective staff development and successful change. The research on both processes attest to this fact. Employing what we know will determine whether we have the highest quality teaching and learning in our laboratories and subsequently whether our students are benefitting from our wealth of experience and knowledge or not. Academic staff development programme is an improving access to learning through variety of ways and medium. In analyzing and putting the theories in function, we will realize that, for a staff to develop him/her, no theory will be left un- used.

2.3 Conceptual Framework of the study

Staff development is one of the major Human Resources management (personnel) functions in an organization .The staff (human resources) of organizations are regarded as the most active and indispensable factor in the process of attaining its goals and so managers are required to give considerable attention to their development so that their full potentials in their work can be realized (Peremode and Chukwuma, 2011). They are the most important among the four factors of production in organizations such that their knowledge, skills and abilities facilitate productivity, resourcefulness and the general well-being of organizations or societies. The more an organization has knowledgeable, skilled and resourceful individuals, the higher the value of human resources of that organization. The value of the human resources is a function of quantity, quality as well as the environment in which it is deployed for production, but high number of human resources is not synonymous with a high value. Consequently, substantial inputs and efforts are required to elevate that potential to active human resources that meet desired

objectives. Among the inputs is a sound education or staff development programme. Agaba, (2005) states that staff development is one of the most important aspects of leadership roles in organizations. Well trained staff plays a significant role in success of an organization. According to Cole, (2002), even when staff are carefully selected, it does not still guarantee acceptable performance from them. This is because a staff with a high potential to perform may not necessarily perform his job efficiently if he does not go through training and development. This is why the training of newly employed staff starts with organizational orientation. The significant role of staff development in the attainment of organizational goals has necessitated this research and the following concepts related to study were therefore clarified and discussed: staff development, purpose of staff development, staff development process and job performance.

2.3.1 Perception of stake holders on Concept of Staff Development

The perceptions of stake holders on staff development activities generally, are aimed at improving, updating or maintaining employee's skills and abilities. Piper and Gater (2006), define staff development as a systematic attempt to harmonize individual interest and wishes and their carefully assessed requirement for furthering their careers with the requirements of the organization within which they are expected to work. Staff development, according to Cole (2002), is any learning activity that is directed towards further needs rather than present needs of staff and is concerned more with career growth than immediate performance. In the same vein, Adesina (2000) defines staff development as: The ways and means by which the leader recognizes staff performance needs and the extent to which the leader shows interest in ensuring that staff needs are met through programmes that would improve the qualitative and quantitative contributions of the staff to the overall goals of the system. Such programmes would aim at

enabling individuals within the system to be more effective in performing their work at preparing individuals for greater responsibilities.

Shahzad, Bhatt and Khalid (2007) view development of staff as being concerned with the provision of learning , development and training opportunities for individuals in an organization in order to improve organizational performance. It is concerned with enhancing resource capability in line with the belief that an organization's staff are the major source of competitive advantage. Thus, staff development implies developing the intellectual capital required by an organization as well as ensuring that the future and present needs of an organization in terms of the right of people is created. Olagboye (2004) affirms that staff development is concerned with teaching or providing an employee with the skills he needs for future jobs and distinguishes staff development from training which is directed at assisting employees to acquire basic skills required for the effective performance of their tasks.

Various scholars have affirmed the distinction between staff development and have defined training separately. For example, Cole (2004) suggests that training is any learning activity which is directed towards acquisition of specific knowledge and skills for the purpose of an occupation or tasks while Ivancevish (2010) views training as a systematic process of altering employee's behavior to further organizational goals which involves improving an employee's skill to the point he or she can do the current job for organizational performance. The manpower services commissions as cited by Wilson (2005) defines training and development as a planned process to modify attitude, knowledge or skills and behavior through learning experiences to achieve effective performance in an activity or range of activities. In a similar vein, Stoner, Freeman and Gilbert (2006) refer to staff development as the acquisition of specific skills by an individual staff for the purpose of performing a particular task. However, Ngu (1990) notes that

even though scholars have defined training and development as two separate concepts there is inconsiderable overlap between the two as there is very little to be said of their differences and opines. Both training and development are purposefully geared towards improvement on skills and performance. Both involve molding or improving workers knowledge and skills towards this end. The differences between the two processes may be in content and method. Ngu (1990:25) therefore defines training and development as "the process of behavioral modification or molding of workers in order to integrate organizational needs with their characteristics.

Staff development is viewed as means of equipping employees with the necessary skills and knowledge to enable them perform their job better and as a way of solving employee problem of self-improvement, advancement and better placement. The efficiency of any organization depends directly on how well its members are trained. Newly hired employees usually need some training before they take up their work: Older employees require training to keep alert to the demands on their present jobs and to prepare for transfer, and promotion (Rashid, 2008). Effective managers recognize staff development as an on-going continuous process because new knowledge and new jobs are constantly creating the need for staff to be developed. Supporting this view, Pigor and Myers as cited by Rashid (2008:1992) admit that "no organization can choose whether or not to train employees". All new employees, regardless of previous training, education, and experience need to be introduced to their new employer's work environment and to be taught how to perform specific tasks. Staff development programmes and interventions are therefore used to tackle many issues and problems in an organization. They may be utilized to orient and socialize new employees into the organization, provide skills and knowledge, and help individuals and groups become more effective.

2.3.2 Concept of Science Laboratory Technology Programme

No educational system is more important to economic development of any nation than Technical Vocational Education and Training (TVET) in which Science Laboratory Technology is one of corner stone programme of TVET, but in most cases, unrelated, poorly planned and managed in many countries (UNESCO, 2002). There are many problems lingering to TVET, but the founder mental to all issue is the Curriculum in relation to staff development. That is how curriculum is planned, developed and implemented and the type of development received by academic staff of these polytechnics that are to implement the curriculum in all aspects of behavioral learning. The curriculum must give clearer directions in respect of:

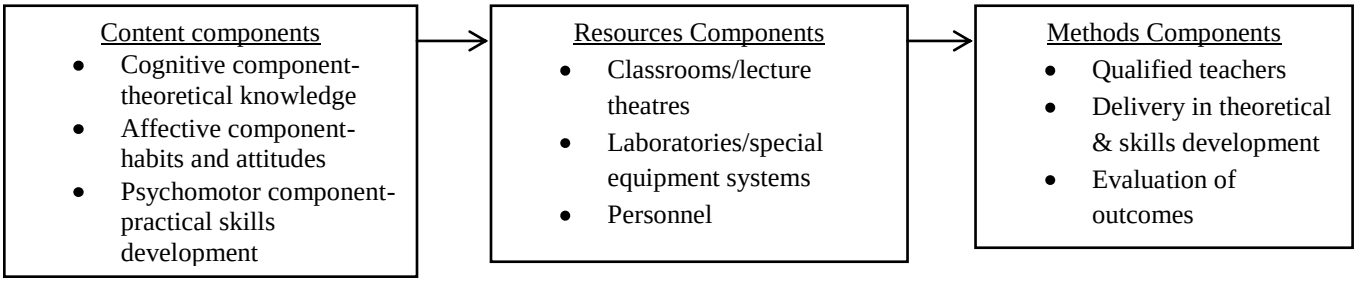
i. What the aims and objectives of the TVE should be
ii. What kind of educational experiences should be provided to achieve the aims and objectives
iii. How these educational experiences could be effectively organized
iv. How the achievement of the aims and objectives could be determined.

Curriculum is a goal or set of values that is activated through planned and development. It is designed as a statement which identifies the element of the curriculum, states what their relationships are to each other, indicates the principles of organization and the requirement of that organization for the administrative conditions under which it is to operate. Yusuf (2013) says, elements of the Curriculum that are in constant interaction are:

a. Purpose (goals and objectives)
b. Contents or subject matters
c. Methods or learning experiences
d. Evaluation

e. The diagram below shows the interaction among these elements

Curriculum elements in science laboratory technology include;



Cognitive components entail knowledge of technology of the various occupations. The knowledge involves talking about the skills and gaining background information. The lecturers give learners information about what to expect, what to look out for, the procedure to be followed, what needs to be known, what precautions to take and what standards that have to be reached.

This is where competencies play very important role in the changing behavior of the learners. Psychomotor component entails practical skills for carrying out technical tasks in the various contents. The psychomotor involves acquiring correct patterns of behavior. As they are acquired, they should be "fixed" by practice. Errors should gradually be eliminated. Academic staff as a lecturer, technologist, technician or an instructor arrange for the learners to have:

i. a demonstration of the skill

ii. opportunity to imitate the skill

iii. practice of the skill under real or stimulated conditions

iv. knowledge of the results

v. guidance and personal assistance

Affective components involve interest, attitudes and work habits desirable for success in technical work. Attitudes are receiving attention in training and education. It is being recognized in developed countries that, is not enough to concentrate upon intellectual and motor skills. Attitudes, too, must be learned and changed, if mastery is to be obtained. Student's attitudes toward learning and instructions are important. Academic staff have a responsibility to see that students enjoy learning.

Attitudes have three components: it has already been pointed out that behavioral objectives in educational objectives statements of educational outcomes which can be measured or observed in the learners have three components:

A Knowledge Component: this consists of what a person knows about the subject.

An Emotional Component: this consists of what a person likes or dislikes about the subject. There can be different intensities of feeling, some likes, for instance, may be strong, others weak.

An Action Component: this consists of what a person does to express feelings of liking or disliking. The teaching of the content components is expected to be thorough in polytechnic education. If we go by the accreditation report of 2006-2011 by NBTE that adequate training is not going on in the entire polytechnic system, one could also conclude that the content component is not getting the attention it deserves. For each course there should be a balance of theory to practice depending on the course and the objectives and contents.

2.3.3. Concept of Laboratory skills

Scientific laboratory skills involve a variety of laboratory-base investigations within biological, chemical, physical and life science areas. They carry out sampling, testing,

measuring, recording and analyzing of results. This is carried out to provide all the technical support to enable the laboratory to function effectively while adhering to correct procedures and health and safety guidelines. In the laboratory, scientists carry out laboratory skills that assist in the advancement and development of modern medicine and science. Knowledge of laboratory skills are mainly employed within industries in government departments and research organizations. The role of teaching laboratory skills is similar in educational institutions where they support science teachers, lecturers and students to acquire necessary skills that is used to carry out the work that allow scientist to concentrate on and perform the more complex analytical processes in the laboratory.

Task can vary on the specific part of laboratory skills in science laboratory technology programme but typically involve:

i. *Performing laboratory test in other to produce reliable and precise data to support scientific investigations*
ii. *Carry out routine task accurately and following strict methodologists to carry out analysis*
iii. *Preparing specimens and samples*
iv. *Constructing, maintaining and operating standard equipment*
v. *Ensuring the laboratory is well stocked and resourced*
vi. *Keeping up to date with technical developments, especially those which can save time and improve reliability (Uzoka, 2014).*

The actual nature of laboratory skills will depend upon the nature of the organization. For example, within an environmental health department the laboratory skills involved may be

analyzing food samples to consider prosecution and to protect public health. While within the water industry the work will mainly focus on the collection and analysis of water samples. Working in the laboratory needs experts that can relate the ability to learn specific, practical techniques and apply this knowledge to solve technical problems. Good hand and eye coordination and ability to use technical equipment with accuracy. Time management skills in other to work on several different projects at the same time are required. Excellent oral communication skills, in other to work effectively with colleagues from all parts of the organization and to explain complex technique to interested parties.

Many public and private organizations employ scientific skills in laboratory technology. Among these include:

1. *Large public limited companies in industry*
2. *Hospitals and public health organizations*
3. *Specific government departments and agencies or government-funded research institutions*
4. *Environmental agencies*
5. *Utility companies*
6. *Research and forensic*
7. *science institutions*
8. *Pharmaceutical and chemical companies*

There are many companies in the food manufacturing business where technicians could seek employment. There are also a range of companies involved in the manufacture of: Plastics, Metals, Oil, Cosmetics, Food and textiles.

There are a number of professional developments on the training of laboratory skills. These usually involve: training on the use of technical apparatus, Conducting specific preparation tasks, Methodology for sampling, Testing and recording, Health and safety checks.

The laboratory skills professional career could develop from assistance technicians to technicians. Technicians to technologists and then to laboratory manager. Taking further qualifications such as Masters or Ph.D and acquiring specialist knowledge may enable you to move into scientific research.

2.4 Implementation of National Policy in Polytechnics

According to Federal Government of Nigeria, (1996); (1998); (2013) in an approved national policy, the purpose of polytechnic education among others is to provide adequately trained middle level manpower. This means producing manpower that will make industry more productive by increasing both the volume and the quality of the goods that are produced as well as giving training and imparting the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self- reliant**.**

National Policy on Education (2013) stated that the goals of technology Education at tertiary level shall be to:

i. *Provide courses of instruction and training in engineering, other technologies, applied science, business and management, leading to the production of trained manpower;*

ii. *Provide the technical knowledge and skills necessary for agricultural, industrial, commercial, and economic development of Nigeria;*
iii. *Give training that impact the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-*
iv. *reliant;*
v. *Train people who can apply scientific knowledge to solve environmental problems for the convenience of man; and*
vi. *Give exposure on professional studies in the technologies.*

In pursuance of these goals, Government shall:

i. *Adopt measures to develop and the ideals of technology education through students ' exposure to practical industrial work experience;*
ii. *Improve immediate and long-term prospects of graduates of technology institutions and other professionals with respect to their status and remuneration; and*
iii. *Encourage technology education institutions to conduct applied research relevant to the needs and aspirations of the nation.*

Efforts shall be made to inculcate an attitude of respect for and appreciation of the role of technology in society. To accomplish this, students shall be made to appreciate the dignity of labor by involving them in making, repairing and assembling machines, gadgets and equipment. Polytechnics and other specialized institutions shall continue to maintain a two-tier programme of studies, viz, the National Diploma (ND) and the Higher National Diploma (HND) with one year period of industrial experience serving as one of the pre-requisites for entry into the degree programmes.

Technology Educational institutions shall select their students except where the law prescribes otherwise. Technology Education institutions shall pay particular attention to research into the promotion of indigenous technology in Nigeria. Not less than 70% of admissions into Polytechnics shall be in technology based courses, other non-technological based courses takes the remaining 30%. Institutions shall operate in collaboration with relevant industries, professional bodies and establishments to ensure practical training and experience for students.

2. 5 Nigerian Polytechnics Staff Development Policy

National Board for Technical Education (NBTE) was established by law, by Act 9 of January 1977) to approve the setting up of polytechnic sector. NBTE is the principal organ of the Federal Ministry of Education specifically created to handle all aspects of Technical and Vocational Education falling outside university education. In addition to providing minimum guide curricula for Technical Vocational Education and Training (TVET), the Board supervises and regulates, through an accreditation processes and provision of standardized minimum guide curricula for TVET. The Board is also created to standardize and approves the setting up of each Polytechnic, regulates the courses, and also sets the minimum standards on admission, teaching and infrastructure.

NBTE Newsletter March (2013) explained that, Quite a number of training has been undertaken by Polytechnic sector, in order to develop their academic staff. Polytechnics are tertiary institutions established by law to train and produce the technical manpower necessary for the execution of the Nation's development plans, goals and strategies. NBTE (2013), National Board for Technical Education (NBTE), has set up a standard, which is one of the criteria that must be meeting by any Polytechnic that required Accreditation. The Staff development

programmes are intended to upgrade and update staff competence and ensure constant availability of good academic and technical staff through attendance at Seminar, Workshops, industrial Placement, long term degree, and higher courses. Academic staff should attend relevant in-service (long or short) courses at least once every five years. Institution/ Programme should have a well-executed staff development policy.

2.5.1 Type of Training in Staff Development Process

Gani (2013) identifies staff development to include formal and informal, group and individual training and education. The goals of staff development are to assist each employee to improve performance in her or his present position and to acquire personal and professional abilities that maximize the possibility of career advancement. Staff development activities include the following:

Conference: Hamby (2012) defines conference as large official meeting at which people with same work or interest come together to discuss their views. Abubakar (2013) sees conference as a meeting of individuals called together to engage in discussion with the aim of accomplishing a limit task within a restricted period of time. It is also seen as formal means of validating social programmes and inducing change in individuals. . Conference are usually gathering of people with common interest or background, with the purpose of allowing them to meet one another and to learn about and discuss issues, ideas, and work that focus on a topic of mutual concern (Nassazi, 2013).

The structure and contents of conference can vary greatly, but a typical frame work would include one or more presentations of work and or ideas about a given topic. The representation may take form of academic staff or non academic staff. It may last for few to

several hours or days and could vary in size. There are four types of conference namely: academic conference, professional conference, training conference and summit conference.

Academic conferences

This is centered around a single subject and sometimes on single topic within the subject. The format is such that the academics present their research work and theories, defend it and expand it in responses to criticism and feedback from colleagues. Conferences are often sponsored by professional organizations of the discipline involved and may be held annually in different cities. Academic staff of polytechnics are usually encouraged to be a registered member of a relevant professional associations and are expected partake in all the activities of the association.

Professional Association Conference: they are similar to academic conference in a way but they turn to address practical issues related to the actual work of the participants and also matters such as regulations, funding and issues that affect the profession. In Nigeria, there are professional associations that exist at state, national and even international levels and they usually organize annual conferences for their members as part of continuing education. The programmes for these conferences usually include speeches by leading experts, discussion of current issues and presentations of research findings (Mathias and Jackson, 2006), one of the main benefits of this is the opportunity member have to meet and share experience with other professionals. Another benefit of professional association is that they keep their member up to date by publishing journals, magazines and newsletters that communicate ideas and practices in the field. In polytechnics to be a member of professional bodies is a condition for promotion for academic staff.

Training Conference

These may be organized by professional association, industry, local, state or federal agencies. The main objective is to train participants on methods and techniques, provide information on new regulations, or simply an exchange of experience and method among people from different backgrounds.

Summit Conference

The organization of this conference is open to any association, group or organization, institution or government. Such conference may address issues ranging from education or any societal problem. The purpose is to inform and mobilize people to tackle a problem. Lecturers seldom participate in this type of conference.

There are many reasons for the organization of conferences, among others is to address a problem and provide new information which enable participants to keep abreast latest information and developments in their field which help to promote inter-disciplinary and intra disciplinary, domestic and transnational communication. It also provides a forum for immediate challenge, correction of ideas in the presence of all participants.

Induction Training

Induction Training is a brief, standardized indoctrination to an agency's philosophy, purpose, policies and regulations given to each worker during his or her first two or three days of employment in order to ensure his or her identification with agency's philosophy, goals and norms. In the Polytechnics, it is called Staff Condition of Service. This is usually given to staff on immediately they are employed. For students, students hand books are given at the point of registration. It usually contains law establishing the institution, rules and regulations governing the examination conducts, general conducts and behavior in the institution.

Job orientation

Job orientation in individual training programme intended to acquaint a newly employed or hired employee with job responsibilities work place, clients and co-worker and orientations and matriculation are conducted for new students. FME/NBTE Bulletin (2013) defined in-Service Education as a continued programme of education provided by the employing authority, with the purpose of developing the competence of personal in their functions appropriate to the position they hold, or to which they will be appointed in the service. In-service education is a planned instructional or training programme provided by an employing agency in the employing setting and designed to increase competence in a specific area. In-service training is usually given to staff of polytechnics by TETFUNDS or the institution concerned for either long or short time training.

Continuing Education

Continuing Education is any extension of opportunities for reading, study and training to any person and adult following their completion of or withdrawal from full time school and /or college programmes for instance, Continuing education in nursing consists of planned learning experiences beyond basic nursing educational programmes. These experiences are designed to promote the development of knowledge, skills, and attitudes for the enhancement of nursing practice, thus improving health care to the public.

Higher degree

Higher degree programmes conducted at the universities are widely accepted as types of staff development programme. NBTE (2010) in polytechnics, including other similar institutions that offer National Diploma (ND) and Higher National Diploma (HND) in Nigeria, undertake higher degree programmes that are relevant to their areas of specialization or primary

assignment. This is why academic staff is permitted to undertake post-graduate programmes such as MSc, MEd and Ph.D.

The educational training programmes whether conducted in the universities or other tertiary institutions, increase the knowledge, skills, experiences and understanding of staff and this eventually improves the competence of staff in job performance. Like any other tertiary institutions, higher degree programmes are relevant to staff in polytechnic sector because without a master's degree, an academic staff is not promoted beyond the rank of lecturer ll. Federal Polytechnic, Ilaro bulletin (2009). The Polytechnic management constantly writes to remind staff of the need to engage in master's degree programme. In the polytechnics where HND and P-HND programmes are offered, academic staff without master's degree may not be assigned to teach students undertaking such programmes. These measures indicate the relevance of higher degree programmes to Polytechnic education.

