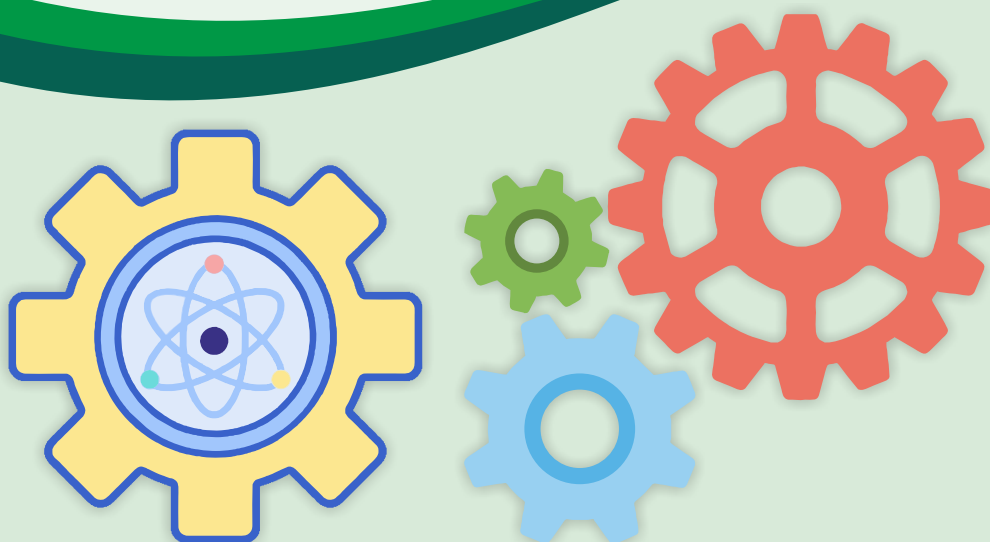




FEDERAL MINISTRY OF EDUCATION

NATIONAL POLICY ON SCIENCE AND TECHNOLOGY EDUCATION



AUGUST, 2018

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FOREWORD

Since 1842 when the nation incorporated science into its education curricula, which before then had placed undue emphasis on literacy and numeracy, the country has been without a national policy to specifically direct and propel science and technical education. Given the critical importance of science and the acquisition of technical and vocational skills as tools for driving national growth and development, the absence of a roadmap for science and technical education has been a very costly oversight indeed.

This absence is partly responsible for the type of poverty-breeding education as opposed to a wealth-creating one we have had over the years. It also accounts for Nigeria's inability to achieve a notable technological take-off.

It is, therefore, heartwarming that this costly national mistake has come to an end with the approval granted by the National Council on Education for a National Policy on Science and Technology Education (S&TE) which is now in our hands. This development is, no doubt a significant one, a sort of landmark achievement by the Federal Government of Nigeria. Moreover, it underscores the passion and determination of the present administration of President Muhammadu Buhari to address the challenges facing the delivery of quality science and technical education in Nigeria.

The National Policy on Science and Technology Education (S&TE) was developed in recognition of the fact that S&TE is an effective tool of empowering the citizenry to overcome poverty and limit the incidence of

social vices due to joblessness arising from lack of skills among its productive workforce. With it now and a development of a companion action plan tagged Implementation Guidelines, it is my hope that our country is well on its way to building a self-confident, self-reliant nation which will produce more of what it needs without having to rely so much on the creative ingenuity and cunning innovation of other nations.

It is my expectation that all stakeholders in the science and technology education sub-sector will adhere to the **Policy and the Implementation Guidelines** to ensure that the desired goal is achieved. I, therefore, recommend effective implementation of this Policy for the growth and the development of science and technology education in Nigeria.



ADAMU ADAMU

Honourable Minister of Education

August, 2018

PREFACE

The need for a National Policy on Science and Technology Education (S&TE) was informed by the observed gaps and poor synergy among all stakeholders which hindered the effective development of the sub-sector.