Short Training

Short Training Course in polytechnics, are referred to conferences, seminars and workshops, they are called so because they usually last for a few numbers of days. An educational conference is a 'large formal gathering of educationists who meet to discuss important educational issues in the country. A conference is usually organized by educational institutions and organizations such as universities, polytechnics, Colleges of Education, professional associations and sometimes in conjunction with educational agencies such as National Board for Technical Education, National Commission for Colleges of Education (NCCE), National Teachers' Institute (NTI) and the Ministry of Education. A conference is organized with a theme and several sub-themes, which encourage participants to write on various

issues. After the opening session, participants are normally grouped into sessions. Participants in each session are expected to discuss all the papers written on the same sub-theme. For each presenter, a limited time is given within which he or she is expected to speak on the important contents of the paper. At the end of each presentation, an assessment of the paper is made by other participants.

Seminar

A seminar consists of a small group of staff with a more experienced staff who come together to discuss particular educational issues such as computer application in educational institutions/teachers assisted learning and teaching practice supervision. A university post-graduate seminar is made up of a lecturer and a group of students coming together so that students present papers on topics they have researched. At the end of each presentation, the lecturer and other students make an assessment of the papers in the form of questions, observations and criticisms. Post-graduate students also present seminar papers on their research topics. The result of this presentation often serves as a gateway for students to carry on with the research work or make further investigations.

Workshop

A workshop is a meeting of staff in an educational institution or educationists from different educational institutions to discuss experiences that will improve their skills. These workshops are based on new trends in educational developments to benefit the participants. Polytechnics in Nigeria, in conjunction with educational agencies such as NBTE, NABTEB, UBEC, non- governmental agencies, professional bodies such as NISLT, COREN, HATMAN etc. organize and conduct workshops for staff of institutions, organizations, industries and so

forth. to offer a variety of activities through seminars and workshops in order to develop different categories of staff. However, the performances of polytechnics on international workshop cannot be regarded as encouraging because the review of report of accreditations carried out by NBTE on the status of academic staff development of polytechnics in the last ten years indicated that majority of those in Federal and state polytechnics that benefited from international workshops were management staff such as rectors, deputy rectors, bursars and registrars. Few state polytechnics claimed to have fairly adequate provision for international workshops.

All staff development programmes are valuable and used with different types of advantages. Abubakar (2013) stated that, short training courses are advantageous because they enable staff to master the techniques of writing and presenting papers and articles in journal publications. Those courses improve the knowledge, skills, experiences and attitudes of academic staff, hereby improving upon their job performance. Also, the certificates awarded from the training courses are used as pail of the requirement for academic staff promotion Ogwuche, (2002), says, one of the problems of the short-training courses is the tendency for some academic staff to write conference papers only when they are due for promotion instead of writing to learn, improve and develop their scope and knowledge. The short training courses also lend to the most relevant skills acquisitions processes on new trends in their professional areas when used to disseminate information about institutional policy or practice, or to train staff in discrete skills and techniques.

Condition of service:

Condition of service for senior staff, says, Sabbatical Leave is a well-known practice in polytechnics, universities and other tertiary institutions in Nigeria. Sabbatical leave is a paid time off-the-job granted to both academics and non- academic senior staff to study or work in other institutions across the country. Sabbatical leave polytechnic Education usually covers a period of one year. Sabbatical leave is aimed to prevent brain drain, enhance the intellectual and professional development of staff and boost individual staff morale. Sabbatical leave also provides staff with an opportunity to live and work in entirely new environment, and widen their horizons by carrying out studies in new fields that would improve upon previous studies. While discussing the importance of sabbatical leave, Mathis and Jackson (2006) hinted that sabbaticals leaves are now adopted even in business organizations because about 19% of US corporations give three to six months off with pay to work on socially desirable projects such as providing technical assistance in foreign countries and participating in corporate volunteer programmes to aid non-profit organizations. One outstanding disadvantage of sabbatical leave is the cost. A staff on sabbatical leave is entitled to full salary and other entitlements in the polytechnic where he or she works. At the same time, remuneration and other allowances are paid according to the terms of agreement between the staff and the host institution.

Membership in Professional Associations is a way of belonging to professional associations and unions is a good way for academic staff to gain valuable knowledge and experience in their areas of specializations. The main activity of professional associations is to organize annual conferences either singly or in collaboration with educational institutions such as universities, polytechnics and Colleges of Education etc. Professional associations also encourage members and other interested educationists to write and publish articles in their

annual academic journals. Polytechnics encourage staff membership in professional associations which are valuable to both staff and the polytechnics and also one of the requirements in meeting accreditation status by NBTE. This is why allowances for journal publications are included in staff consolidated salaries and certificates of memberships in professional associations are demanded as part of requirements when academic staff are to be promoted from senior lecturer to principal lecturer. In other institutions around the world like the American Society for Microbiology, the cost of institutional membership in that professional association is included in departmental budgets which are approved and paid for at that level. However, individual membership which assists in personal development of staff without any significant benefit to the institution is to be subsidized Cornbleth, (2010). Academic Staff of Science Laboratory Technology in Nigerian polytechnics belongs to professional associations such as Nigerian Institute for Science and Technology (NISLT). The main problem with membership in professional associations is that some staff may register for the sole purpose of enriching their requirements for promotions instead of using it to develop themselves academically.

Staff meetings

Staff meetings on occasional basis are activities meant for the training the development of all cadre of staff in organizations. In Polytechnics, the senior management, academic board, schools and departments occasionally organize and conduct meetings for staff members. The main reasons for holding academic staff meetings are: to share relevant information; plan for future of programmes; coordinate the activities of staff and students; review past events and inform members of staff about certain academic educational issues. Staff meetings may not be directly relevant to staffs primary assignment or area of specialization, but they serve as avenues for the staff to get acquainted with each other and express their opinions on issues rose in the

meetings. They also serve as training ground for staff to know the techniques involved in planning and conducting meetings, and the roles of key members like the chairperson and the secretary. All these eventually contribute to the development of academic staff of SLT. However, if care is not taken, some meetings may lead to conflicts and crises among staff, waste of time arising from inadequate preparation of key members or unnecessary and prolonged discussions.

Delegations of Authority

Delegations of Authority in Polytechnics in Nigeria are made up of large number of students and staff. Available statistics supplied by the NBTE indicated that in the 2013/2014 academic session, Federal Polytechnic, Nassarawa alone had a total population of 8,936 students and 1,248 staff, while Kano State Polytechnic, Kano, had-a total population of 6.367 students and 914 staff from these population figures, it is clear that the Rector of Polytechnic needs the talents and co-operation of other staff to perform for the system to function effectively. Other administrative and academic's heads also need the efforts of subordinates to carry out their responsibilities effectively.

Delegation according to Lucey (2005), is the process by which a more senior and experience staff transfers part of his own -authority to a subordinate, so that the subordinate can carry out some tasks. According to Cole and Kelly (200I), delegation is a distinct type of power sharing; process that takes place when a manager gives subordinates the responsibility and authority to make certain decisions that were previously made by the manager. Delegation is a common practice in Polytechnic Education. A head of department, for example, may delegate a staff to act as head in his or her absence. Delegation can be regarded as temporary promotion in which staff are trained to practice more challenging responsibilities in future. Delegation,

therefore, offers an opportunity for academic staff to grow and develop, especially if the delegate is expected to make decisions and assume responsibility.

One of the advantages of delegation is that it creates confidence in the delegate and encourages co-operation and teamwork among members of staff. Delegation also ensures that departmental duties and responsibilities are carried out effectively because they are shared out to members of staff. However, some heads may not want to delegate their authority for fear of accountability to their subordinates to carry out the assignment successfully. At other times, a head may not delegate authority because of the fear that the subordinate may perform better and, therefore, pose a threat to his or her position. At other instances, subordinates may be reluctant to accept responsibility, especially when there is a poor superior-subordinate relationship, or when the subordinate feels that the delegated responsibility does not march with the rewards, or when the subordinate is afraid of failure in carrying out the delegated tasks (Press, 2005).

Committee Assignment

Committee Assignment is a development technique in which promising members of staff are assigned to work as members of committees formed by the Polytechnic in Nigeria. There are functions through various committees such as the students' welfare and disciplinary committee, community relation committee, examination malpractice investigation committee, students' advisory committee, hostel allocation committee, SIWES committee and staff development committee etc. The committee system is advantageous because it offers staff an opportunity to

interact with experienced members of staff and this improves human relations in the polytechnic, the trainees become acquainted with a variety of issues and processes governing the polytechnics, which enable members to understand the relationship between department and the problems created by the interface of various units. For instance, members of staff assigned to work in the security committee, stand a chance of understanding the security measures and problems associated with attempts to provide security for the entire members of the Polytechnic. However, where too many committees are formed without sufficient guidelines as to what members are expected to do, the exercise may turn out to be time-wasting activities. Also, if members are not given the opportunity to participate fully, they become frustrated and the activity becomes detrimental to their development. The staff development programme in Manchester Metropolitan University (2008) offers an opportunity for effective chairing of the university committees. The aim of this event is to help delegates serve in the committees effectively and in line with the university style and protocol.

2.5.2 Professional Staff Development Programmes attended by academic staff of polytechnics

Nigerian Institute for Science Laboratory Technology(NISLT) (2014) conducted training on Science Laboratory equipment, instrumentation for Laboratory technologist /Scientist and other users of science equipment. The workshop was organized by center of Excellence for Technical and Vocational Education in collaboration with Nigerian Institute of Science and Technology, held at College of Science and Technology, (CST), Kaduna Polytechnic. The workshop aimed at providing a guide to flame photometer Analysis, Flame Emission and Atomic Absorption Spectrophotometer and Calibration use and maintenance of UV- Visible Spectrophotometer.

During the year under review, 51 Federal and State polytechnics benefitted from a grant of 15 million for the development of their laboratories and rehabilitation of their existing ones. This made it possible to train academic staff of the institutions on the use of the new laboratories equipment. Examples of these laboratories/workshops are found in the Kaduna Polytechnic, where the following laboratories/workshops were constructed, furnished and equipped. Not only that, staff of laboratories/workshops are developed to learn the use of the equipment provided.

NBTE, (2009) revealed that ECOWAS in collaboration with UNESCO has organized a Sub-regional Workshop on revitalizing TVET in the West African sub-region at Abuja, Nigeria. The replication of this was done by several polytechnics, among is Federal Polytechnic, Kazaure. This workshop recommended, among others, which efforts are made to:

i. s

As a result ECOWAS Commission commenced implementation of the above recommendations by initiating a training programme in all the 15 Member States to upgrade the professional and pedagogical skills of TVET technical teachers, curriculum developers and policy makers on Science and Applied Science programmes.

Flexible Skills initiative was developed by National Board for Technical Education (NBTE) in collaboration with the Common Wealth of Learning (COL) to increase access to TVET, especially in the area of academic staff professional development in the area of Applied Science for TVE training. The programme started in the year 2011. Many polytechnic Academic staff and NBTE staff have benefitted from this programme. Common Wealth of Learning has also organized an on-line course for TVET Policy Makers and Institutional Managers for both Science and non-scientific programmes on Flexible Skills Development, in the year 2012.

UNESCO-Nigeria, African Development Bank, ECOWAS, and TETFund are not left out in this programme. For instance, UNESCO – Nigeria TVE Revitalization Project II, a workshop was organized for staff of Science and Technology based programmes on important of provision and updating Laboratory and Workshop equipment. NBTE, newsletter (2013).NBTE, has also carried out a Training workshop for TVET Academic Applied Science staff on Curriculum and Instructional Material Development in the ECOWAS Regions, in Kaduna UNESCO Center of Excellence, from 2nd to 14th December 2012.

Digital Bridge Institute, International Center for Communications Studies, has organized Advance Digital Appreciation Programme for Tertiary Institutions (ADAPTI) Training in DBI Abuja. This workshop was attended by Academic Staff of all disciplines in the Nigerian Polytechnics. Its Objective was to provide literacy in Communication in all Programmes, that all learning processes can take place anywhere, anytime, regardless of the number of participants in a lower cost.

Nigerian Institute of Science Laboratory Technology, (NISLT) in collaboration with NBTE, has severally organized training for Polytechnics Laboratory staff (Technologist, Technicians and Laboratory Attendants). Some of these workshops that are carried out are: Five –day training workshop, on "hands-on" training on science laboratory technology equipment, instrumentation for laboratory technologists/scientists and other users of science equipment.

2.6 Nature and Scope of Science Laboratory Technology Programme

Science Laboratory Technology is a programme of study that is offered in polytechnics and similar tertiary institution. It is offered at National Diploma and Higher National Diploma level. The National Diploma is designed to produce technicians capable of carrying out various laboratory analysis and practical works under the supervision of a technologist. Specifically to:

i. *Assist in chemical analysis and quality control in: industry (oil, food, brewing, detergent, textiles, etc.), hospitals, schools, colleges and research institutions.*
ii. *Assist in physics and electronic laboratories with physical analyses and the maintenance of instrumentation*
iii. *Assist in biological and biochemical analysis and experiments in hospitals, schools, colleges and research institutes*
iv. *Prepare students for employment in related work such as sales, marketing, administration and management in the industries in 1 above and, also, for self-employment.*

The HND options of SLT are designed to produce Technologists capable of carrying out the above tasks based on the specialization in the options listed. The available options of SLT are: HND SLT Options in: Chemistry, Biochemistry, Biology, Microbiology, Environmental Biology and Physics with Electronics.

The minimum entry requirement into the National Diploma in Science and Laboratory Technology Programme is five Credits level passes in Senior Certificate Examination (SSCE) or National Examination Council (NECO) in not more than two sittings. The subjects must include the following: Mathematics and English with any three of the following: Biology or Agricultural Science, Chemistry and Physics. Entrants must possess at least credit grades in Biology, Chemistry, Physics and English Language. The entry requirement into the HND Science Laboratory Technology (in all the options of HND SLT) is at least a lower credit level pass in National Diploma (ND) in Science Laboratory Technology and a minimum of twelve (12) months of supervised industrial experience. In exceptional cases, ND diplomats with a pass

(CGPA of 2.00 - 2.49) grade but has two or more years of cognate working experience in the specific field are considered for admission into the HND Programme.

2.6.1 Curriculum Content of Science Laboratory Technology (SLT)

The Curriculum of the ND/HND SLT consists of four main components. These are: General Studies/Education, Foundation Courses, Professional Courses and Supervised Industrial Works Experience Scheme (SIWES) for ND only .The General Education component shall include courses for both ND and HND in:

Art Humanities - English Language, and Communication. These are compulsory.

Social Studies - Citizenship (the Nigerian Constitution), Entrepreneurship are compulsory.

The General Education component shall account for not more than 10% of total contact hours for the programme.

Foundation Courses include: courses in Economics, Mathematics, Pure Science, Computer Applications, Technical Drawing, Descriptive Geometry, Statistics, etc. The number of hours will vary with the programme and may account for about 10-15% of the total contact hours.

Professional Courses: are courses which give the student the theory and practical skills he needs to practice his field of calling at the technician/technologist level. These may account for between 60 - 70% of the contact hours depending on programme.

Supervised Industrial Work Experience Scheme (SIWES) is usually taken during the long vacation following the end of the second semester of the first year.

Science Laboratory Technology (SLT) Curriculum Structure

The structure of the ND/HND programmes consists of four semesters of classroom, laboratory and workshop activities in the college and a semester (3-4 months) of Supervised

Industrial Work Experience Scheme (SIWES) which takes place at the end of the second semester of the first year for ND only. Each semester shall be of 17 weeks duration made up as follows: 15 contact weeks of teaching, i.e. theoretical and practical work and 2 weeks for tests, quizzes, examinations and registration.The programme is usually accredited by the NBTE. The diplomats shall be awarded Certificate, after passing prescribed course work, examinations, diploma project and the supervised industrial work experience. For candidates to be certified passed, he or she should have completed a minimum of between semester 90 and 100% credit units depending on the option of the SLT at HND level. However, Diploma Certificate shall be awarded based on 90 and 100 Distinction CGPA3.50 - 4.0, Upper Credit CGPA3.00 - 3.49, Lower Credit CGPA2.50 - 2.99, Pass CGPA2.00 - 2.49.

2.6.2 Resources for the implementation of Science Laboratory Technology Programmes

There are requirements of human and material resources that must be available in the polytechnics offering Science Laboratory Technology at both ND and HND level. The material resources include laboratories space and equipment, workshops facilities and Field facilities.

List of Laboratories and workshops Facilities and equipment required for ND SLT.

1. *Chemistry Laboratory*
2. *Biology Laboratory*
3. *Physics Laboratory*
4. *Instrumentation Room*
5. *Glassblowing Workshop*
6. *Meteorological Station*
7. *Biological Garden*
8. *Library stocked with relevant/current textbooks and journals*

9. Classrooms/Lecture theaters

List of equipment/furniture used in the list of facilities above would be attached as appendix.

The academic staff to implement the curriculum of Science Laboratory Technology are as follows: at least ten lecturers (10), out of which five should have the following qualifications: B.Sc/M.Sc Biology - 1No, B.Sc/M.Sc Chemistry - 1No, B.Sc/M.Sc Physics - 1No, B.Sc/M.Sc Biochemistry - 1No and B.Sc/M.Sc Microbiology - 1No

Also, one of the above should be at least a Senior Lecturer and a registered member of relevant professional association to serve as the head of department.

Technical staff forms the next category of the academic staff of SLT. Four (4) Technologists, four (4) Technicians and four (4) Laboratory Assistance and Attendants with the following qualifications: HND SLT Biology or Biology/Microbiology, HND SLT Chemistry or Chemistry/Biochemistry, HND SLT Physics with Electronics, HND Glass/Ceramics Technology. Others are: technicians (with ND SLT), Laboratory Assistants (with WASC/GCE/SSCE) and Laboratory Attendants (with FSLC)

Models of curriculum implementation

Curriculum implementation according to Danladi (2011), says is a way of putting the curriculum documents into action. It is a stage when in the midst of learning activities, teachers and learners are involved in negotiation, aimed at promoting learning. The academic staff adopts the appropriate teaching methods and materials to guide students learning. Danladi (2011) identified some methods used in the delivery /implementation of SLT curriculum includes: Lecture, Teaching, other approaches or activities include: Discussions, Seminars, Tutorials, Projects, Assignments, Open learning, Case study, Role play, Simulations, Problem solving, Experiments, Demonstrations, Brainstorming, Group work andTeam teaching

The most potent way of enhancing an improved practical content in technology/skill education is the appropriateness of the methods of teaching and workshop practice. Joyce and Well (2008) listed demonstration, project method, experimental among others as basic technology teaching methods that required the use of tools, equipment and materials, used in the practical class. Bukar (2002) has observed that teaching methods used in polytechnics are outdated; rote learning is common with lecturers and instructors doing little more in the classrooms than copying their notes onto blackboard. The students, most of whom cannot afford a textbook, must then transcribe the note into a notebook and those who regurgitate a credible portion of their note from memory usually achieve high success. It is good to note that, new approaches to learning that emphasize active intellectual engagement, participation and discovery, rather than simple absorption of facts in our practical classes in the laboratories.

In the process of implementing the curriculum or the total and systematically organized learning experiences, the academic staff is expected to know and understand the following models:

- Center periphery
- Proliferation of center
- Shifting center

Center periphery model, the process of implementation of the curriculum is centrally controlled by government and its related agencies. For instance, the guide to lesson preparation and preparation may be directed from the regulatory agencies like NBTE, FME, Resource centers etc. The center is in charged with the management of the resources required for the

implementation. The center also, provides training programmes on long and shot terms for the human resources that are to be used for the implementation process.

Proliferation center approach involves using more than one center in the process of implementation. Institution may be managed by zones. A zone serves as primary centers, while institutions are the secondary centers. The success of this model depends on availability of funds, supply of adequate instructional materials and training facilities at the various levels of implementation as well as effective monitoring network and regular supervision of the entire process.

Shifting center model: The implementation of curriculum in this model involves movement from one center to another. The implementation does not cover the entire area at the same time. For instance, in Nigeria where education is in the concurrent list of the national constitution, the implementation of educational policies is left at the discretion of the state and the local government councils. In this process, some states and local councils have advantage over others because of financial and human potentials.

In polytechnic settings, center peripheral and shifting center model is related to this study, and therefore, they are to be adopted. In states polytechnics according to NBTE bulletin of March, 2014, page 14 State polytechnics are being managed by the resources obtained from the state source of revenue. However, the TETFunds has greatly done wonders in terms of equipment, infrastructure, and staff development to enrich disadvantage states that could not carry out its responsibilities. Hence infrastructures, equipment, instructional materials, sponsorships for higher learning etc are being provided at the federal level, to all states and federal tertiary institutions. Regulatory bodies such as, National Board for Technical Education

(NBTE), National Universities Commission (NUC), and National Commission for Colleges of Education (NCCE) to oversee the activities of polytechnics, universities and colleges of education as the case may be.

As it has earlier been pointed out, that Polytechnic Education is a technical formal education offering instruction in industrial arts, engineering and applied science at adult level to prepare persons for immediate technical knowledge needed for employment and also to prepare basis for those who seek for higher education through technology continue education. In achievements of the objectives of this study, it is imperative to discuss the frame work of theories and models that the study would be based upon. This is also necessary if students are to acquire practical skills, in particular laboratory skills and ensure that the science laboratory technology curricular is fully implemented in polytechnics to produce desired outcome. For smooth delivery and implementation of curriculum, academic staff development programme is directly responsible on the student's ability to acquire laboratory skills in Nigerian polytechnics generally and its implication for the science laboratory technology curriculum cannot be over emphasized. The question here is how well have the curriculum of science laboratory technology been able to impart the desired skills in the graduates of polytechnics? This would be determined by how much skills are been learnt by the academic staff as they develop one self and the amount he can pass over to teach his students.

2.6.3 Constraints in the implementation of SLT Curriculum

Yakubu (2010), the methods used in proposing and acquiring the infrastructural development and equipment needed for skills acquisition in SLT programme seems not to be of great advantage to the implementation of the curriculum. Some Polytechnics are just a little above the secondary school level, equipment and infrastructural wise due to inadequate funding.

In acquiring equipment for SLT, in some instances, it is contracted out to contractors. In an attempt to make more profits they buy inferior things and submit to institutions. This equipment may not serve at all, or becomes bad within a short period of time. In some instance, even when the equipment is available, it could lie down without installing to use. This is because the technologist or the technician stationed as staff of such laboratory do not know how to operate such equipment, due to lack of adequate staff training and development as a result of inadequate funding by successive administrations. They become un- productive, obsolete and there by rendered useless over time. There by, in this situation, students may be thought only the theoretical part of that course, leading to inadequate or complete poor skills acquisitions by students in laboratory work.

Analysis of the curricular identified that the goals and objectives of some of the programmes in Sciences Laboratory Technology focused more, on knowledge not skills, making it difficult to achieve the desired objectives in teaching appropriate skills to students by the academic staff of SLT in TVETs institutions. Also, the curricula used for teaching Science Laboratory Technology programmes in our polytechnics are all due for reviewing, thereby, obsolete. Yusuf (2012) stated that, the curricula of SLT were reviewed last in 2005 into 2007 respectively.

2.7. Impact of Evaluation on the Outcome of Staff Development Programme

The final logical stage in the process of staff development is to find out how effective the programme or activity has been and this is referred to as evaluation. Evaluation simply means assessment of the value or worth of a programme, equipment or a human resource in an organization. In the context of training and development, Hamblin (1970) as cited by Cole (2002:370) defined evaluation as “any attempt to obtain information (feedback) on the effect of a

training programme and to assess the value of the training in the light of that information" Evaluation of training and development programmes can be conducted internally or externally internal evaluation is interested in assessing whether a training or development programme has achieved its objectives, that is whether the trainees or staff have learnt what they were taught. The external evaluation aims at finding whether the trainees have applied what was learnt in training or whether they are able to perform to the level expected of them after training. The main aim of evaluation, therefore, is to determine the extent to which a particular training programme or development activity is actually beneficial to the trainees and whether it is relevant to the professional needs of staff and the needs of organizations that have sponsored them for the programmes.

Bucher and Krotee (2002) provided the following guidelines for evaluation of staff. First and foremost, evaluation should involve staff members because it is a co-operative venture and staff should be included in developing criteria for evaluation because they need to understand the process. Evaluation should be future oriented and be mainly concerned with developing an improved staff. Where shortcomings are identified, a training programme should be provided. Evaluation should be based on helping staff to grow on the job by maintaining strengths and reducing weakness. Evaluation should be well organized, systematic and reliable so that other evaluations using the same evaluation criteria will arrive at the same or similar conclusion. Evaluation is not only concerned with trainers and trainees, but will all aspects of training and development which include the practical learning context, the course content, the learning methods employed and the equipment/materials used in the programme Academic staff are the universal resource found in all kinds of academic institutions, because there is no institution that can function without academic staff. For Science Laboratory Technology programme that is

offered in Nigerian Polytechnic, there are two types of academic staff. Academic staff that are responsible for the implementation of the theoretical part of the curriculum guide. They deal with the cognitive part of the learning processes. They are found in different categories, depending on their qualifications and years of experience on the job. These categories range from instructors to Chief lecturer. The second types of academic staff in SLT Programme are those that implement the practical aspects of learning process in the curriculum. They are in charge of the practical that are carried out in Laboratories, but could be supported by lecturers some times. Their nomenclatures are Technologist, Technicians and Laboratory attendants. The Technologist carried out the practical while the Technician prepares media and other laboratory equipment/facilities settings. The Laboratory attendants' assists in the laboratory by cleaning up the laboratory before and after practical sessions. Maintaining the laboratory up- keeps safety practical procedures are done by Technicians. The important of Academic staff in the laboratory cannot be over emphasized.

It is often important for staff to identify some areas of weaknesses in the job performance. Identification of their weak areas is done by observing the performance of other experienced colleagues to identify their own areas of weaknesses. Whichever way weaknesses are identified, once there is a difference between the actual performance and the required standard, productivity is negatively affected, and this suggests the need for improvement. Nassazi (2013). This improvement is achieved through staff development programmes. Staff development programmes is referred to a variety of educational and training activities which are designed purposely to give staff the additional knowledge, skills, attitudes, experiences and understanding needed to perform up to the required standard. This implies that changing the attitude of academic staff is a function of training and development, and the end result is to help

the institution of learning to achieve its objectives. However, previous researchers have identified the differences between training and development, even though, the two concepts are used interchangeably. Dabo (2001), differentiated the concept by explaining training as the teaching of lower level technical staff on how to perform their current job, while development mean teaching the managers and professionals the skill needed for both present and future jobs. Matis and Jackson (2006) explain that staff can be trained to perform certain activities such as drive a truck, operate machines, assemble equipment for practical lessons etc. whereas development of staff bigger challenges with a more wider area that may not be too specific. Therefore, training in these instances, be for lower staff of the academics, such as Technicians and Laboratory Attendants, while development is for higher Technologist. For the purpose of this study, both the lower and the higher professional can go for the two and thereby used the word interchangeably.

This section focuses on the theory/model and issues that are related to the staff development programme in Science Laboratory Technology Programme, its impacts on skills acquisitions by students. The section, therefore, formed the basis for the theoretical framework of this study.

2.7 Impact of Information Communication Technology Training Programmes on Academic Staff Job Performance

Academic staff plays a crucial role in the development, adoption and implementation of any educational curriculum or innovation. This role becomes even more critical in the adoption and integration of information and communication technology (ICT) into educational institutions. It has been revealed that the knowledge of ICT usage improves human capacity in

every field of human endeavors, including business transaction, industrial operations, educational programmes and life in general lecturers is hence crucial to the successful implementation of staff programmes. Lecturers that are motivated to learn are more likely to attend professional development programmes within and outside of school. The school managers (Rectors, Registras, and Deans) are therefore expected to guide , support, monitor, implement and evaluate staff development programmes.

It is also imperative to make provision of teaching and learning facilities through means of ICT for an effective staff development programme. Both human and material resources must be provided (Abubakar, 2013). Without up to date teaching and learning materials such as, text books, journals, workshops, laboratories and internet facilities, academic staff cannot also update their knowledge. Thus the development of academic staff if development is hindered when they cannot avail themselves with relevant and current text books, journals and other materials.

2.8. Empirical Studies

The study of impact of staff development programme has attracted the attention of many researchers worldwide, such that there are several research reports, experts' opinions and theory papers on the subject. Akinyele (2007) carried out a study titled the Impact of Nigerian Training Programmes on employee Performance investigated the relationship between workers training and the achievement of organizational goals as well as the relationship between workers knowledge, skills attitude and job performance. The population of the study was made up of all the international Institute of Tropical Agriculture Ibadan between 2000 and 2006. Purposive sampling technique was used for selecting seventy respondents made up of General Staff, Senior Staff and Management staff. Chi- Square was used to test the significance of the relationship

between the variables. The findings of the study revealed that the training programmes of International Institute of Tropical Agriculture Ibadan were well structured and planned and led to the acquisition of new skills, knowledge and competence required for performance on the job. The researcher also affirms that the growth and development of an organization depend on the training given to its employees. The study suggests that organizations interested in efficiency must embark on training programmes for their staff on the job. This is because increase in knowledge and scope in once profession leads to increase in productivity and achievements of organizational/ institutional goal.

A similar study that was conducted by Rashid (2008), on the effect of Manpower Training and Development on Staff performance in the Federal College of Education (FCE) Zaria. The survey method was used and data collected with the aid of questionnaire from 125 academic and non-academic staff. The study only made used of descriptive statistics such as frequency counts and percentages to analyses data and test hypotheses. Showing that, the various training programmes that are available in FCE Zaria did not impact positively in enhancing the skills, knowledge of the staff, and their performance on the job and service delivery. The effectiveness of the programmes had also led to the problem of staff retention in the college, especially among the highly experience senior academic staff. The study therefore, recommends that, the college should emphasize on both on the-job and off- the job training for staff of the college and staff training should not be the right of every staff. In conclusion the work suggests that effective strategies should be adopted to evaluate the effect of training on staff of the college. Finally, training should not be seen as routine activities, but as an important aspect of personnel management and should be a constant and continuous exercise.

The review of this study has also indicated that quite a number of researchers on staff development programmes as well as other related issues in personnel management were conducted mostly by master's degree students in public administration. Certainly such studies were based on private business organization and their related issues such as banks, companies with only few on secondary schools, colleges of Education and National Library. This research is unique because it aimed at examining the impact of Academic Staff Development on Students Laboratory Skill's Acquisitions in Nigerian Polytechnic: Implication to Science Laboratory Technology Programme. Unlike the previous studies that aimed at private managers of businesses, library facilities, secondary school staff development and practices etc. this study aimed on skills acquisition of students and also the corresponding staff development for capacity to deliver to teach and practice their professions.

Idem and Archibong (2012) investigated the adjustment challenges of new academic staff in the University of Calabar, Cross River State. The survey research design was adopted and four research questions were used to guide the study. A questionnaire was developed, validated and used for data collection from a sample of 50 new academic staff drawn, using stratified random sampling techniques. The data were analyzed using descriptive statistics (percentages). The results showed that there were systemic deficiencies on the part of the university administration in terms of organizing a planned orientation/training programme for new academic staff, they had to contend with problems associated with teaching and learning, relationship-oriented issues (mentoring) and work environment related issues on their own. It was therefore recommended that orientation/induction programmes should be provided for new staff.

Another study, conducted by Aladejena, Aladejena and Ehindero (2006) examined mentoring among eight pairs of university academic learning methods in Nigeria. A descriptive

survey was used to assess the mentoring process among 16 lecturers. Data was collected with the aid of a questionnaire and it was analyzed using descriptive statistics. The findings indicated that mentoring among university academics operate mostly in an informal and unstructured manner. In addition most of the mentoring relationships were channeled towards research and publication while a legible part was focused on classroom teaching. Most relationships were initiated and sustained by proximity and academic related activities. It was also found that multiple and same gender mentoring was found to be more common and more successful than single and cross gender mentoring. The researcher therefore recommended that mentoring relationship should be used for initial and continuing teacher education.

Yet another study by Akinnagbe and Baiyeri (2011) on the training needs analysis of lecturers for information and communication technology skills enhancement in Faculty of Agriculture, University of Nsukka. Data for the study was collected from 66 academic staff through the use of a questionnaire. Data were analyzed using percentages, mean statistics and chart. The result of the study revealed that, lecturers were skilled in general windows operation, word processing and internet/on-line but were not skilled in slides preparation/presentation, spreadsheet preparation, and data analysis using computer software. The highest demand for ICT training need by lecturers was data analysis using computer software like SPSS, GENSTAT, Excel, E-view and the like. The study therefore, recommended that academic staff of faculty should be exposed to ICT training to enhance teaching and research in the universities.

Similarly, Jegede (2009) studied the nature and impact of ICT trainings received by teachers' educator in south west Nigeria teacher training institution (universities and colleges of education). Data was obtained from a total of 469 teachers educators with the aid of a questionnaire. The data was analyzed using descriptive statistics such as means and percentages,

and inferential statistics such as the one way analysis of variance and chi-square. Results showed that more than half of the educators had been exposed to one form of training or the other but the training did not have significant effect on basic ICT skills. The study suggests a more focused and teacher-targeted ICT training content for teachers.

Peretomode and Chukwuma (2011) in another study examined the relationship between manpower development and lectures' productivity in tertiary institutions in Delta state, Nigeria using the ex-post-facto design to collect data from 205lecturers. The data was analyzed with the Pearson product moment correlation coefficient and multiple regression statistics. The result showed that manpower development enhances lecturers' productivity irrespective of gender, faculty and type of educational institution. The study recommended that management of tertiary institutions and the national universities commission (NUC) should continue to encourage lecturers actively participate not only in local development efforts but also international seminars, workshop, conferences and short courses outside shores of Nigeria, by providing funding for sponsorship of lecturers.

Murty and Fathima (2013) studied the perceptions and attitudes of employees towards training and development in public sector unit in India. The survey unit of research was adopted and data was collected with the aid of the questionnaire from a total of 402 respondents. The data was analyzed using one sample t-test, one way analysis of variance and the chi-square. Findings from the study showed that the employees had a positive attitude toward nature of work, work environment and training. The study recommended workers' participation in management and decision making.

One of the benefits from this review was the extensive coverage of concepts by previous researchers. For instance, the studies conducted by Afuwan (2003) and Akpan (2003), Aliyu (2004), Abubakar (2005) enable the present researcher to identify and understand concepts and other key issues that are related to staff development programmes. However, most of these researches had no empirical studies in their review of related literature. Very few of the researches had some traces of empirical studies which were somehow embedded in the conceptual frame work of the study. Abubakar (2005), for instance, testified that his review of his related literature was on Notable scholars in educational research such as Ali (2006) and Korb (2008).

Previous researches on staff development and related issues indicated that great attention was given to explain what constitute the target populations and the samples selected for the studies. At a glance some research topics indicated who or what constitute the target populations for the study. For instance, Yusuf (2008) conducted a study on Manpower Development and its Impacts on Human Resources Utilization: Case Study of Motivation, job performance and job satisfaction among National Library of Nigeria were the target population.

The finding from the previous researcher shows that there was inadequate funding of staff in many organizations. The findings of Agaba (2005) and Abubakar (2005) revealed that staff development was restricted to only few Academic staff. It was also indicated that staff development policies are not adequately implemented. On the basic of the conclusions and findings of previous researchers, there are recommendations that all categories of staff must be developed and trained to be able to perform all task in their mandate, be employed and subsequently face the challenges in their professions.

From the above therefore, it becomes imperative that the literature reviews so far has relevance to the present study and from the foregoing, it is evident that the study were not carried out in polytechnics and on a programme of studies alone. All the related literature reviewed is focus on training and development of staff academically and professionally. They all speak about adequate of human and material resources that should be use in carrying out training and development. They also stressed on the repercussions of not developing staff in an academic environment and other organizational set-ups. Academic staff can only give what they have in terms of knowledge and skills. If they are short of that in any way, then the programme is deficient, and therefore not fit for its purpose. For these reason the empirical studies reviewed are related to the present study and it has confirmed that, a good staff development policy of an institution could have significant effect on the acquisition of Laboratory skills by students in Science Laboratory Technology Programme, In Nigerian Polytechnics.

2.8 Summary

The chapter examined models, theories and types of staff development and how they are related to one another. The review of past researches reveals the strengths and weaknesses of previous researches and related work, thereby enabling the present researcher to improve upon the present research. The empirical studies reviewed so far are researches on staff development programmes and other similar issues on skills acquisition and problems of staff development and personnel management. Hence the present study investigated the impact of Academic Staff Development Programme on Students Laboratory Skills Acquisition in Nigerian Polytechnic. In that human and material resources and the curriculum of Science Laboratory upgrade has been found to be the bed rock of skill's acquisition processes in Nigerian university.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a detailed account of the methods used to carry out the study. The chapter is organized into the following sections: research design, population, sample and sampling procedure, instruments for data collection, pilot study, validity and reliability of the instrument, procedure for data collection, and procedure for data analysis.

3.2 Research Design

Descriptive survey was used for this study within which ex-post factor design has been chosen. According to Emmanuel (2013), it is used for studies which aim at collecting data on an already existing situation and describing in a systematic manner, the characteristics feature or facts about a given population and it is also the design used to study subject that are already assigned to, or classified into the various levels of variables, whose effects are being investigated and cannot be alter by anyone.

Therefore, the descriptive survey design was adopted for the study because it involves an investigation covering the entire population of Academic staff and students of Science Laboratory Technology programme, the human and material resources needed to acquire relevant skills in SLT and the impact of Science Laboratory to professional development in the Polytechnics in Nigeria. Hence; the researcher usually has no control over the variables of

interest and therefore cannot manipulate them. Indeed, the researchers can only attempts to link some already existing effect or observations to some variables as causative agents

3.3. Population

The population for this study comprised all the 2,495 staff and 74,850 students in Polytechnics offering Science Laboratory Technology programme in Nigeria with a total number of 87 polytechnics. These are indicated in table 3.1.

Table 3.1 Population of academic staff and students of science laboratory technology programme in Nigerian polytechnics(2015).

S/NO	GEOPOLYTICAL ZONE	NUMBER OF POLYTECHNICS	NUMBER OF ACADEMIC STAFF	NUMBER OF STUDENTS
1.	North-West	14	430	12,900
2.	North-East	10	265	7,950
3.	North-Central	12	410	12,300
4	South-West	25	620	18,600
5	South- East	11	280	8400
6	South-South	15	490	14,700
	TOTAL	**87**	**2495**	**74,850**

Source: National Board for Technical Education (NBTE) 2015.

3.4. Sample and Sampling Technique

The sampling technique used for this research was stratified sampling technique. Twelve (12) out of the eighty seven (87) that is 13.79%, approximately 14% of the polytechnics offering Science Laboratory Technology programme were used for the study. The strata used were six geo-political zones of Nigeria. The selection from the stratum was done based on probability proportional to size techniques. In other words the academic staff and student's strength of a particular institution gave it a better chance of being selected. According to Emmanuel (2013) is a procedure adopted when the population is divided into units or sections with distinct boundaries.

According to Kashim (2009) and Emmanuel (2013), in a descriptive survey study, it is desirable to have a minimum of 10% of the entire population to represent all. It could then be considered an unbiased estimate of the entire population. Using simple random sampling procedures, thirty (30) students of Science Laboratory Technology Programme would be selected from each of the twelve (12) selected polytechnics, making a total of 360 students that was used. The advantage of these sampling techniques is that it ensured a fair representation of the target population and also enables the researcher to gather data from respondents in all the polytechnics, since it will be too expensive and time consuming to have access everyone.

The least number of academic staff from the twelve selected polytechnics is twenty nine (29), to have uniform number in all the polytechnics therefore, purposive sampling was adopted to select twenty (20) Academic Staff of Science Laboratory Technology department in each of the twelve (12) selected polytechnics, making a total of two hundred and forty (240) staff that

was used for the study. In purposive sampling, specific elements which satisfy some pre-determined criteria are selected. It is important to recognize that the representativeness of such samples is only assumed.

Table 3.2: Sampled Institutions, their population and sample of their respondents

S/N	Geo-Political Zones	Polytechnic sample Selected	Population of Academic Staff of SLT	Sample of Academic Staff of SLT	Students population in SLT	Sampled of Student of SLT
1	North-West	Sokoto State Polytechnic,Sokoto	38	20	149	**30**
2	North-West	Federal polytechnic, Kazaure	34	20	122	**30**
3	North East	Federal Polytechnic, Bauchi	35	20	179	**30**
4	North East	Ramat Polytechnic, Maiduguri	31	20	134	**30**
5	North Central	Federal Polytechnic, Bida	32	20	216	**30**
6	North Central	Kwara State Polytechnic, Ilorin	31	20	180	**30**
7	South –West	Osun State Polytechnic Iree	32	20	142	**30**
8	South –West	Federal Polytechnic, Ado Ekiti	44	20	122	**30**
9	South –South	Auchi Polytechnic, Auchi	30	20	120	**30**
10	South- South	Delta State Polytechnic, Ozoro	29	20	116	**30**
11	South-East	Federal Polytechnic, Uwana-Afikpo	30	20	182	**30**
12	North- East	Institute of Management and Technology, Enugu	32	20	204	**30**
Total	6	12	398	240	1866	360

Source: NBTE Directory of Accredited Programmes in Polytechnics (2014) and (2016)

3.5 Instrumentation

Questionnaire and observation were employed in this study as research instruments. Questionnaire usually consists of a set of items that are presented in written form to a respondent who is expected to respond in writing. Questionnaire was the main instrument used for the data collection. It was used because it is the most appropriate instrument suitable for distribution to a large population, at the same time where the respondents are usually given enough time to fill in the questionnaire and are always assured of anonymity.