The policy is long overdue considering the fact that the technological and scientific advancement of any nation depends on the teaching and learning of science and technology subjects.

The Federal Ministry of Education, therefore, organized consultative meetings and workshops to develop and harmonize the inputs that were submitted by stakeholders which culminated into the draft policy and the final document.

The role of Science and Technology Education is central to the industrial development of any country. There is therefore the need to re-position the delivery of Science and Technology Education in Nigeria to meet the current global technological explosion through an all-inclusive functional policy and the provision of a legal framework to guide the mobilization of appropriate interventions for the sub-sector.

A holistic approach which shall involve sectorial Ministries, Departments and Agencies (MDAs), Institutions of Higher Learning, the Private Sector, Non-Governmental Organizations (NGOs), Media, professional associations and International Partners is projected for the implementation of this policy.

The adoption of this policy will allow the enactment of guiding principles and pertinent strategic options for effective implementation mechanisms for Science and Technology interventions towards addressing unemployment in Nigeria.



Arc. Sonny S. T. Echono
Permanent Secretary
Federal Ministry of Education

ACKNOWLEDGEMENT

The National Policy on Science and Technology Education (S&TE) was developed for inclusiveness and to enhance the growth of the sub-sector through the provision of legal framework to guide the mobilization of appropriate interventions.

The collaborative efforts of the Honourable Ministers of Federal Ministries of: Industry, Trade & Investment, Agriculture & Rural Development, Information & culture, Labour & Employment, Environment, Water Resources, Science and Technology and Youths & Sports Development; Representatives from Ambrose Ali University Ekpoma, Federal University of Technology Minna, Federal University of Technology Owerri, Federal University of Technology Yola, Federal Polytechnic Kaduna, Kogi State Polytechnic, Federal College of Education (Technical) Yaba, Lagos, Federal College of Education (Technical) Omoku, Rivers State, Honourable Commissioners of State Ministries of Education and Education Secretary FCT, and other agencies such as NABTEB, NBTE, NUC, NCCE, STAN, NERDC, NATT, MAN, ITF and NGOs are highly commended for their significant contributions and supports.

We equally note with great appreciation, the invaluable technical contributions and supports of the Resource persons from the Academia, Agencies, Retired Directors and other stakeholders in the development of the policy. The support of African Development Bank (ADB) towards the production and dissemination of the policy and its Guidelines is also highly appreciated.

I also wish to commend the leadership support of the Directors of Educational Planning Research & Development and Basic & Secondary Education Departments.

Finally, I recognize the staff of the Technology and Science Education Department, and other FME staff who worked at various stages to develop and perfect the document.



Mrs. Elizabeth O. Adedigba

Director, Technology & Science Education
Federal Ministry of Education
Abuja.

ACRONYMS

ADB – African Development Bank
ATA – Agricultural Transformation Agenda
ARCN – Agricultural Research Council of Nigeria
CAADP – Comprehensive African Agricultural Development Programme
ANCOPS – Association of Nigerian Conference of Principals
COREN – Council for Regulation of Engineering in Nigeria
CORBON – Council of Registered Builders of Nigeria
CRF – Consolidated Revenue Funds
CSO – Civil Society Organisation
CPN – Computer Professional Registration of Nigeria
CVC – Committee of Vice Chancellors
DFID – Department for International Development
DPs – Development Partners
FCT – Federal Capital Territory
FEC – Federal Executive Council
FME – Federal Ministry of Education
FBO – Faith Based Organisation
FEQAS – Federal Education Quality Assurance Service
GCI – Global Competitiveness Index
HETAN – Home Economics Teachers Association of Nigeria
HR&D – Human Resource and Development
ICT – Information and Communication Technology
IEIs – Innovation Enterprise Institutions
ITF – Industrial Training Fund
JCCE – Joint Consultative Committee on Education
JICA – Japan International Cooperation Agency