Close-ended structure was adopted for the design of the questionnaire, in which specific statements were prepared on one side and a response on the other side. The response format consists of four alternative options from which the respondents are expected to choose one option for each statement. The four alternative options is the Likert-type scale, consisting of the following codes. Strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD).

The questionnaire was designed for two categories of respondents. These are the academic staff and students of Science Laboratory Technology Department in polytechnics. The questionnaire I contained 60 items and is for academic staff and questionnaire II contained 20 items which is for students. Part 1 of the two categories of questionnaires would request for demographic data of the respondents such as gender, age, highest educational qualifications, and years of working experience, present rank also like, programme of studies, year admitted and so forth. Part 2 of questionnaire 1 for academic staff would be divided into 5 sections (A to E) respectively. Items were designed to provide answer by placing a tick in a provided box.

Observation is a process employed to find out some information that can assist the researcher in determining other issues in related to the study, Emmanuel (2013) explained that observation involves watching people, events, situations or phenomena and obtaining first- hand

information relating to particular aspects of such people, events, situation or phenomena. Non-participant observation would be adopted, that is, the researcher is not going to be involved in the behaviour being observed. Observations was carried out using the records of NBTE accreditation reports which are obtained from records of student's practical work conducted from the curriculum guide, comments from field during Students Industrial Work Experience Schemes (SIWES) that students undergoes in the second year of ND programmes, that are usually tracked and recorded by the polytechnics, examination records of students and staff development files of the Science Laboratory Technology Programmes department in the selected polytechnics. Observation schedule/ Check list of ten items was used to report the researcher's observations.

3.5.1. Validity of the Instrument

Validity implies the extent to which an instrument measures what it was designed to measure. To determine the content validity of questionnaire utilized in this study, the researcher's colleagues, supervisors and experts in the Department of Educational Foundations and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria were given the instrument to assess its clarity and relevance. The corrections and modifications made were incorporated into the final copy of the questionnaire. The use of experts to validate the questionnaire was based on the opinions of Emmanuel (2013), who state that scientific validation by some competent colleagues who are familiar with the purpose of the survey is an effective method of content validity of a research instrument.

3.5.2. Pilot Study

To establish the reliability of the instruments, a pilot study was conducted using Kaduna Polytechnic and Nuhu Bamali Polytechnic. These two polytechnics are not part of the target polytechnics used in this study. The researcher presented her introductory letter that has earlier

been obtained from the Department of Educational Foundations and Curriculum along with her student's identity card to enable the researcher sought for official permission of the appropriate authorities in collecting relevant information from the respondents. A total of thirty (30) copies of questionnaire (1) were distributed to academic staff and thirty (30) copies of questionnaire (2) to students of Science Laboratory Technology programme. Twenty nine out of the thirty questionnaire administered to academic staff were completed and returned. One was returned un- attended to. All the 30 questionnaires administered to students were completed and returned.

3.5.3 Reliability of the Instruments

The data collected from the pilot study conducted was statistically analyzed using Cronbach's Alpha reliability technique which shows a reliability index of 0.814. This result confirms that the instruments are reliable for use in the conduct of the main study. This according to Emmanuel (2013), an instrument can be said to be reliable if its reliability index falls between 0.05 and positive (+1) because the closer the reliability index to 1 the more reliable it becomes and the closer it is to zero (0) the less reliable it is.

3.6. Procedure for Data Collection

The researcher employed the following procedures for the collection of data for the study. First, the researcher obtained an introductory letter from the Department of Educational Foundations and Curriculum. She also sought for permission from the Management of National Board for Technical Education (NBTE) Kaduna, so as to afford the researcher opportunity to use the accreditation reports for the observation process. Six research assistants were employed after a day's training on the procedures for the administration and retrieval of the instrument using a

written manual drawn by the researcher. The administration and retrieval of the instruments lasted for six weeks.

3.7. Procedure for Data Analysis

The data collected from the administration of the research instruments was analyzed using the following statistical tools: in analyzing section 'A' which is asking questions on Bio-Data of the respondents, frequencies and percentages, was used for the analysis. For the research questions, mean, minimum and maximum was used. After which Chi-Square (X2) Contingency Test was used to determine the significances of the various hypotheses. However, for observation, simple percentages would be used to summarize the researcher's observation arising from the use of observation schedule.

CHAPTER FOUR

DATA ANALYSIS, RESULT AND DISCUSSIONS

4.1 Introduction

This chapter presents the analysis of the data collected and the results obtained from a study titled Perception of stake holders on academic staff development programmes on laboratory skills acquisition in Nigerian polytechnics. The statistical package of IBM SPSS version 23 was used for the analysis. To achieve this, seven objectives, seven research questions

and seven research null hypotheses were stipulated. The analyses consist of 234 staff and a total of 348 students. The analysis is presented in three sections. The first section presented the bio-data variables of the respondents (staff and students) in frequencies and percentages. The second section answers the research questions using the descriptive statistics of items frequencies, mean, and standard deviations, in which the cumulative mean of the set items in the research question is compared with the decision mean of 2.500 computed based on the 4-likert scale options given as (4+3+2+1)/4=2.50. The third section tests the seven null hypotheses, with the inferential statistics of Chi-squares statistics, all the statistics were tested at 0.05 alpha level of significance. The summary of the major findings was also provided.

Distribution of respondents by their bio data variables

Table 4.1.1: Distribution of Staff respondents by: Polytechnic

Polytechnic	Frequency	Percent
Sokoto State Poly	20	8.5
Federal Poly Kazuare	18	7.7
Federal Poly Bauchi	17	7.3
Ramat Poly Maiduguri	20	8.5
Federal Poly Bida	20	8.5

Kwara Poly Ilorin	19	8.1
Osun State Poly Iree	20	8.5
Fed. Poly Ado Ekiti	20	8.5
Auchi Poly Auchi	20	8.5
Delta State Polytechnic	20	8.5
Fed Poly UwanaAfikpo	20	8.5
IMT Enugu	20	8.5
Total	234	100.0

The table above showed the distribution of the academic staff according to number of questionnaires that are completed in their various polytechnic. Twelve (12) different polytechnic were considered. They are Sokoto State Polytechnic, Federal Poly Kazaure, Fedearal Poly Bauchi, Ramat Poly Maiduguri, Federal Poly Bida, Kwara Poly Ilorin, Osun State Poly Iree, Federal Poly Ado Ekiti, Auchi Poly Auchi, Delta State Poly, Federal Poly Uwana- Afikpo and IMT Enugu being represented by 20,18,17,20,20,19,20,20,20,20,20 and 20 respectively. The total staff that responded to the instruments was 234.

4.1.2: Demographic data Analysis

Table 4.1.2: Distribution of Staff respondents by: Designation

	Frequency	Percent
Mgt staff	9	3.8
Head of Dept	19	8.1
Lecturer	127	54.3
Technology	48	20.5
Technician	16	6.8
Lab Attendants	15	6.4
Total	234	100.0

The table above showed the designation of the academic staff. It was revealed that 19 representing 8.1% are head of departments as against 127 representing 54.3% that are lecturers as against 48 or 20.5% that are technologist, while 25 representing 10.6% are technician and the rest 15 or 6.5% are laboratory attendants.

Table 4.1.3: Distribution of Staff respondents by: Qualification

	Frequency	**Percent**
Doctoral Degree	9	3.8
Masters degree	101	43.2
Bachelor Degree	52	22.2
HND	48	20.5
ND	14	6.0
Others	10	4.3
Total	234	100.0

On the staff highest academic qualification, it was found out that while 9 or 38% have Doctoral degree, 101 or 43.2% have Masters Degree, 52 or 22.2% are bachelor's degree staff holders, while 48 or 20.5% are HND, 14 or 6.0 are ND and the rest 10 or 4.3 possess other forms of qualification.

Table 4.1.4: Distribution of Staff respondents by: Gender

	Frequency	**Percent**
Female	65	27.8
Male	169	72.2
Total	234	100.0

The table above revealed that 65 or 27.8% of the staff are females and the rest 169 representing 72.2% are male staff.

A Table 4.1.5: Distribution of Staff respondents by: age

	Frequency	Percent
25-35 yrs	72	30.8
36-45 yrs	107	45.7
46-55 yrs	51	21.8
56-65 yrs	4	1.7
Total	234	100.0

On the staff age ranges, 72 or 30.8% are between 25-35 years, 107 or 45.7% are between 36-45 years, 51 or 21.8% are between 46-55 years and the rest 4 or 1.7% between 56-65 years.

Table 4.1.16 Distribution of Staff respondents by: Years of experience

	Frequency	Percent
0-5 yrs	72	30.8
6-10 yrs	65	27.8
11-15 yrs	46	19.7
16-20 yrs	23	9.8
21-25 yrs	19	8.1
26-30 yrs	9	3.8
Total	234	100.0

On respondents years of experience it was discovered that while 72 or 30.8% have spent between 0-5 years, 65 or 27.8% spent between 6-10 years, while 46 19.7% have spent between

11-15 years as against 23 or 9.8%, 19 or 8.1% spent between 21-25 years and the rest 9 or 3.8% of the staff have between 26-30 years of working experience.

Table 4.1.7: Distribution of Students respondents by: Polytechnic

Polytechnic	Frequency	Percent
Sokoto Polytechnic	29	8.3
Federal Polytechnic Kazuare	29	8.3
Federal Polytechnic Bauchi	30	8.6
Ramat Poly Maiduguri	28	8.0
Federal Polytechnic Bida	28	8.0
Kwara Polytechnic Ilorin	29	8.3
Osun State Polytechnic Iree	30	8.6
Federal Poly Ado Ekiti	28	8.0
Auchi Polytechnic Auchi	28	8.0
Delta state Polytechnic	29	8.3

Federal Polytechnic Uwana Afikpo	30	8.6
IMT Enugu	30	8.6
Total	348	100.0

The table above showed students distribution according to their polytechnics. Twelve (12) polytechnics with a total of 348 students were used for the analysis. It was observed that Sokoto State Polytechnic, Federal Polytechnic Kazaure, Kwara Polytechnic Ilorin, Delta State Polytechnic has 29 respondents, representing 8.3% each. While Federal Polytechnic Bauchi, Osun State polytechnic, Federal polytechnic Uwana Afikpo and IMT Enugu had 30 respondents representing 8.6% each. On the other hand Ramat Poly Maiduguri, Federal Polytechnic Bida, Federal Polytechnic Ado Ekiti and Auchi Polytechnics Auchi had 28 respondents representing 8.0% each. This brings to a total of 348 respondents that were duly analyzed in this study.

4.2 Response to Research Questions

This section highlights the responses to the research questions raised in chapter one. They are:

1. What is the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;
2. What is the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;
3. How adequate is the resources provided for funding academic staff development programme in Nigerian Polytechnics;

4. What is the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;
5. What is the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;
6. What is the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics?
7. What is the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

Response on Research question (1) what is the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;

Table 4.2.1: The perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;

S/N	ITEMS	SA	A	D	SD	MEAN	STD
		126	98	8	2	3.49	.609
1.	Participation in conferences would enhance lecturers' ability to develop students' critical thinking and problem solving skills.						
2	Participation of Academic staff in seminars, workshops and conferences enhance practical skills to teach the operation of analytical equipment, tools and other facilities used in skills acquisition by students.	111	114	7	2	3.43	.598
3	All academic staff in laboratories can teach	79	145	9	1	3.29	.557

	relevant skills to students through connection of prior knowledge and experience to the present learning situation to produce desired outcome when they attend conferences, workshops and seminars.						
4	Stake holders had the view that academic Staff are given clearly defined procedures outlining their responsibilities in teaching practical skill to students.	55	152	25	2	3.11	.604
5	Staff are given basic information about the procedures of handling of equipment and other facilities used in the laboratory for practical lessons.	65	120	47	2	3.06	.715
6	Academic staff and students have attended clear and structured programmes of initiation into the laboratory practices, organized by the department of science laboratory technology.	47	109	71	7	2.84	.775
7	Staff are encouraged to treat students fairly irrespective of their learning abilities during practical class.	71	129	29	5	3.14	.704
8	Staff and Students often discuss skill instructional issues and problems with each other in the laboratory, through informal and formal assessment techniques to improve students' performance	51	139	37	7	3.00	.706
	Cumulative mean					3.17	

Decision mean=2.500

The above table showed staff responses on Perception of stakeholder on academic staff development on laboratory skills acquisition. Their overall response in this regard is positive as the cumulative mean of 3.17 was found to be higher than the decision mean of 2.500. Specifically most the respondents believed that Participation in conferences has enhanced lecturers' ability to develop students' critical thinking and problem solving skills. As this item one attracted the highest mean response of 3.49 with details showing that while 126 were in

strong agreement, 98 were in agreement as against 8 that disagreed and the rest 2 strongly disagreed.

In the same manner, some respondents are of the opinion that participation of academic staff in seminars, workshops and conferences enhance practical skills to teach the operation of analytical equipment, tools and other facilities used in skills acquisition by students, as this item two attracted the second highest mean response of 3.43 with details showing that while 111 were in strong agreement, 114 were in agreement as against 7 that disagreed and the rest 2 respondents are in strong disagreement.

It can be concluded that staff responses on Perception of stakeholders on academic staff development on laboratory skills acquisition, is on the positive note specifically, Participation in conferences has enhanced lecturers' ability to develop students' critical thinking and problem solving skills and that Participation of Academic staff in seminars, workshops and conferences enhance practical skills to teach the operation of analytical equipment, tools and other facilities used in skills acquisition by students,

4.2.2 Research question (2) what is the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics

Table 4.2.2: Responses of staff on impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics

S/N	ITEMS	SA	A	D	SD	MEAN	STD
1	When academic staff are employed, a senior colleagues is designated to provide them with professional support.	64	116	47	7	3.01	.772
2	A senior colleague regularly works with academic staff to encourage their personal	47	148	32	7	3	.678

	and professional growth.						
3	The mentor guides lecturers to incorporate a variety of instructional strategies in their skills acquisition processes	48	138	42	6	2.97	.699
4	Polytechnics' management sponsor academic staff to attend conferences, seminars and workshops.	61	117	50	6	3	.761
5	Management pays postgraduate tuition fees of academic staff to attend higher degrees, seminars, workshops and conferences.	68	92	65	9	2.94	.849
6	Management gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences.	86	120	19	9	3.21	.749
7	Sabbatical leave for qualified staff is granted when they apply.	61	112	49	12	2.95	.822
8	Management often grants professional development leave to lecturers when they apply	47	116	54	17	2.82	.833
	Cumulative mean					2.987	

Decision mean=2.500

The above table showed the availability of academic staff development programmes in Nigerian polytechnics. Their overall response in this regard is positive as the cumulative mean of 2.987 was found to be higher than the decision mean of 2.500. Specifically, the Management gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences. As this item six attracted the highest mean response of 3.21 with details showing

that 86 were in strong agreement, 120 were in agreement as against 19 that disagreed and the rest 9 strongly disagreed.

In the same vein, most of the respondents are of the opinion that, a senior colleague regularly works with academic staff to encourage their personal and professional growth. This item two attracted the second highest mean response of 3, with details showing that 47 were in strong agreement, 148 were in agreement as against 32 that disagreed and the rest 7 in strong disagreement. In summary availability of academic staff development programmes in Nigerian polytechnics specifically, Management gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences and a senior colleague regularly works with academic staff to encourage their personal and professional growth.

4.2.3Research question (3) how adequate is the resources provided for funding academic staff development programme in Nigerian Polytechnics;

Table 4.2.3: Responses on Adequacy is the resources provided for funding academic staff development programme in Nigerian Polytechnics;

S/N	ITEMS	SA	A	D	SD	MEAN	STD
1	All academic staff of Science Laboratory Technology have benefited from sponsorships of staff development policy in the polytechnics.	30	53	119	32	2.35	.871
2	Half of academic staff of Science Laboratory	32	59	116	27	2.41	.866

	Technology have benefited from sponsorships of staff development policy in the polytechnics.						
3	Only few of academic staff of Science Laboratory Technology have benefited from sponsorships of staff development policy in the polytechnics.	42	99	77	16	2.71	.838
4	No academic staff of Science Laboratory Technology have benefited from sponsorships of staff development policy in the polytechnics.	27	36	84	87	2.01	.996
5	Only lecturers Science Laboratory Technology have benefited from sponsorships of staff development policy in the polytechnics.	20	34	108	72	2.01	.893
6	Only Technologists and technicians of Science Laboratory Technology have benefited from sponsorships of staff development policy in the polytechnics.	7	23	135	69	1.86	.704
7	Some Academic staff are sent on training without consideration its relevance to present job or future posting.	26	40	105	63	2.12	.934
8	Management of Polytechnics rely more on TETFund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored and the duration of time given when approval is given.	68	106	39	21	2.94	.904
9	Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave due to inadequate resources.	63	89	66	16	2.85	.898
10	The frequency/duration provided for staff training in polytechnics do not encourage academic staff to be motivated for development	35	95	81	23	2.61	.859
	cumulative mean					**2.387**	

Decision mean =2.50

Table 4.2.3 showed the adequacy of staff development programme in Nigerian Polytechnics. Their overall response in this regard is positive as the cumulative mean of 2.387 was found to be higher than the decision mean of 2.500. Specifically, Management of Polytechnics rely more on TETFund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored and the duration of time given

when approval is given. As this item eight attracted the highest mean response of 2.94 with details showing that 68 were in strong agreement, 106 were in agreement as against 39 that disagreed and the rest 21 strongly disagreed. In the same vein, most respondents are of the opinion that, Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave, as this item nine attracted the second highest mean response of 2.85, with details showing that while 63 were in strong agreement, 89 were in agreement as against 66 that disagreed and the rest 16 in strong disagreement. In summary there is adequacy of staff development programme in Nigerian Polytechnics specifically. The issue of concerned here is that, Management of Polytechnics rely more on TETFund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored and the duration of time given when approval is given. And Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave.

4.2.4 Research question (4): What is the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;

Table 4.2.4: Response rate on the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;

S/N	ITEMS	SA	AA	D	SD	MEAN	STD
1	Lack of adequate support and feedback from the management, when approval is been sort by academic staff.	31	119	59	25	2.67	.839
2	Stake holders' fail to ensure adequate resources to implement training by the authorities.	33	124	56	21	2.72	.815
3	Management does not provide adequate information on available opportunities in and outside the polytechnics on staff development.	38	114	58	24	2.71	.860

4	Lack of transparency and fairness in sponsorship (training is provided for some lecturers that are close to the management).	46	98	55	35	2.66	.959
5	Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave.	46	124	45	19	2.84	.832
6	Absence of planned, systematic and structured staff development programme for lecturers.	41	95	66	32	2.62	.929
7	Some lecturers are sent for training without consideration for its relevance to the present or future job.	38	61	86	49	2.38	.991
8	Modalities for accessing development programmes are not made known to lectures.	49	76	74	35	2.59	.981
9	Poor working environment (lack of adequate motivation, physical facilities and communication) hinder lecturers development	46	116	51	21	2.80	.858
10	Management rely on TET Fund for sponsorships than the general allocation in the school.	68	128	19	19	3.05	.835
	Cumulative mean					**2.704**	

Decision mean =2.500

Table 4.2.4 showed the accessibility of staff development in Nigerian Polytechnics. Their overall response in this regard is positive as the cumulative mean of 2.704 was found to be higher than the decision mean of 2.500. Specifically, Management relies on TET Fund for sponsorships than the general allocation in the school. Item number ten attracted the highest mean response of 3.05 with details showing that 68 were in strong agreement, 128 were in agreement as against 19 that disagreed and the rest 19 strongly disagreed. In the same vein most are of the opinion that, Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave as the item five attracted the second highest mean response of 2.84, with details

showing that while 46 were in strong agreement, 124 were in agreement as against 35 that disagreed and the rest 19 in strong disagreement. In summary, Accessibility of staff Development in Nigerian Polytechnic specifically, Management rely on TET Fund for sponsorships than the general allocation in the school and Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave.

4.2.5 Research question Five (5): What is the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;

Table 4.2.5: response on the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;

S/N	ITEMS	Response categories				MEAN	STD
		SA	A	D	SD		
1	Academic staff that participated in conferences, workshops and seminars gained skills in making public presentations of lectures and speeches.	67	141	12	14	3.12	.752
2	Academic staff ability to write scholarly papers has improved as a result of participating in conferences, workshops and seminars.	74	134	14	12	3.15	.748
3	Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars.	78	134	10	12	3.19	.740
4	Participation in conferences, workshops and seminars	75	138	7	14	3.17	.750

	has improved lecturers' ability to publish their work in academic journals or conference proceedings.						
5	Lecturers can manage their classroom activities effectively after attending conferences, workshops and seminars.	47	141	32	14	2.94	.759
6	Participation in conferences, workshops and seminars has broadened academic staff's knowledge of the courses they teach.	58	148	14	14	3.07	.738
7	Lecturers' supervision of students' projects on skill's acquisitions has been enhanced as results of participation in conferences.	65	143	10	16	3.10	.766
8	Lecturers' classroom communication and interactive skills (e.g correct use of language, oral and written) have been enhanced as a result of attending conferences, workshops and seminars.	49	157	15	13	3.03	.705
9	Lecturers can use various techniques (e,g. observation, test, oral questioning and presentation) to determine students' performance having participated in conferences, workshops and seminars.	63	146	14	11	3.12	.711
	CUMULATIVE MEAN					3.098	

Decision mean = 2.50

Table 4.2.5 showed the relevance of academic staff development to capacity to teach laboratory skills in the polytechnics. Their overall response in this regard is positive as the cumulative mean of 3.098 was found to be higher than the decision mean of 2.500. Specifically, Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars. As this item three attracted the highest mean response of 3.19 with details showing that 78 were in strong agreement, 134 were in agreement as against 10 that disagreed and the rest 12 strongly disagreed. They were of the opinion that participation in conferences, workshops and seminars has improved lecturers' ability to publish their work in academic journals or conference proceedings. This item four attracted the second highest mean response of 3.17, with details

showing that 75 responses were in strong agreement, 138 were in agreement as against 7 that disagreed and the rest 14 in strong disagreement. In summary, Relevance academic staff development to capacity to teach laboratory skills in the polytechnics specifically, Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars and Participation in conferences, workshops and seminars has improved lecturers' ability to publish their work in academic journals or conference proceedings.

4.2.6 Research Question Six: What is the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics?

Table 4.2.6 : Response on the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics?

S/N	ITEMS	Response categories				MEAN	STD
		SA	AA	D	SD		
1	Participation in higher education programme has broadened and updated their knowledge of teaching the practical and theoretical contents of the curriculum.	95	130	3	6	3.34	.637
2	Lecturers who attended higher educational programme have improved on research abilities.	109	107	13	5	3.37	.688
3	Lecturer's ability to supervise students' projects effectively has been enhanced as a result of higher education training.	101	117	12	4	3.35	.658
4	Participation in higher education has helped lecturers to handle a' range of challenging classroom management issues in SLT.	85	138	9	2	3.31	.585
5	Acquisition of higher education has improved the out-put productivity of lecturers in the polytechnics.	97	117	16	4	3.31	.675
6	Acquisition of higher degrees especially Ph.D has negatively affected the retention of lecturers in the Polytechnics.	64	92	58	20	2.85	.920

7	As part of condition of service for academic staff, they are encouraged to participate in continuous professional development.	64	142	22	6	3.13	.675
8	Staff that attend conferences, workshops and seminars are taught to imbibe professional behavior (e.g. punctuality, carefulness, and laboratory dress code and appearance) that are expected of them.	60	157	12	5	3.16	.607
9	Academic staff are encouraged to relate with their senior colleagues after acquiring higher degrees to promote team work and mentoring relationships among them.	76	146	9	3	3.26	.590
10	As Mentors, senior staff that have acquired higher degrees assist others with new teaching materials to implement the curriculum of SLT.	70	133	21	10	3.12	.739
	Cumulative mean					3.22	

Decision mean=2.500

Table 4.2.6 showed the impact of professional training of academic staff on their job performance in the polytechnics. Their overall response in this regard is in agreement that professional training of academic staff has positive impact on their job performance in the polytechnics. This is evidence, in the cumulative mean of 3.22 that was found to be higher than the decision mean of 2.500. Specifically, Lecturers who attended higher educational programmes have improved in their research abilities. As this item two attracted the highest mean response of 3.37 with details showing that 109 were in strong agreement, 107 were in agreement as against 13 that disagreed and the rest 5 strongly disagreed. In the same way are of the opinion that, Lecturer's ability to supervise students' projects effectively has been enhanced as a result of higher education training. The item three attracted the second highest mean response of 3.35, with details showing that while 101 were in strong agreement, 117 were in agreement as against 12 that disagreed and the rest 14 in strong disagreement. In summary, impact of professional training of academic staff on their job performance in the polytechnics, specifically, Lecturers

who attended higher educational programmes have improved research abilities and, Lecturer's ability to supervise students' projects effectively has been enhanced as a result of higher education training.

4.2.7: Research question (7) what is the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

Table 4.2.7: Responses of students on the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

S/N	Items	Response categories				mean	Std.
		VI	AD	IN	VI		
1	Science Laboratory Technology curriculum is well structured and up to date to meet-up new events in the programme.	133	132	57	26	3.07	.918
2	The Basic Sciences laboratories in your institution are adequately furnished, equipped to be used to teach all the topics in the curriculum of Science Laboratory Technology (SLT)	61	134	108	45	2.61	.922
3	Your overall impression of evaluation systems (e.g. grades and grading system of examinations and certification procedures) are good	91	149	69	39	2.84	.941
4	Time allocation for SIWES programme is adequate	136	131	42	39	3.05	.980
5	Time allocation Industrial Training for SLT programme is not adequate	77	113	64	94	2.50	1.112
6	Overall practical experience acquired in the Science Laboratory Technology (SLT) programme based on	86	122	75	65	2.66	1.047

	the curriculum contents is satisfactory						
7	Time allocated for practical in the curriculum is inadequate, therefore need more time allocation	63	114	82	89	2.43	1.059
8	The duration of your training Programme is adequate to cover the curriculum contents of Science Laboratory Technology.	114	133	53	48	2.90	1.012
9	Library services provided you with relevant books and journals to study the content of the curriculum of SLT	88	114	77	69	2.64	1.066
10	Technical staff of the laboratory do assists lecturers during practical work in the laboratories	92	120	67	69	2.68	1.071
11	Ability of the academic staff in laboratories to communicate effectively with students during practical lessons is satisfactory	83	143	88	34	2.79	.917
12	Relationships between staff and students of the SLT and other academic staff of other department is cordial	86	162	65	35	2.85	.905
13	There are enough competent staff in your laboratories.	84	141	75	48	2.75	.974
14	There are enough academic staff in your Science Laboratory Technology programme.	88	128	86	46	2.74	.982
15	Practical classes are boring, because of bad attitude and poor relationships between academic staff and students	42	99	107	100	2.24	1.000
16	Relationship is good between academic staff and students within your department	109	140	72	27	2.95	.911
17	Staff in the laboratory (technologist, technicians laboratory Attendants and instructors) conduct practical for students alone without any assistance from lectures	80	138	76	54	2.70	.991
18	There is a good relationship and understanding between your department and others in sharing facilities when the need arises.	94	119	77	58	2.72	1.039
19	There are adequate facilities/equipment in Science Laboratory Technology laboratories in your institution(physics, Chemistry and Biology)	84	111	77	76	2.58	1.080

20	There are sufficient hand tools and accessories in your laboratories	90	79	87	92	2.48	1.140
	Cumulative mean					***2.709***	

Decision mean =2.500

The table above showed student's responses on the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics, which they rated above average since the cumulative mean of 2.709 was found to be higher than the decision mean of 2.5000.

Specifically, Science Laboratory Technology curriculum is well structured and up to date to meet-up with the new events in the programme, as this item attracted the highest mean response of 3.07. Details of response showed that while 133 rated this very adequate while 132 rated it as adequate as against 57 that rated it as inadequate and the rest 26 rated this very inadequate. In the same vein, time allocation for SIWES programme is adequate as this opinion attracted their second highest mean response of 3.05 with details showing that while 136 rated this as very adequate, 131 others rated it as adequate while 42 rated it as inadequate and the rest 39 rated it as very inadequate.

In summary, students responses on the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics , which they rated above average since the cumulative mean of 2.709 was found to be higher than the decision mean of 2.5000, as most of the students believed that Science Laboratory Technology curriculum is well structured and up to date to meet-up with new events in the programme, and time allocation for SIWES programme as adequate.

4.3 Testing of Research Hypotheses

Hypotheses formulated in a null form for this study titled perception of stake holder on academic staff development programmes on 'laboratory skills acquisition in Nigerian

polytechnics was tested from the data collected from 234 staff and a total of 348 students of SLT programmes in polytechnics. The seven null hypotheses statements were rejected. This is because the cumulative means was higher than the decision mean set up for the study. The seven hypotheses stipulated are analyzed and are as follows:

Hypothesis One: There is no significant difference in the opinions of respondents concerning the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics.

Table 4.3.1: Chi-Square (X2) Contingency Test in the opinions of staff respondents concerning the perceptions of stake holders on academic staff development programmes available in Nigerian Polytechnics;

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
Impact of academic staff development programmes on laboratory skills acquisition by students in Nigerian Polytechnics.		228.057	**32.671**	21	0.000	Significant

X^2 calculated =228.057 >32.671, at df 21

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the perception of stake holders on academic staff development programmes on laboratory skills acquisition in Nigerian Polytechnics. Reasons for these is that, the calculated X^2 value of 228.057 was found to be higher than the X^2 critical value of 32.671at df 21, while the calculated p- value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the

impact of academic staff development programmes on laboratory skills acquisition by students in Nigerian Polytechnics is hereby rejected.

Hypothesis Two: There is no significant difference in the opinions of respondents concerning the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;

Table 4.3.2:Chi-Square (X2) Contingency Test on the opinions of staff respondents concerning the impact of academic staff development on laboratory skills acquisition by students in Nigerian Polytechnics;

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
Availability of academic staff development programmes in Nigerian Polytechnics.		78.893	**32.671**	21	0.000	Significant

X^2 calculated =78.893>32.671, at df 21

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the availability of academic staff development programmes in Nigerian Polytechnic. Reason for this is the calculated X^2 value of 78.893 was found to be higher than the X^2 critical value of 32.671at df 21, while the calculated p- value of 0.000 was found to be lower than the 0.05c alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the availability of academic staff development programmes in Nigerian Polytechnics is hereby rejected.

Hypothesis Three: There is no significant difference in the opinions of respondents concerning the adequacy of resources provided for funding academic staff development programme in Nigerian Polytechnics;

Table 4.3.3:Chi-Square (X2) Contingency Test in the opinions of staff respondents concerning the adequacy of resources provided for funding academic staff development programme in Nigerian Polytechnics;

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
The adequacy of academic staff development programmes in Nigerian Polytechnics.		459.918	**40.113**	27	0.000	Significant

X^2 ***calculated =459.918 >40.113, at df 27***

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the adequacy of resources provided for funding academic staff development programme in Nigerian Polytechnics. The reason is that the calculated X^2 value of459.918 was found to be higher than the X^2 critical value of 40.113at df 27, while the calculated p-value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the adequacy of academic staff development programmes in Nigerian Polytechnics is hereby rejected.

Hypothesis Four: There is no significant difference in the opinions of respondents concerning the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;

Table 4.3.4:Chi-Square (X2) Contingency Test in the opinions of staff respondents concerning the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics;

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
The accessibility of staff development programmes in Nigerian Polytechnics		145.872	**40.113**	27	0.000	Significant

X^2 calculated =145.872 >40.113, at df 27

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the role of stakeholders in the accessibility of staff development programmes in Nigerian Polytechnics. The reason is that the calculated X^2 value of 145.872 was found to be higher than the X^2 critical value of 40.113at df 27, while the calculated p value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the accessibility of staff development programmes in Nigerian Polytechnics is hereby rejected.

Hypothesis Five: There is no significant difference in the opinions of respondents concerning the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;

Table 4.3.5:Chi-Square (X^2) Contingency Test in the opinions of staff respondents concerning the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics;

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
The relevance of staff development to capacity building of staff to teach laboratory skills in Nigerian Polytechnics.		48.392	**36.415**	24	0.000	Significant

X^2 calculated =48.392 >36.415, at df 24

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the relevance of staff training and development programmes to capacity building of academic staff to teach laboratory skills in Nigerian Polytechnics. The reason is that the calculated X2 value of 48.392 was found to be higher than the X2 critical value of 36.415at df 24, while the calculated p- value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the relevance of staff development to capacity building of staff to teach laboratory skills in Nigerian Polytechnics is hereby rejected.

Hypothesis Six: There is no significant difference in the opinions of respondents concerning the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics.

Table 4.3.6:Chi-Square (X2) Contingency Test in the opinions of staff respondents concerning the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics.

VARIABLE	N 240	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
The impact of professional training of academic staff on their job performance in the Polytechnics.		219.502	**40.113**	27	0.000	Significant

X^2 calculated =219.502 >40.113, at df 27

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of respondents concerning the potency of staff development, in the implementation of Science Laboratory Technology (SLT) curriculum in Nigerian Polytechnics.. The reason is that the calculated X^2 value of 219.502 was found to be higher than the X^2 critical value of 40.113at df 27, while the calculated p- value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of respondents concerning the impact of professional training of academic staff on their job performance in the Polytechnics is hereby rejected.

Hypothesis seven: There is no significant difference in the opinions of respondents concerning the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

Table 4.3.7:Chi-Square (X2) Contingency Test on the opinions of student's respondents concerning the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics.

VARIABLE	N 360	CALCULATED X^2	CRITICAL X^2	DF	P	Remarks
The Appraisals of Curriculum of Science Laboratory Technology(SLT) and over-all assessment for work habit and attitude to the Programme		403.721	**79.082**	57	0.000	Significant

X^2 calculated =403.721>79.082, at df 57

Results of the Chi-Square (X^2) Contingency Test, above showed that significant difference exist in the opinions of students respondents concerning the opinion of students about the design of SLT curriculum, in skills acquisitions processes in the basic science laboratories in Nigerian Polytechnics. The reason is that the calculated X^2 value of 403.721 was found to be higher than the X^2 critical value of79.082at df 57, while the calculated p- value of 0.000 was found to be lower than the 0.05 alpha level of significance. Therefore the null hypothesis which states that there is no significant difference in the opinions of students concerning the relevance of Curriculum of Science Laboratory Technology (SLT) to acquisition of practical skills and over-all assessment for work habit and attitude to the Programme is hereby rejected.

4.4 Summary of Major Findings

The following are the summary of the major findings. All the seven null hypotheses had p- values that were lower than the significant value of 0.05alpha level of significance set for the study. In view of this, all the research questions were answered and all the null hypotheses stipulated were rejected. The study came up with the following findings:

1. Finding revealed that participations in all forms of staff development such as, conferences, seminars, workshops, summits, meetings and all others forms of developments have been found to enhance academic staff's knowledge in critical thinking, problem solving, teaching of the operations of analytical equipment used in acquisitions of practical skills in Technical Education and Vocational Training (TVET) in general.
2. Staff development are given clearly defined procedures outlining their responsibilities in teaching practical skills to students and are given basic information about procedures of handling of equipment and other facilities in the Basic Science Laboratories during induction of new staff and students in the polytechnics.
3. The study has revealed that academic staff development programmes exists in Nigerian Polytechnics. Professional supports are usually given to academic staff when employed to the department. A senior colleague regularly works with the newly employed staff to encourage their personal and professional growth. They are provided with mentoring services to guide the new staff on how to incorporate a variety of instructional strategies in skills acquisition processes.
4. To buttress the availability of staff development programme in Nigerian polytechnics, stake holders of polytechnics sponsors academic staff to attend conferences, seminars and

workshops and all other forms of development processes. Salaries, Tuition fees and some allowances are paid, while time off or permission is given by the management. These variables signify the availability of staff development in Nigerian Polytechnics.

5. There was no adequacy of academic staff development programmes in Nigerian Polytechnics. This is because, majority of staff have not been privileged to benefit from the programme. Only few academic staff of science laboratory technology have benefited so far. Reasons for this are, management of polytechnics rely more on TETFund for sponsorships than the general allocation from the institutions and thereby limiting the number of academic staff that can be sponsored at a time.
6. There is a bureaucratic bottleneck in the processing of approval for sponsorships of academic staff in the polytechnics; staff are not encouraged to apply for training and developments. Those sponsored for higher training, in some instance do not complete the studies; they abandoned the course in the interim.
7. Findings equally revealed that, there is difficulties in accessibility of staff development programme in polytechnics, this has been associated to inadequate resources to sponsor staff by the managements of polytechnics.
8. Information are usually kept as secrete. It is kept away from majority of academic staff, revealing them too few individuals that are closed to the management staff. Therefore, only those with such information are privileged to go for any forms of training.
9. It became obvious from the findings, that, staff that are developed are found to be more articulates and having broad knowledge in making public presentations and speeches, writing papers, research, publications in academic journals and conferences proceedings

and also they can teach using thevarious scientific process skills and techniques. They can also provide mentoring service when the need arises.

10. Few staff that have been opportune to go for staff development programmes are found to be more articulates and having broad knowledge and skills that can be transferred to students in Science Laboratory Technology.
11. Findings from this study show that, students are of the opinion that, Science Laboratory Technology (SLT) curriculum is well structured and up to date to meet up with new events in the programme.
12. The basic science laboratories in polytechnics are adequately furnished, equipped to be used for the implementation of all the practical contents in the curriculum. However, this statement made by students are contradictory because the researcher observed many obsolete equipment in most of the laboratories visited in the polytechnics, while some are not available at all.
13. It was also revealed that, the evaluation system of examination and Student's Industrial Work Experience programme (SIWES) are adequate.
14. Time allocated for practical class in or outside the laboratory is grossly inadequate. The SLT curriculum should be reviewed to provide adequate time for practical classes in and outside the laboratory.

4.5 Discussion of Findings

This section presents the discussion of findings on the opinions of the respondents on all the issues related to the seven objectives, the seven research questions and the seven null hypotheses that are stipulated for the study. The main objective of this study was to investigate

the perceptions of stakeholders on academic staff development programme on laboratory skills acquisition in Nigerian Polytechnics. The data collected through the administration of questionnaires was analyzed using Chi-Square (X^2) Contingency Test at 0.05 alpha level of significance. This unit presents the discussion on the findings of the study.

The view of academic staff development programmes and student's laboratory skills acquisitions was sought and aggregated. The opinion of respondents on the perceptions of stakeholders on academic staff participation in various forms of staff development programmes such as conferences, seminars, workshops, meetings, orientation programmes, induction courses, short or long time higher degree among others was inadequate, this is because of lack of proper sponsorships by the polytechnics who depend largely on TETFunds for sponsorships, thereby given sponsorship to only few staff. Delaying or shortening the period of time approved for studies for staff, hence only short terms trainings are approved, in other to safe cost. The bureaucratic bottleneck in given sponsorship's approval is other great hinderers to staff development, thereby making it uninteresting for staff to apply for training, looking at the processes involved. Many staff are not given clear guidance on the procedures for application, as this aspect was not provided in staff hand book, outlining the process and conditions for training and development. Abubakar (2012), discover that, there was a serious deficiency in academic staff sponsorships and disseminations of information. This has resulted in great disadvantage on student's laboratory skills acquisitions.

Apparent from these findings is that, provision of academic staff development programme is imperative in enhancing lecturers' effectiveness in the discharge of their duties in the polytechnics. Thus, academic staff needs to be regularly provided with opportunities like seminars, workshops, conferences, summits etc. for them to improve their knowledge and

practical skills of the subject they teach. This is basically necessary because, we are living in a rapidly changing world such that whatever knowledge and skills academic staff have learnt becomes stale very fast, as new challenges and realities emerge in the society. Emmanuel (2013), to meet the needs in the changing world, a well packaged staff development programme like regular seminar on current issues in education is likely to further equip the academic staff with competences to discharge their duties effectively.

On the issues related to the impact of conference on the job performance of academic staff, the respondents were of the opinion that conferences had made significant impact on the job performance of lecturers. It had made them to gain skills in making presentations and writing scholarly papers and also enhanced their skills in teaching, supervision of student projects and carrying out research. In addition, they could also collaborate effectively with other lecturers to find solutions to problems in the polytechnic. Thus participation of academic staff in conferences had improved the overall job performance of academic staff.

Academic staff attendance of conferences is recognized as a means towards promotion and development in their respective areas of specialization or carrier and is a more frequent activity in the polytechnic. Peretomode and Chukwuma (2012) affirm that, the promotion of academic staff has come to be increasing as a result of quality of papers presented in conferences or published articles in journals and books. Although promotion may be the driving force for staff participation in conferences, it has facilitated the broadening of their knowledge and enhanced their work as academic staff. Gani (2013) state that academic staffs need to participate in variety of programmes to acquire skills needed to transform laboratory preceding which lead to proper skills acquisitions.

The impact of participation of academic staff development in higher education programme on their job performance was also sought. Findings indicate that there was consensus of the respondents' opinion that higher education qualification programme had made positive and significant impact on the job performance of the academic staff, thereby improving the acquisition of skills by students in the laboratory. Higher degree of academic staff has broadened the knowledge of their specializations in terms of teaching, research, and supervision of student's projects and work of maintenance of disciplines in the classroom managements. This can be said is the reasons why lecturers are sponsored for higher degree programmes. In support of this view Yakubu (2010) stated that TETFund and had sponsored academic staff for post graduate training (Masters and PhD) so as to improve their capacity to teach in tertiary institution. Relying on TETFund alone for sponsorships by polytechnic has limited the number of academic staff that can go for further training at any point in time. Managements now creates a means of introducing ways by which staff 'A' have to finish and return to take over the job, before staff 'B' can apply for training. This could results in several years in between staff to acquire adequate training and developments. Thus, it can be stated that higher educational qualification programmes gives academic staff opportunity to develop their skills in performing their jobs effectively and at the same time motivating them to achieve their goals.

However, higher education has affected the retention of academic staff with PhDs in the polytechnics; consequently, the polytechnics have limited number of staff with PhDs which affects their quality of manpower when compared to the Universities. The Universities are therefore increasingly benefiting from higher training of academic staff from Polytechnics. This study point that if higher education programmes are to improve capacity in the polytechnics,

staff development in the polytechnics must be structured to enable academic staff‟s progress to attain professorial status as the case in the Universities.

The impact of academic staff attitude towards attendance and participation in conferences was also examined. Data showed that generally staff attitude towards conferences attendance and participation was positive. Many academic staff had shown keen interest in attending and participating in conferences. They regard conference as essential in enhancing their careers and learning capability. They were willing to take part in conference even without financial and moral support from management. For these reasons attendants of conference is a now essential tool for teaching and learning in the polytechnics. These findings are in agreement with that of Murty and Fathima (2013) who discovered that employees had positive towards training. It contradicts the findings of Muzaffar and Malik (2012) that teacher's are mostly reluctant to participate in training and development.

Concerning the impact of organizational issues that constrain training and development of academic staff in the polytechnics, findings revealed that the managements of Polytechnics failed to provide adequate information to staff on available opportunities and modalities for academic staff assessing development programmes were not available to lecturers. These have hinders staff from participation in staff development programmes because, for them to effectively participate adequately, information is essential an.

The observation made by the researcher in the basic science laboratories, accreditation reports that was obtained from National Board for Technical Education (NBTE), also from the interactions with the head of departments in the selected polytechnics revealed that, as against the revelation made by students in the relevance of Science Laboratory Technology Curriculum

to acquisition of practical skills and over, all appraisal to work attitude to the programme, and also in determining the availability and adequacy of furniture and equipment used in the basic science laboratories, was discovered that some of these statements made by both the academic staff and students in their responses were not rightly pointed out. Some of the equipment available in the science laboratories are old and obsolete, some are not functional, some of the available equipments that are good are inadequate in quantity to take a class of one stream of thirty students, based on the standard of class streaming of 30 students per class stipulated by NBTE standard.

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CHAPTER FIVE
SUMMARY, CONCLUSIONAND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions deduced based on the findings and requisite recommendations. The chapter also gives suggestions for further studies and contribution to knowledge.

5.2 Summary

The study is titled the perceptions of stake holders on academic staff development programmes on laboratory skills acquisition in Nigerian polytechnics. In order to do this, the study was structured into five chapters which this section summarizes. The first chapters dwell on the general background of the study in which it was stressed that Polytechnic education depends on the quality of academic staff in terms of level of training, exposure, potency and

opportunities for professional development. The ability of students to acquire practical skills will therefore depend, on the competence of their academic staff to pass on such skills.

Polytechnic Education is a veritable means of producing the various levels and kinds of manpower required for the industrial, economical and social development of a nation. The statement of problems dwells on the very level of staff performance in the polytechnics due to largely low laboratory skills acquisition among others. The study was structured into seven objectives and seven questions and was answered by hypotheses tested. The study is significant as it provide ample information on staff development programmes and skills acquisitions by students for the Federal Government, State government, curriculum planners, staff and students and other researchers and stake holders in polytechnic sector.

Chapter two presented the literature review and empirical studies while chapter three presented the study's research methodologies. The study adopted the ex-post factor survey research design. The population consists of all the polytechnics in the country. The sample included staff and students from 12 carefully selected polytechnics across Nigeria. The instruments consist of two separate questionnaires for staff and students and observation checklist. The staff questionnaires consist of seven bio data variables and 60 structured questions into six different sections of the seven objectives. The student questionnaire consists of 20 structured questions that form the seventh objectives.

Chapter four provided the data analysis of the data obtained from the respondents. A total of 234 staff and a total of 348 students duly responded to the instruments whose responses formed the data analysis. Among others it was summarized that significant difference exist in the opinions of staff and students concerning the impact of academic staff development

programmes on laboratory skills acquisition by students in Nigerian Polytechnics. Chapter five concludes the entire study drawing up the conclusions deduced from the study as well as offers some recommendations.

5.3 Conclusion

Based on the study, the following conclusions are deduced: Participation in adequate staff development of acquiring of higher degree by academic staff has broadened the knowledge of their specializations in terms of teaching, research, supervision of student's projects and practical work in laboratories, also in maintenance of disciplines in the classroom managements. Conferences and seminars have made academic staff gain skills in making presentations and writing scholarly papers and also enhanced their skills in teaching, supervision of student projects/practical and carrying out research. In addition, they could also collaborate effectively with other lecturers to find solutions to problems relating to academic work outputs in the polytechnic. Thus participation of academic staff in conferences had improved the overall job performance.

It is evidenced that there is availability of academic staff development programmes in Nigerian polytechnics and management of polytechnics gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences. However, findings on that issue subsequently revealed that the managements of Polytechnics failed to provide adequate information to staff on available opportunities and modalities for academic staff assessing development programmes. Also, there was evidenced of adequate of staff development programme in Nigerian Polytechnics, but management of Polytechnics relies more on TET Fund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored, therefore, creating bureaucratic bottlenecks in processing of approvals for sponsorship or study leave in many instances. This has limited the number of academic staff that can go for further training at any point in time. Staff 'A' would have to wait

for staff B to finish and return to take over the job, before staff 'B' can apply and go for any kind of long training. This could results in several years in between staff A and B.

Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars, which has been recognized as a means towards promotion and development in their respective areas of specialization or carrier and is a more frequent activity in the polytechnics. Even though, promotion may be the driving force for staff participation in conferences and it has facilitated the broadening of their knowledge and enhanced their work as academic staff in transferring of acquires skills which leads to proper skills acquisitions.

Students responses on the relevance of Science Laboratory Technology(SLT) Curriculum to acquisitions of practical skills and over-all appraisal for work habit and attitude to the Programme, which they rated above average as most students believed that Science Laboratory Technology curriculum is well structured and up to date to meet-up new events in the programme. And time allocation for SIWES programme is adequate.

5.4 Recommendations

Based on the findings of this study, the following recommendations are hereby put forward.

1. The federal and state government should set up monitoring team to all state and Federal; Polytechnics for regular inspection and provisions of laboratory materials.
2. Staff of polytechnics especially the academic staff should be made to acquire adequate skills on laboratory practices.
3. Students should be adequately supervised in their SIWESS programme to enable them gain the required knowledge on skills best practices in SLT laboratories.
4. The management of polytechnics should encourage the academic staff to attend development programmes through sponsorships and used it as promotion demands in the polytechnics instead of relying too much on the TETFunds.
5. Government should adequately provide funds for the realization of laboratory skills development related issues through support to actively participate not only in local development efforts but international seminars, workshops and conferences by providing information and increased funding.
6. Non governmental agencies and rich individuals should assist in complementing government efforts financially in providing materials for laboratory skills.

5.6 Contributions to Knowledge

This study will contribute to knowledge in the following ways:

The outcome of this study will provide base and information source to all future researches related to this study. All categories of staff and students of polytechnics will find the outcome very interesting as it will provide them additional knowledge on how to acquire laboratory skill.

Stake holders especially government will use the information and knowledge from this study to draw recommendations on how best to improve the academic staff laboratory skills acquisition for the benefit of the students academic knowledge. It would give a clear picture of man power and corresponding staff development needed in respect of Science Laboratory Technology Programme offered in Polytechnic sector. It would reveal the synergy that exists between Academics and Professional Associations. The study would add to knowledge on the importance of the provisions of equipments and other facilities needed for Science Laboratory programmes.

5.5 Suggestions for Further Studies

This study is by no means exhaustive, further studies should be carried out on

1. Effect of Academic qualification and Experience on the effective use of laboratory skills in Nigerian polytechnics.
2. Relevant of Management staff and Funding to the development of skills in Science Laboratory Technology Programmes.
3. Uses of Competency based Curriculum in Teaching and Learning of Skills in Science Laboratory Technology Programmes.

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APPENDIX I: Letter attached to the questionnaire

Questionnaire for Academic Staff and Students of Science Laboratory Technology Department on Perceptions of Stake holders on the Academic Staff Development Programme for Laboratory skills Acquisition in Nigerian Polytechnics.

Department of Education

Faculty of Education

Ahmadu Bello University

Zaria.

Dear Sir/Madam

I am a postgraduate student of Ahmadu Bello University, Zaria, carrying out a PhD research study. The purpose of the questionnaire is to obtain your opinion on the Perceptions of Academic Staff Development Programme for Laboratory skills Acquisition in Nigerian Polytechnics.

Kindly assist to complete the questionnaire as whatever information provided by you would be confidential. It is for research purpose only.

Thank you for your cooperation.

Yours Faithfully,

Mrs Fatima Kabir Umar

APPENDIX ll A

QUESTIONNAIRE l

PERCEPTIONS OF STAFF DEVELOPMENT PROGRAMMES FOR LABORATORY SKILLS ACQUISITION IN POLYTECHNICS IN NIGERIA

INSTRUCTION:
Please mark (√) in the space provided for the option which best represents your views on the issues below.

SECTION A

BIO – DATA

1. Your current status or designation (please tick one)
   a. Management staff [ ]
   b. Head of Department [ ]
   c. Lecturer [ ]
   d. Technologist [ ]
   e. Technician [ ]

f. Laboratory Attendants [ ]

2. Highest educational qualification
   a. Doctoral degree [ ]
   b. Master's degree [ ]
   c. Bachelor's degree [ ]
   d. Higher National Diploma [ ]
   e. National Diploma [ ]
   f. Others [ ]
3. Gender
   a. Female [ ]
   b. Male [ ]

4. Age
   a. 25-35 [ ]
   b. 36-45 [ ]
   c. 46-55 [ ]
   d. 56 - 65 [ ]
   e. 66 and above [ ]

5. Years of Experience
   a. 0 – 5 years [ ]
   b. 6 – 10 years [ ]
   c. 11 – 15 years [ ]
   d. 16 – 20 years [ ]
   e. 21 – 25 years [ ]
   f. 26 – 30 years [ ]
   g. 31 and above years [ ]

SECTION B

INSTRUCTION

Please indicate your opinion on the issues raised by marking (√) in the column that represents your opinion.

Note: SA: Strong Agree 4

A: Agree 3

D: Disagree 2

SD: Strongly Disagree 1

S/No.	Items Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
A.	**Perceptions of stake holders on academic staff development programme in Nigerian polytechnics**				
5	Participation in conferences has enhanced lecturers' ability to develop students' critical thinking and problem solving skills.				
6	Participation of Academic staff in seminars, workshops and conferences enhance practical skills to teach the operation of analytical equipment, tools and other facilities used in skills acquisition by students				
7	Academic staff in laboratories can teach relevant skills to students by connecting their prior knowledge and experience to the present learning situation to produce desired outcome when they attend conferences, workshops and seminars.				
8	Academic Staff are given clearly defined procedures outlining their responsibilities in teaching practical skill to students.				
9	Staff are given basic information about the procedures of handling of equipment and other facilities used in the laboratory for practical lessons.				

10	Academic staff and students have attended clear and structured programmes of initiation into the laboratory practices, organized by the department of science laboratory technology.	
11	Staff are encouraged to treat students fairly irrespective of their learning abilities during practical class.	
12	Staff and Students often discuss skill instructional issues and problems with each other in the laboratory, through informal and formal assessment techniques to improve students' performance	
B	**Impact of academic staff development programmes on laboratory skills acquisitions in Nigerian polytechnics.**	
13	When academic staff are employed, a senior colleagues is designated to provide them with professional support.	
14	A senior colleague regularly works with academic staff to encourage their personal and professional growth.	
15	The mentor guides lecturers to incorporate a variety of instructional strategies in their skills acquisition processes	
16	Polytechnics' management sponsor academic staff to attend conferences, seminars and workshops.	
17	Management pays postgraduate tuition fees of academic staff to attend higher degrees, seminars, workshops and conferences.	
18	Management gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences.	
19	Sabbatical leave for qualified staff is granted when they apply.	
20	Management often grants professional development leave to lecturers when they apply	
C	**Adequacy of resources in funding academic staff development programme in Nigerian Polytechnic**	

21	All academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic
22	Half of academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic
23	Only very few of academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic
24	No academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic
25	Only lecturers Science Laboratory Technology have benefited in staff development policy of the polytechnic
26	Only Technologists and technicians of Science Laboratory Technology have benefited in staff development policy of the polytechnic
27	Some Academic staff are sent on training without consideration for its relevance to present job or future posting
28	Management of Polytechnics rely more on TETFund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored and the duration of time given when approval is gven.
29	Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave
30	The frequency/duration provided for staff training in polytechnics do not encourageacademic staffto be motivated for development
D	**The role of stake holders in accessibility of staff development in Nigerian Polytechnics**
31	Lack of adequate support and feedback from the management.
32	Failure to ensure adequate resources to implement training by the authority
33	Management does not provide adequate information on available staff development opportunities in and outside the polytechnics.
34	Lack of transparency and fairness in sponsorship (training is provided for some lecturers that are close to the management).
35	Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave.

36	Absence of planned, systematic and structured staff development programme for lecturers.	
37	Some lecturers are sent for training without consideration for its relevance to the present or future job.	
38	Modalities for accessing development programmes are not made known to lectures.	
39	Poor working environment (lack of adequate motivation, physical facilities and communication) hinder lecturers development	
40	Management rely on TETFund for sponsorships than the general allocation in the school.	
E	**Relevance of staff training and development to capacity building of staff to teach laboratory skills in the polytechnics.**	
41	Academic staff that participated in conferences, workshops and seminars gained skills in making public presentations of lectures and speeches.	
42	Academic staff ability to write scholarly papers has improved as a result of participating in conferences, workshops and seminars.	
43	Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars.	
44	Participation in conferences, workshops and seminars has improved lecturers' ability to publish their work in academic journals or conference proceedings.	
45	Lecturers can manage their classroom activities effectively after attending conferences, workshops and seminars.	
46	Participation in conferences, workshops and seminars has broadened academic staff's knowledge of the courses they teach	
47	Lecturers' supervision of students' projects on skill's acquisitions has been enhanced as a results of participation in conferences	
48	Lecturers' classroom communication and interactive skills (e.g correct use of language, oral and written) have been enhanced as a result of attending conferences, workshops and seminars.	
49	Lecturers can use various techniques (e,g. observation, test,	
50	oral questioning and presentation) to determine students' performance having participated in conferences, workshops and seminars.	
F	**The potency of staff development in the implementation of science laboratory technology (SLT) curriculum in Nigerian**	

Polytechnics.

51 Participation in higher education programme has broadened and updated their knowledge of their teaching subject.

52 Lecturers who attended higher educational programme have improved research abilities.

53 Lecturer's ability to supervise students' projects effectively has been enhanced as a result of higher education training.

54 Participation in higher education has helped lecturers to handle a' range of challenging classroom management issues.

55 Acquisition of higher education has improved the productivity of lecturers in the polytechnics.

56 Acquisition of higher degrees especially Ph.D has negatively affected the retention of lecturers in the Polytechnics.

57 As part of condition of service for academic staff, they are encouraged to participate in continuous professional development.

58 Staff that attend conferences, workshops and seminars are taught to imbibe professional behavior (e.g. punctuality, carefulness, and laboratory dress code and appearance) that are expected of them.

59 Academic staff are encouraged to relate with their senior colleagues after acquiring higher degrees to promote team work and mentoring relationships among them.

60 As Mentors, senior staff that have acquired higher degrees assist others with new teaching materials to ease their work.

APPENDIX 1I B

QUESTIONNAIRE FOR STUDENTS OF SCIENCE LABORATORY TECHNOLOGY ON

PERCEPTIONS OF STAKE HOLDERS ON STAFF DEVELOPMENT PROGRAMMES FOR LABORATORY SKILLS ACQUISITION IN NIGERIA POLYTECHNICS:

INSTRUCTION:

General Information:

SECTION A

Please fill in the appropriate column in the space provided

1. **Name of your institution**----------
2. **Course title**----------
3. **Present year of studies**----------
4. **Year of graduation from the polytechnic**----------

SECTION B

Opinion of students about the design of Science Laboratory Technology (SLT) Curriculum in skills acquisitions processes in the Basic Science Laboratories in Nigerian Polytechnics.

Very Adequate----------4
Adequate----------3
Inadequate---------- 2
Very inadequate----------1

Please indicate by putting a tick in the appropriate column in the space provided

S/N	STATEMENT	1	2	3	4
1	Science Laboratory Technology curriculum is well structured and up to date to meet-up new events in the programme.				
2.	The Basic Sciences laboratories in your institution are adequately furnished, equipped to be used to teach all the topics in the curriculum of Science Laboratory Technology (SLT)				
3.	Your overall impression of evaluation systems (e.g. grades and grading system of examinations and certification procedures) are good				
4.	Time allocation for SIWES programme is adequate				
5.	Time allocation for SIWES programme is not adequate				
6.	Overall practical experience acquired in the Science Laboratory Technology (SLT) programme based on the curriculum contents is satisfactory				
7.	Time allocated for practicals in the curriculum is inadequate, therefore need more time allocation				
8.	The Length of your training Programme is enough to cover the curriculum of Science Laboratory Technology				
9.	Library services provided you with relevant books and journals to study the content of the curriculum of SLT				

10. Technical staff of the laboratory do assists lecturers during practical work in the laboratories

11 Ability of the academic staff in laboratories to communicate effectively with students during practical lessons is satisfactory

12 Relationships between staff and students of the SLT and other academic staff of other department is cordial

13 There are enough competent staff in your laboratories

14 There are enough academic staff in your Science Laboratory Technology programme.

15 Practical classes are boring, because of bad attitude and poor relationships between academic staff and students

16 Relationship is good between academic staff and students within your department

17 Staff in the laboratory (technologist, technicians laboratory Attendants and instructors) conduct practicals for students alone without any assistance from lectures

18 There is a good relationship and understanding between your department and others in sharing facilities when the need arises.

19 There are adequate facilities/equipment in Science Laboratory Technology laboratories in your institution(physics, Chemistry and Biology)

20 There are sufficient hand tools and accessories in your laboratories

APPENDIX III

CHECK LIST FOR OBSEVATION IN SCIENCE LABORATORY TECHNOLOGY DEPARTMENT IN POLYTECHNICS

S/N	ITEMS	OBSERVATIONS MADE	REMARKS
1	Observe the consumables and equipment used in the basic science laboratories		
2	View the equipment that are available but not in good condition.		

3 See equipment that are supplied by TETFund and other international donor agencies.

4 Collect samples of students log book, where practicals conducted by students are recorded. See the number of practical conducted in the last semester. Make comments on the type and grading of practical conducted.

5 See projects that are carried out by TETFunds intervention and other non-governmental agencies and community interventions in the polytechnics.

From the reports, obtained from NBTE accreditation of programmes in Polytechnics, the following items would be

observed:

6	The Curriculum of study used for practical classes for SLT programme
7	The percentage of Practical covered in practical classes for SLT programmes.
8	View comments of NBTE officials that visited the SLT programmes.
9	See the list of equipment in the Basic Science Laboratories that are used for SLT programmes. Relate it to the standard provided by NBTE.
10	Availability or non-availability of required equipment in the Basic Science Laboratories used for SLT

programmes.

APPENDIX IV
Frequencies

Frequency Table

Polytechnic		Frequency	Percent	Valid Percent	Cumulative Percent
valid	Sokoto Poly	20	8.5	8.5	8.5
	Fed Poly Kazuare	18	7.7	7.7	16.2
	Fed Polyn Bauchi	17	7.3	7.3	23.5
	Ramat Poly Maiduguri	20	8.5	8.5	32.1
	Fed Poly Bida	20	8.5	8.5	40.6
	Kwara Poly Ilorin	19	8.1	8.1	48.7
	Osun State Poly Iree	20	8.5	8.5	57.3
	Fed Poly Ado Ekiti	20	8.5	8.5	65.8
	Auchi Poly Auchi	20	8.5	8.5	74.4
	Delta state Poly	20	8.5	8.5	82.9
	Fed Poly UwanaAfikpo	20	8.5	8.5	91.5
	IMT Enugu	20	8.5	8.5	100.0
	Total	234	100.0	100.0	

Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mgt staff	9	3.8	3.8	3.8
	Head of Dept	19	8.1	8.1	12.0
	Lecturer	127	54.3	54.3	66.2
	Technology	48	20.5	20.5	86.8
	Technician	16	6.8	6.8	93.6
	Lab Attendants	15	6.4	6.4	100.0
	Total	234	100.0	100.0	

Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Doctoral Degree	9	3.8	3.8	3.8
	MAsters degree	101	43.2	43.2	47.0
	Bacehlor Degree	52	22.2	22.2	69.2
	HND	48	20.5	20.5	89.7
	ND	14	6.0	6.0	95.7
	Others	10	4.3	4.3	100.0
	Total	234	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	65	27.8	27.8	27.8
	Male	169	72.2	72.2	100.0
	Total	234	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-35 yrs	72	30.8	30.8	30.8
	36-45 yrs	107	45.7	45.7	76.5
	46-55 yrs	51	21.8	21.8	98.3
	56-65 yrs	4	1.7	1.7	100.0
	Total	234	100.0	100.0	

Years of experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 yrs	72	30.8	30.8	30.8
	6-10 yrs	65	27.8	27.8	58.5
	11-15 yrs	46	19.7	19.7	78.2
	16-20 yrs	23	9.8	9.8	88.0

	21-25 yrs	19	8.1	8.1	96.2
	26-30 yrs	9	3.8	3.8	100.0
	Total	234	100.0	100.0	

```
FREQUENCIES VARIABLES=a1 a2 a3 a4 a5 a6 a7 a8
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  /ORDER=ANALYSIS.
```

A1
Frequencies

Statistics

		A1	A2	A3	A4	A5	A6	A7	A8
N	Valid	234	234	234	234	234	234	234	234
	Missing	0	0	0	0	0	0	0	0
Mean		3.49	3.43	3.29	3.11	3.06	2.84	3.14	3.00
Std. Deviation		.609	.598	.557	.604	.715	.775	.704	.706

Frequency Table

Participation in conferences has enhanced lecturers' ability to develop students' critical thinking and problem solving skills.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	.9	.9	.9
	D	8	3.4	3.4	4.3
	A	98	41.9	41.9	46.2
	SA	126	53.8	53.8	100.0
	Total	234	100.0	100.0	

Participation of Academic staff in seminars, workshops and conferences enhance practical skills to teach the operation of analytical equipment, tools and other facilities used in skills acquisition by students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	.9	.9	.9
	D	7	3.0	3.0	3.8
	A	114	48.7	48.7	52.6

	SA	111	47.4	47.4	100.0
	Total	234	100.0	100.0	

Academic staff in laboratories can teach relevant skills to students by connecting their prior knowledge and experience to the present learning situation to produce desired outcome when they attend conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	1	.4	.4	.4
	D	9	3.8	3.8	4.3
	A	145	62.0	62.0	66.2
	SA	79	33.8	33.8	100.0
	Total	234	100.0	100.0	

Academic Staff are given clearly defined procedures outlining their responsibilities in teaching practical skill to students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	.9	.9	.9
	D	25	10.7	10.7	11.5
	A	152	65.0	65.0	76.5
	SA	55	23.5	23.5	100.0
	Total	234	100.0	100.0	

Staff are given basic information about the procedures of handling of equipment and other facilities used in the laboratory for practical lessons.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	.9	.9	.9
	D	47	20.1	20.1	20.9
	A	120	51.3	51.3	72.2
	SA	65	27.8	27.8	100.0
	Total	234	100.0	100.0	

Academic staff and students have attended clear and structured programmes of initiation into the laboratory practices, organized by the department of science laboratory technology.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.0	3.0	3.0
	D	71	30.3	30.3	33.3
	A	109	46.6	46.6	79.9
	SA	47	20.1	20.1	100.0
	Total	234	100.0	100.0	

Staff are encouraged to treat students fairly irrespective of their learning abilities during practical class.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.1	2.1	2.1
	D	29	12.4	12.4	14.5
	A	129	55.1	55.1	69.7
	SA	71	30.3	30.3	100.0
	Total	234	100.0	100.0	

Staff and Students often discuss skill in structional issues and problems with each other in the laboratory, through informal and formal assessment techniques to improve students' performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.0	3.0	3.0
	D	37	15.8	15.8	18.8
	A	139	59.4	59.4	78.2
	SA	51	21.8	21.8	100.0
	Total	234	100.0	100.0	

B
Frequencies

Statistics

		B1	B2	B3	B4	B5	B6
N	Valid	234	234	234	234	234	234
	Missing	0	0	0	0	0	0
Mean		3.01	3.00	2.97	3.00	2.94	3.21
Std. Deviation		.772	.678	.699	.761	.849	.749

Frequency Table

When academic staff are employed, a senior colleagues is designated to provide them with professional support.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.0	3.0	3.0
	D	47	20.1	20.1	23.1
	A	116	49.6	49.6	72.6
	SA	64	27.4	27.4	100.0
	Total	234	100.0	100.0	

A senior colleague regularly works with academic staff to encourage their personal and professional growth.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.0	3.0	3.0
	D	32	13.7	13.7	16.7
	A	148	63.2	63.2	79.9
	SA	47	20.1	20.1	100.0
	Total	234	100.0	100.0	

The mentor guides lecturers to incorporate a variety of instructional strategies in their skills acquisition processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	2.6	2.6	2.6
	D	42	17.9	17.9	20.5
	A	138	59.0	59.0	79.5
	SA	48	20.5	20.5	100.0
	Total	234	100.0	100.0	

Polytechnics' management sponsor academic staff to attend conferences, seminars and workshops.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	2.6	2.6	2.6
	D	50	21.4	21.4	23.9
	A	117	50.0	50.0	73.9
	SA	61	26.1	26.1	100.0
	Total	234	100.0	100.0	

Management pays postgraduate tuition fees of academic staff to attend higher degrees, seminars, workshops and conferences.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	3.8	3.8	3.8
	D	65	27.8	27.8	31.6
	A	92	39.3	39.3	70.9
	SA	68	29.1	29.1	100.0
	Total	234	100.0	100.0	

Management gives academic staff time off/permission to attend higher degrees, seminars, workshops and conferences.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	3.8	3.8	3.8
	D	19	8.1	8.1	12.0
	A	120	51.3	51.3	63.2
	SA	86	36.8	36.8	100.0
	Total	234	100.0	100.0	

Sabbatical leave for qualified staff is granted when they apply.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	12	5.1	5.1	5.1
	D	49	20.9	20.9	26.1
	A	112	47.9	47.9	73.9
	SA	61	26.1	26.1	100.0
	Total	234	100.0	100.0	

Management often grants professional development leave to lecturers when they apply

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	17	7.3	7.3	7.3
	D	54	23.1	23.1	30.3
	A	116	49.6	49.6	79.9
	SA	47	20.1	20.1	100.0
	Total	234	100.0	100.0	

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FREQUENCIES VARIABLES=c1 c2 c3 c4 c5 c6 c7 c8 c9 c10
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  /ORDER=ANALYSIS.
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C

Frequencies

Statistics

		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
N	Valid	234	234	234	234	234	234	234	234	234	234
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		2.35	2.41	2.71	2.01	2.01	1.86	2.12	2.94	2.85	2.61
Std. Deviation		.871	.866	.838	.996	.893	.704	.934	.904	.898	.859

Frequency Table

All academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	32	13.7	13.7	13.7
	D	119	50.9	50.9	64.5
	A	53	22.6	22.6	87.2

	SA	30	12.8	12.8	100.0
	Total	234	100.0	100.0	

Half of academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	27	11.5	11.5	11.5
	D	116	49.6	49.6	61.1
	A	59	25.2	25.2	86.3
	SA	32	13.7	13.7	100.0
	Total	234	100.0	100.0	

Only very few of academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	16	6.8	6.8	6.8
	D	77	32.9	32.9	39.7
	A	99	42.3	42.3	82.1
	SA	42	17.9	17.9	100.0
	Total	234	100.0	100.0	

No academic staff of Science Laboratory Technology have benefited in staff development policy of the polytechnic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	87	37.2	37.2	37.2
	D	84	35.9	35.9	73.1
	A	36	15.4	15.4	88.5
	SA	27	11.5	11.5	100.0
	Total	234	100.0	100.0	

Only lecturers Science Laboratory Technology have benefited in staff development policy of the polytechnic

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	SD	72	30.8	30.8	30.8
	D	108	46.2	46.2	76.9
	A	34	14.5	14.5	91.5
	SA	20	8.5	8.5	100.0
	Total	234	100.0	100.0	

Only Technologists and technicians of Science Laboratory Technology have benefited in staff development policy of the polytechnic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	69	29.5	29.5	29.5
	D	135	57.7	57.7	87.2
	A	23	9.8	9.8	97.0
	SA	7	3.0	3.0	100.0
	Total	234	100.0	100.0	

Some Academic staff are sent on training without consideration for its relevance to present job or future posting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	63	26.9	26.9	26.9
	D	105	44.9	44.9	71.8
	A	40	17.1	17.1	88.9
	SA	26	11.1	11.1	100.0
	Total	234	100.0	100.0	

Management of Polytechnics rely more on TETFund for sponsorship than the general allocation in the school and this limit the number of Academic staff that can be sponsored and the duration of time given when approval is gven.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	21	9.0	9.0	9.0
	D	39	16.7	16.7	25.6
	A	106	45.3	45.3	70.9
	SA	68	29.1	29.1	100.0
	Total	234	100.0	100.0	

Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	16	6.8	6.8	6.8
	D	66	28.2	28.2	35.0
	A	89	38.0	38.0	73.1
	SA	63	26.9	26.9	100.0
	Total	234	100.0	100.0	

The frequency/duration provided for staff training in polytechnics do not encourage academic staff to be motivated for development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	23	9.8	9.8	9.8
	D	81	34.6	34.6	44.4
	A	95	40.6	40.6	85.0
	SA	35	15.0	15.0	100.0
	Total	234	100.0	100.0	

D

Frequencies

Statistics

		D1.	D2	D3	D4	D5	D6	D7	D8	D9	D10
N	Valid	234	234	234	234	234	234	234	234	234	234
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		2.67	2.72	2.71	2.66	2.84	2.62	2.38	2.59	2.80	3.05
Std. Deviation		.839	.815	.860	.959	.832	.929	.991	.981	.858	.835

Frequency Table

Lack of adequate support and feedback from the management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	25	10.7	10.7	10.7
	D	59	25.2	25.2	35.9

	A	119	50.9	50.9	86.8
	SA	31	13.2	13.2	100.0
	Total	234	100.0	100.0	

Failure to ensure adequate resources to implement training by the authority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	21	9.0	9.0	9.0
	D	56	23.9	23.9	32.9
	A	124	53.0	53.0	85.9
	SA	33	14.1	14.1	100.0
	Total	234	100.0	100.0	

Management does not provide adequate information on available staff development opportunities in and outside the polytechnics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	24	10.3	10.3	10.3
	D	58	24.8	24.8	35.0
	A	114	48.7	48.7	83.8
	SA	38	16.2	16.2	100.0
	Total	234	100.0	100.0	

Lack of transparency and fairness in sponsorship (training is provided for some lecturers that are close to the management).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	35	15.0	15.0	15.0
	D	55	23.5	23.5	38.5
	A	98	41.9	41.9	80.3
	SA	46	19.7	19.7	100.0
	Total	234	100.0	100.0	

Bureaucratic bottlenecks delays processing of approvals for sponsorship or study leave.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	19	8.1	8.1	8.1
	D	45	19.2	19.2	27.4
	A	124	53.0	53.0	80.3
	SA	46	19.7	19.7	100.0
	Total	234	100.0	100.0	

Absence of planned, systematic and structured staff development programme for lecturers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	32	13.7	13.7	13.7
	D	66	28.2	28.2	41.9
	A	95	40.6	40.6	82.5
	SA	41	17.5	17.5	100.0
	Total	234	100.0	100.0	

Some lecturers are sent for training without consideration for its relevance to the present or future job.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	49	20.9	20.9	20.9
	D	86	36.8	36.8	57.7
	A	61	26.1	26.1	83.8
	SA	38	16.2	16.2	100.0
	Total	234	100.0	100.0	

Modalities for accessing development programmes are not made known to lectures.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	35	15.0	15.0	15.0
	D	74	31.6	31.6	46.6
	A	76	32.5	32.5	79.1
	SA	49	20.9	20.9	100.0
	Total	234	100.0	100.0	

Poor working environment (lack of adequate motivation, physical facilities and communication) hinder lecturers development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	21	9.0	9.0	9.0
	D	51	21.8	21.8	30.8
	A	116	49.6	49.6	80.3
	SA	46	19.7	19.7	100.0
	Total	234	100.0	100.0	

Management rely on TETFund for sponsorships than the general allocation in the school.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	19	8.1	8.1	8.1
	D	19	8.1	8.1	16.2
	A	128	54.7	54.7	70.9
	SA	68	29.1	29.1	100.0
	Total	234	100.0	100.0	

```
FREQUENCIES VARIABLES=e1 e2 e3 e4 e5 e6 e7 e8 e9
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  /ORDER=ANALYSIS.
```

E
Frequencies

Statistics

		E1	E2	E3	E4	E5	E6	E7	E8	E9
N	Valid	234	234	234	234	234	234	234	234	234
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.12	3.15	3.19	3.17	2.94	3.07	3.10	3.03	3.12
Std. Deviation		.752	.748	.740	.750	.759	.738	.766	.705	.711

Frequency Table

Academic staff that participated in conferences, workshops and seminars gained skills in making public presentations of lectures and speeches.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	14	6.0	6.0	6.0
	D	12	5.1	5.1	11.1
	A	141	60.3	60.3	71.4
	SA	67	28.6	28.6	100.0
	Total	234	100.0	100.0	

Academic staff ability to write scholarly papers has improved as a result of participating in conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	12	5.1	5.1	5.1
	D	14	6.0	6.0	11.1
	A	134	57.3	57.3	68.4
	SA	74	31.6	31.6	100.0
	Total	234	100.0	100.0	

Academic staff's knowledge of new research developments in his area of specialization has increased as a result of participation in conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	12	5.1	5.1	5.1
	D	10	4.3	4.3	9.4
	A	134	57.3	57.3	66.7
	SA	78	33.3	33.3	100.0
	Total	234	100.0	100.0	

Participation in conferences, workshops and seminars has improved lecturers' ability to publish their work in academic journals or conference proceedings.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	14	6.0	6.0	6.0
	D	7	3.0	3.0	9.0
	A	138	59.0	59.0	67.9
	SA	75	32.1	32.1	100.0
	Total	234	100.0	100.0	

Lecturers can manage their classroom activities effectively after attending conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	14	6.0	6.0	6.0
	D	32	13.7	13.7	19.7
	A	141	60.3	60.3	79.9
	SA	47	20.1	20.1	100.0
	Total	234	100.0	100.0	

Participation in conferences, workshops and seminars has broadened academic staff's knowledge of the courses they teach

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	14	6.0	6.0	6.0
	D	14	6.0	6.0	12.0
	A	148	63.2	63.2	75.2
	SA	58	24.8	24.8	100.0
	Total	234	100.0	100.0	

Lecturers' supervision of students' projects on skill's acquisitions has been enhanced as a results of participation in conferences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	16	6.8	6.8	6.8
	D	10	4.3	4.3	11.1
	A	143	61.1	61.1	72.2
	SA	65	27.8	27.8	100.0
	Total	234	100.0	100.0	

Lecturers' classroom communication and interactive skills (e.g correct use of language, oral and written) have been enhanced as a result of attending conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	13	5.6	5.6	5.6
	D	15	6.4	6.4	12.0
	A	157	67.1	67.1	79.1
	SA	49	20.9	20.9	100.0
	Total	234	100.0	100.0	

Lecturers can use various techniques (e,g. observation, test, oral questioning and presentation) to determine students' performance having participated in conferences, workshops and seminars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	11	4.7	4.7	4.7
	D	14	6.0	6.0	10.7
	A	146	62.4	62.4	73.1
	SA	63	26.9	26.9	100.0
	Total	234	100.0	100.0	

F
Frequencies

Statistics

		F1	F2	F3	F4	F5	F6	D7	D8	D9	D10
N	Valid	234	234	234	234	234	234	234	234	234	234
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		3.34	3.37	3.35	3.31	3.31	2.85	3.13	3.16	3.26	3.12
Std. Deviation		.637	.688	.658	.585	.675	.920	.675	.607	.590	.739

Frequency Table

Participation in higher education programme has broadened and updated their knowledge of their teaching subject.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	2.6	2.6	2.6
	D	3	1.3	1.3	3.8
	A	130	55.6	55.6	59.4
	SA	95	40.6	40.6	100.0
	Total	234	100.0	100.0	

Lecturers who attended higher educational programme have improved research abilities.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.1	2.1	2.1
	D	13	5.6	5.6	7.7
	A	107	45.7	45.7	53.4
	SA	109	46.6	46.6	100.0
	Total	234	100.0	100.0	

Lecturer's ability to supervise students' projects effectively has been enhanced as a result of higher education training.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	1.7	1.7	1.7
	D	12	5.1	5.1	6.8
	A	117	50.0	50.0	56.8
	SA	101	43.2	43.2	100.0
	Total	234	100.0	100.0	

Participation in higher education has helped lecturers to handle a' range of challenging classroom management issues.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	.9	.9	.9
	D	9	3.8	3.8	4.7
	A	138	59.0	59.0	63.7
	SA	85	36.3	36.3	100.0
	Total	234	100.0	100.0	

Acquisition of higher education has improved the productivity of lecturers in the polytechnics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	1.7	1.7	1.7
	D	16	6.8	6.8	8.5
	A	117	50.0	50.0	58.5
	SA	97	41.5	41.5	100.0
	Total	234	100.0	100.0	

Acquisition of higher degrees especially Ph.D has negatively affected the retention of lecturers in the Polytechnics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	20	8.5	8.5	8.5
	D	58	24.8	24.8	33.3
	A	92	39.3	39.3	72.6
	SA	64	27.4	27.4	100.0
	Total	234	100.0	100.0	

As part of condition of service for academic staff, they are encouraged to participate in continuous professional development.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	2.6	2.6	2.6
	D	22	9.4	9.4	12.0
	A	142	60.7	60.7	72.6
	SA	64	27.4	27.4	100.0
	Total	234	100.0	100.0	

Staff that attend conferences, workshops and seminarsare taught to imbibe professional behavior (e.g. punctuality, carefulness, and laboratory dress code and appearance) that are expected of them.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.1	2.1	2.1
	D	12	5.1	5.1	7.3
	A	157	67.1	67.1	74.4
	SA	60	25.6	25.6	100.0
	Total	234	100.0	100.0	

Academic staff are encouraged to relate with their senior colleagues after acquiring higher degrees to promote team work and mentoring relationships among them.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.3	1.3	1.3
	D	9	3.8	3.8	5.1
	A	146	62.4	62.4	67.5
	SA	76	32.5	32.5	100.0
	Total	234	100.0	100.0	

As Mentors, senior staff that have acquired higher degrees assist others with new teaching materials to ease their work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	10	4.3	4.3	4.3
	D	21	9.0	9.0	13.2
	A	133	56.8	56.8	70.1
	SA	70	29.9	29.9	100.0
	Total	234	100.0	100.0	

APPENDIX V: CHI-SQUARE TEST

Worksheet size: 100000 cells

Chi-Square Test

Expected counts are printed below observed counts

	sa	a	d	sd	Total
1	126	98	8	2	234
	75.62	125.75	29.12	3.50	
2	111	114	7	2	234
	75.62	125.75	29.12	3.50	
3	79	145	9	1	234
	75.62	125.75	29.12	3.50	
4	55	152	25	2	234
	75.62	125.75	29.12	3.50	
5	65	120	47	2	234
	75.62	125.75	29.12	3.50	
6	47	109	71	7	234
	75.62	125.75	29.12	3.50	
7	71	129	29	5	234
	75.62	125.75	29.12	3.50	
8	51	139	37	7	234
	75.62	125.75	29.12	3.50	
Total	605	1006	233	28	1872

```
Chi-Sq = 33.556 +  6.124 + 15.322 +  0.643 +
         16.547 +  1.098 + 16.807 +  0.643 +
          0.151 +  2.947 + 13.906 +  1.786 +
          5.625 +  5.480 +  0.584 +  0.643 +
          1.493 +  0.263 + 10.970 +  0.643 +
         10.835 +  2.231 + 60.207 +  3.500 +
          0.283 +  0.084 +  0.001 +  0.643 +
          8.018 +  1.396 +  2.129 +  3.500 =  228.057
DF = 21, P-Value = 0.000
8 cells with expected counts less than 5.0
```

Chi-Square Test

Expected counts are printed below observed counts

	sa	a	d	sd	Total
1	64	116	47	7	234
	60.25	119.88	44.75	9.12	
2	47	148	32	7	234
	60.25	119.88	44.75	9.12	
3	48	138	42	6	234
	60.25	119.88	44.75	9.12	
4	61	117	50	6	234
	60.25	119.88	44.75	9.12	
5	68	92	65	9	234
	60.25	119.88	44.75	9.12	
6	86	120	19	9	234
	60.25	119.88	44.75	9.12	
7	61	112	49	12	234
	60.25	119.88	44.75	9.12	
8	47	116	54	17	234
	60.25	119.88	44.75	9.12	
Total	482	959	358	73	1872

```
Chi-Sq =  0.233 +  0.125 +  0.113 +  0.495 +
          2.914 +  6.599 +  3.633 +  0.495 +
          2.491 +  2.740 +  0.169 +  1.070 +
          0.009 +  0.069 +  0.616 +  1.070 +
          0.997 +  6.482 +  9.163 +  0.002 +
         11.005 +  0.000 + 14.817 +  0.002 +
          0.009 +  0.517 +  0.404 +  0.906 +
          2.914 +  0.125 +  1.912 +  6.796 =  78.893
DF = 21, P-Value = 0.000
```

Chi-Square Test

Expected counts are printed below observed counts

	sa	a	d	sd	Total
1	30	53	119	32	234
	35.00	63.40	93.00	42.60	
2	32	59	116	27	234
	35.00	63.40	93.00	42.60	
3	42	99	77	16	234
	35.00	63.40	93.00	42.60	

```
     4       27       36       84       87      234
          35.00    63.40    93.00    42.60

     5       20       34      108       72      234
          35.00    63.40    93.00    42.60

     6        7       23      135       69      234
          35.00    63.40    93.00    42.60

     7       26       40      105       63      234
          35.00    63.40    93.00    42.60

     8       68      106       39       21      234
          35.00    63.40    93.00    42.60

     9       63       89       66       16      234
          35.00    63.40    93.00    42.60

    10       35       95       81       23      234
          35.00    63.40    93.00    42.60

Total       350      634      930      426     2340

Chi-Sq =  0.714 +  1.706 +  7.269 +  2.638 +
          0.257 +  0.305 +  5.688 +  5.713 +
          1.400 + 19.990 +  2.753 + 16.609 +
          1.829 + 11.842 +  0.871 + 46.276 +
          6.429 + 13.633 +  2.419 + 20.290 +
         22.400 + 25.744 + 18.968 + 16.361 +
          2.314 +  8.637 +  1.548 +  9.769 +
         31.114 + 28.624 + 31.355 + 10.952 +
         22.400 + 10.337 +  7.839 + 16.609 +
          0.000 + 15.750 +  1.548 +  9.018 =  459.918
DF = 27, P-Value = 0.000
```

h

Chi-Square Test

```
Expected counts are printed below observed counts

             sa        a        d       sd    Total
     1       31      119       59       25      234
          43.60   105.50    56.90    28.00

     2       33      124       56       21      234
          43.60   105.50    56.90    28.00

     3       38      114       58       24      234
          43.60   105.50    56.90    28.00

     4       46       98       55       35      234
          43.60   105.50    56.90    28.00
```

```
     5       46      124       45       19      234
          43.60   105.50    56.90    28.00

     6       41       95       66       32      234
          43.60   105.50    56.90    28.00

     7       38       61       86       49      234
          43.60   105.50    56.90    28.00

     8       49       76       74       35      234
          43.60   105.50    56.90    28.00

     9       46      116       51       21      234
          43.60   105.50    56.90    28.00

    10       68      128       19       19      234
          43.60   105.50    56.90    28.00

Total       436     1055      569      280     2340

Chi-Sq =  3.641 +  1.727 +  0.078 +  0.321 +
          2.577 +  3.244 +  0.014 +  1.750 +
          0.719 +  0.685 +  0.021 +  0.571 +
          0.132 +  0.533 +  0.063 +  1.750 +
          0.132 +  3.244 +  2.489 +  2.893 +
          0.155 +  1.045 +  1.455 +  0.571 +
          0.719 + 18.770 + 14.882 + 15.750 +
          0.669 +  8.249 +  5.139 +  1.750 +
          0.132 +  1.045 +  0.612 +  1.750 +
         13.655 +  4.799 + 25.244 +  2.893 =  145.872
DF = 27, P-Value = 0.000
```

Chi-Square Test

```
Expected counts are printed below observed counts

             sa        a        d       sd    Total
     1       67      141       12       14      234
          64.00   142.44    14.22    13.33

     2       74      134       14       12      234
          64.00   142.44    14.22    13.33

     3       78      134       10       12      234
          64.00   142.44    14.22    13.33

     4       75      138        7       14      234
          64.00   142.44    14.22    13.33

     5       47      141       32       14      234
          64.00   142.44    14.22    13.33

     6       58      148       14       14      234
```

```
          64.00   142.44    14.22    13.33

     7       65      143       10       16      234
          64.00   142.44    14.22    13.33

     8       49      157       15       13      234
          64.00   142.44    14.22    13.33

     9       63      146       14       11      234
          64.00   142.44    14.22    13.33

Total       576     1282      128      120     2106

Chi-Sq =  0.141 +  0.015 +  0.347 +  0.033 +
          1.563 +  0.501 +  0.003 +  0.133 +
          3.063 +  0.501 +  1.253 +  0.133 +
          1.891 +  0.139 +  3.668 +  0.033 +
          4.516 +  0.015 + 22.222 +  0.033 +
          0.562 +  0.217 +  0.003 +  0.033 +
          0.016 +  0.002 +  1.253 +  0.533 +
          3.516 +  1.487 +  0.043 +  0.008 +
          0.016 +  0.089 +  0.003 +  0.408 =  48.392
DF = 24, P-Value = 0.002
```

Chi-Square Test

```
Expected counts are printed below observed counts

              sa         a         d        sd    Total
     1        95       130         3         6      234
           82.10    127.90     17.50     6.50

     2       109       107        13         5      234
           82.10    127.90     17.50     6.50

     3       101       117        12         4      234
           82.10    127.90     17.50     6.50

     4        85       138         9         2      234
           82.10    127.90     17.50     6.50

     5        97       117        16         4      234
           82.10    127.90     17.50     6.50

     6        64        92        58        20      234
           82.10    127.90     17.50     6.50

     7        64       142        22         6      234
           82.10    127.90     17.50     6.50

     8        60       157        12         5      234
           82.10    127.90     17.50     6.50

     9        76       146         9         3      234
```

```
          82.10   127.90    17.50     6.50

    10       70      133       21       10      234
          82.10   127.90    17.50     6.50

Total       821     1279      175       65     2340

Chi-Sq =  2.027 +  0.034 + 12.014 +  0.038 +
          8.814 +  3.415 +  1.157 +  0.346 +
          4.351 +  0.929 +  1.729 +  0.962 +
          0.102 +  0.798 +  4.129 +  3.115 +
          2.704 +  0.929 +  0.129 +  0.962 +
          3.990 + 10.077 + 93.729 + 28.038 +
          3.990 +  1.554 +  1.157 +  0.038 +
          5.949 +  6.621 +  1.729 +  0.346 +
          0.453 +  2.561 +  4.129 +  1.885 +
          1.783 +  0.203 +  0.700 +  1.885 =  219.502
DF = 27, P-Value = 0.000
```

Student chi square

Worksheet size: 100000 cells

Chi-Square Test

Expected counts are printed below observed counts

	C1	C2	C3	C4	Total
1	133	132	57	26	348
	88.68	126.28	75.31	57.73	
2	51	134	108	45	338
	86.13	122.65	73.14	56.07	
3	91	149	69	39	348
	88.68	126.28	75.31	57.73	
4	136	131	42	39	348
	88.68	126.28	75.31	57.73	
5	77	113	64	94	348
	88.68	126.28	75.31	57.73	
6	86	122	75	65	348
	88.68	126.28	75.31	57.73	
7	63	114	82	89	348
	88.68	126.28	75.31	57.73	
8	114	133	53	48	348
	88.68	126.28	75.31	57.73	
9	88	114	77	69	348
	88.68	126.28	75.31	57.73	
10	92	120	67	69	348
	88.68	126.28	75.31	57.73	
11	83	143	88	34	348
	88.68	126.28	75.31	57.73	
12	86	162	65	35	348
	88.68	126.28	75.31	57.73	
13	84	141	75	48	348
	88.68	126.28	75.31	57.73	
14	88	128	86	46	348
	88.68	126.28	75.31	57.73	
15	42	99	107	100	348
	88.68	126.28	75.31	57.73	

16	109	140	72	27	348
	88.68	126.28	75.31	57.73	
17	80	138	76	54	348
	88.68	126.28	75.31	57.73	
18	94	119	77	58	348
	88.68	126.28	75.31	57.73	
19	84	111	77	76	348
	88.68	126.28	75.31	57.73	
20	90	79	87	92	348
	88.68	126.28	75.31	57.73	
Total	1771	2522	1504	1153	6950

```
Chi-Sq = 22.153 +  0.259 +  4.451 + 17.442 +
         14.328 +  1.050 + 16.610 +  2.187 +
          0.061 +  4.087 +  0.528 +  6.078 +
         25.254 +  0.176 + 14.732 +  6.078 +
          1.538 +  1.397 +  1.698 + 22.782 +
          0.081 +  0.145 +  0.001 +  0.915 +
          7.435 +  1.194 +  0.595 + 16.934 +
          7.231 +  0.357 +  6.608 +  1.641 +
          0.005 +  1.194 +  0.038 +  2.199 +
          0.124 +  0.312 +  0.917 +  2.199 +
          0.363 +  2.213 +  2.139 +  9.756 +
          0.081 + 10.103 +  1.411 +  8.951 +
          0.247 +  1.716 +  0.001 +  1.641 +
          0.005 +  0.023 +  1.518 +  2.384 +
         24.570 +  5.894 + 13.337 + 30.944 +
          4.657 +  1.490 +  0.145 + 16.360 +
          0.849 +  1.087 +  0.006 +  0.241 +
          0.319 +  0.420 +  0.038 +  0.001 +
          0.247 +  1.849 +  0.038 +  5.780 +
          0.020 + 17.703 +  1.815 + 20.339 =  403.721
DF = 57, P-Value = 0.000
```

APPENDIX VII

LIST OF FACILITIES & STAFF REQUIRED FOR

ND SCIENCE LABORATORY TECHNOLOGY

1. Chemistry Laboratory

2. Biology Laboratory

3. Instrumentation Room

4. Physics Laboratory

5. Glassblowing Workshop

6. Meteorological Station

7. Biological Garden

- Fish pond with different species of fish

- Different species of plants

- Small animals (in animal house/cage) such as Rabbits, Guinea Pig, etc

8. Library stocked with relevant/current textbooks and journals

9. Classrooms

10. Lecturers - 5No

• B.Sc/M.Sc Biology - 1No

• B.Sc/M.Sc Chemistry - 1No

• B.Sc/M.Sc Physics - 1No

• B.Sc/M.Sc Biochemistry - 1No

• B.Sc/M.Sc Microbiology - 1No

* One of the above should be at least a Senior Lecturer and a registered member of

relevant professional body to serve as the H.O.D.

11. Technologists - 4No

• HND SLT Biology or Biology/Microbiology - 1No

• HND SLT Chemistry or Chemistry/Biochemistry - 1No

• HND SLT Physics with Electronics - 1No

• HND Glass/Ceramics Technology - 1No

11. Technicians (with ND SLT) - 4No (Optional)

12. Laboratory Assistants (with WASC/GCE/SSCE) - 4No

13. Laboratory Attendants (with FSLC) - 4No

EQUIPMENT REQUIRED IN LABORATORIES/WORKSHOP & OTHER FIELD FACILITIES

A. BIOLOGY/MICROBIOLOGY

S/N	ITEM	NO REQUIRED
1	Top loading balance	5
2	Aquarium	2
3	Dessicator	4
4	Microscopes*Binocular	30 NO.
5	Potometer	5
6	Respirometer(Simple)	5
7	Microtome (Hand type)	2
8	Dissecting Kits	30

9 Dissecting Board or trays with wax 30

10 Net (pond, plankton) 15

11 Net Buttery 5

12 Thermometers (Assorted) 30

13 PH Meter 2

14 Heating mantle 5

15 Photosynthesis Apparatus 2

16 Animal cages2

17 Insects cages 5

18 Centrifuge (Electric&buckects) 2

19 Glass still Distiller 2

20 Magnifier (Hand lens) 20

21 Blood grouping kit 4

22 Clinostat clockwork 5

23 Water bath (with eccentric rings) 2

24 Blender 2

25 Autoclave 2

26 Inoculating chamber 2

27 ColumnChromatograph2

28 Hydrometer 1

29 Auxinometer2

30 Incubator 2

31 Soil sieves (Various sizes) 5 sets

32 Oven(Thermometer&Electric) 1

33 Vacuum pump 2

34 Ice coolant 2

35 Soil test kit 10

36 Heamatocrit Centrifuge 5

37 Quadrant 5

38 Sprinker3

39 Sampling bottles 30

B. CHEMISTRY/BIOCHEMISTRY

C. INSTRUMENTATION ROOM

S/N ITEM NO REQUIRED

1. Spectrophotometer (UV) or UV/Visible 1

2. Refractometer (Table Top) or 1

Refractometer (Hand Held) 2

3. Conductivity Meter 1

4. Analytical Balance 5

5. Magnetic Stirrer 2

6. PH Meter (Digital) 4

7. Colony Counter 1

8. Electrophoresis Equipment 1

9. Polarimeter 1

*10. Atomic Absorption Spectrophotometer (AAS) 1

*11. High Performance Liquid Chromatograph (HPLC)

* Desirable but not compulsory at ND level

ITEMS	NO REQUIRED
1. Balance (Top loading)	5
2. Centrifuge (Electric & 8 Buckets)	2
3 Distillation apparatus	5
4 Kipps apparatus	1
5 Oven (Electric thermostatic control)	1
6 Khejedahl apparatus	1
7 Vacuum pump	2
8 Thermometers (Assorted)	20
9 Waterbath with eccentric rings	4
10 Water manesty	1
11 Water deioniser	1
12 Heating mantle	4
13 Hot plate	4
14 Muffle furnace	1

15 Thermostated water bath 1

16 Vacuum dry oven 1

17 Melting point apparatus 2

18 Soxhlet apparatus 2

19 Flame photometer 1

20 Thin layer chromograph 2

21 Lovibond comparator 2

22 Column chromatograph 2

23 Rotary vacuum evaporator 1

24 Paper chromatograph apparatus 2

25 Voltameter (copper) 2

26 Voltameter (Hoffman H-Type) 5

The Instrumentation Room should have the capacity to accommodate at least 15 students at a time, located in between the Chemistry/Biochemistry and Biology/Microbiology laboratories, accessible to both from inside and be furnished as follows:

i. Functional Air-conditioner (s)
ii. Tiled Floor (PVC or Ceramic Tiles)
iii. Side Concrete Workbenches with enough electrical outlets
iv. Windows with dark blinds
v. Adequate provision for water supply

D. PHYSICS/ELECTRONICS

S/N	ITEMS	NO REQUIRED
1.	Accumulator (Alcad)	12
2.	Accumulator (lead type)	10
3.	Air cell	5
4.	Air Thermometer	5
5	.Ammeter half (dual range) Moving coil,	10 each
6	.Triple Beam Balance	5
7.	Bar Breaking apparatus	5
8	.Barometer	3
9	Bimetallic strip	5
10	Pendulum Bob	20
11	Boyles law Apparatus (J. Tube mounted type)	15
12	Calorimeter	
13	Capillary tube Apparatus	10
14	Capacitance	10
15	Charles law Apparatus	5
16	Cantilever	5
17	Continuous flow Apparatus for specific heat capacity	5
18	Electric field Apparatus	1
19	Electromagnet	3

20 Gold Leaf Electroscope:

*Dual purpose with internal scale 52

21 Falling body apparatus for determination of g 1

22 Eureka can 5

23 Forces board (wall type) 5

24 Fly Wheel for kinetic 16energy demonstration

25 Gravitational Constant apparatus 1

26 Hydrometer 5

27 Hygrometer (Regnault&wet/dry) 1 each

28 Inclined plane & friction board 5

29 Induction coil 1

30 Induction Coil(large, with different induction values)

31 Sprinkler for iron filings 10

32 Lens(Assorted of various Diameter & focal length& holders) 50

33 Latent Heat of steam Apparatus

34 Linear Expansion

Apparatus

35 Bar Magnet -

36 Power eclipse 1

37 Cylindrical 2

38 Horse shoe 1

39 Magnetic needle(agate) Bearing

40 Manometer 1

41 Micrometer screw guage 2

42 Mirrors(concave, convex

of different diameter)

20 each

43 Optical pins 100

44 Potentiometer 6

45 Pulleys (Open- sided

pattern)

46 Ray box 6

47 Resistance box (Assorted) 8

48 Resistances

Known 20 ohm

Known 5 ohm

Unknown 4.5 ohm

49 Rheostat

6 ohm 5 amp

41.5 ohm, 2amp

195 ohm 1amp

50 Ripple tank 1

51 Vernier caliper 10

52 Sonometer 2

53 Resonance Tube 6

54 Spherometer 2

55 Spectrometer 5

56 Stop clock (Assorted) 20

57 Thermometer(Assorted) 30

58 Pyrometer 2

59 Transformer(Assorted) 3

60 Wheat stone bridge 2

61 Meter bridge 2

62 Weight (10mg-100g) 1box

63 Spring balance 5

64 Pivot 10

65 Travelling microscope 2

66 Ostwald Viscometer 1

67 Torsion balance 2

68 Density bottle(50 cm) 10

69 Prism glass 60o,45o,90o 20 each

70 DC Generator 3

71 Trolleys 10

72 Specific Density bottle 10

73 Galvanometer, centre zero 10

74 Key (Reversing & Tapping) 6

75 Lens (spherical biconvexd= 50mm)

Focal length 500mm

Focal length 250mm

Focal length 200mm

Focal length 150mm

Focal length 100mm

76 Multimeter 2

77 Vernier caliper 10

78 Optical bench 3

79 Oscillator (sine &square signal generator)

80 Oscilloscope (single &double beam)

81 Capacitance substitution

82 Powersupply unit with meter 5

83 Searle's surface tension apparatus 5

84 7400 TTL logic gate series 5

85 Bread board 5 pkts

86 Vero board 5 pkts

87 Diodes (Assorted) 5 pkts each

88 Transistors (Assorted) 5 pkts each

89 Resistor of various values, ratings & type 10 each

90 Rectifier unit (IC) (8-pin IC socket etc.) 5

91 Capacitors (Different types: 1 ufetc) 5 each

92 Soldering iron (different power ratings) 5

93 Voltameter

94 Wheel & axe compound 2

95 Tuning folks 10

96 Rectangular prism (115×65×20mm) 12

97 Semicircular prism 90×45×16mm 12

98 Voltmeter 10

99 Ball Bearing 5 pkts

E. GLASSBLOWING WORKSHOP

S/N ITEM NO REQUIRED

1. Rotary Air Blower/Compressor 1

2. Safety Goggle (Plain) 15

3. Bunsen Burner for Bench Annealing 15

4. Gas Cylinder filled with Oxygen & Acetylene gases/Regulators

1 each

5. Forceps 15

6. Oxygen/Air Gas Burners 15

7. Hand Gloves 15

8. Diamond Cutter 5

9. Cones 5

10. Reamers 5

11. Glass Cutting Knife 5

12. Didymium Spectacles OR Coloured Spectacles 115

13. Glassblowing Tapers (Different diameters) 15 Sets

14. Glass Inspection Polarizer or Hand Held Lens 15

15. Glass Engraving Machine 2

The 15No Oxygen/Air Gas Burners should be connected to the gas taps with rubber tubing of different colours to indicate the various gases carried.

The workshop should be spacious enough to accommodate at least 15 students working in cubicles at a time and the workbenches should be padded with asbestos to minimize glass breakages. Desirably, extractor fans or Air-conditioners should be installed

.

F. METEOROLOGICAL STATION

S/N ITEM NO REQUIRED

1. Soil Thermometer 6

2. Psychrometer 1

3. Wet & Dry Bulb Thermometer 2

4. Rain Gauge 2

5. Sunshine Recorder 1

6. Light Meter 1

7. Anemometer 1

8. Wind Vane 1

9. Secchi Disc 1

The Meteorological station should be located where there will be no obstructions to wind flow and be secured with a wire fence.

G. SPECIES OF PLANTS REQUIRED IN BIOLOGICAL GARDEN

Monocotyledonous Plants

A. Gramineasee.g Grass, Bamboo, etc

B. Palmaee.g Palms, etc

C. Liliaceaee.g Onions, etc

Dicotyledonous Plants

A. Leguminosaee.gCrotolaria, Cassia, etc

B. Combretaceaee.gCombretum, etc

C. Sterculiaceaee.g Cola, etc

D. Malvaceaee.g Hibiscus, etc

E. Bombacaceaee.gBombax, etc

F. Rutaceaee.g Citrus, etc

G. Anacardiaceaee.g Mango, Cashew Nuts, etc

H. Maliaceaee.g Mahogany, etc

I. Compositaee.gTridax, etc