ACRONYMS

M.A.N – Mathematics Association of Nigeria
MAN – Manufacturers Association of Nigeria
NABTEB – National Business and Technical Examinations Board
NATT – Nigerian Association of Teachers of Technology
NARS – National Agricultural Research System
NBTE – National Board for Technical Education
NCE – National Council on Education
NCCE – National Commission for Colleges of Education
NDE – National Directorate of Employment
NEC – National Economic Council
NECO – National Examinations Council
NERDC – Nigeria Education Research and Development Council
NGO – Non-Governmental Organisation
NIOB – Nigeria Institute of Builders
NHEP – National Health Education Planning
NMC – National Mathematical Centre
NOTAP – National Office of Technology Acquisition and Promotion
NPE – National Policy on Education
NSE – Nigerian Society of Engineers
NS&TEF – National Science and Technology Education Fund
NSTEC – National Science and Technology Education Council
NTVEC – National Technical and Vocational Education Council
NUC – National Universities Commission
NVA – Nigerian Vocational Association
NV20:2020 – Nigeria Vision20: 2020
PASET – Partnership for Science, Engineering and Technology
PPP – Public Private Partnership

ACRONYMS

R&D – Research and Development
SMASE – Strengthening Mathematics and Science Education
STEP-B – Science and Technology Education in Post-Basic
STVE – Skills Training and Vocational Education
STVET – Science, Technology and Vocational Education and Training
STAN – Science Teachers Association of Nigeria
SMEDAN – Small and Medium Enterprise Development Agency of Nigeria
S&TE – Science and Technology Education
SUBEB – State Universal Basic Education Board
TVET – Technical and Vocational Education and Training
TETFund – Tertiary Education Trust Fund
TRCN – Teachers Registration Council of Nigeria
TTIs – Teacher Training Institutions
UBEC – Universal Basic Education Commission
UNICEF – United Nations Children's Fund
UNIDO – United Nations Industrial Development Organisation
VEIs – Vocational Enterprise Institutions
WAEC – West African Examinations Council

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CHAPTER ONE

INTRODUCTION

1.1 Preamble

Science and Technology Education (S&TE) Policy of Nigeria lays out policy direction as to how Science and Technology would be taught (pedagogy) and assessed, the pre-service and in-service education of teachers of Science and Technology, teacher demand and supply, provision of science infrastructure such as laboratories, workshops, equipment, textbooks and other resources in educational institutions. Equally covered in the policy are plans and strategies for technology and vocational enterprise, the total sum of which will crystallize into an efficient business and industrial environment that can task the creativity of citizenry for national development. The Policy lays a more solid foundation on the basis of which Nigeria shall accelerate her industrial and technological development.

There is a general consensus that a strong S&TE system for the citizenry is a prerequisite for a knowledge-based economy and innovation. Nigeria is operating in a world shaped by scientific discovery and revolutionary technologies, which are transforming communication, learning and economies. Innovations resulting from these discoveries and technologies

are responsible for the new industries, creating a wide array of new jobs that otherwise would not have been possible, thus shaping the influence of nations and their competitiveness.

This policy also defines the scope of S&TE in Nigeria. It gives an overview and situation analysis of S&TE in Nigeria as well as the policy environment. It also sets out the expected results/outputs of Nigeria's S&TE endeavours.

1.2 Overview and Situation Analysis

In Nigeria's Vision 20:2020 document, it was posited that “By 2020, Nigeria will have a large, strong, diversified, sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life to its citizens” (**NV20:2020 P. 9**). In the said document, it is also stipulated amongst others that investment in human capital would be required to enhance national competitiveness. The vision considers education as both a basic human right and a critical element in human development. NV20:2020 rightly identified the need to re-focus the country's educational system in the areas of access, equity, quality, infrastructure, teacher quality and development, curriculum relevance, funding and planning. The vision also recognizes the need to give priority attention to Technical and Vocational Education and Training (TVET), provide skilled manpower for technological and industrial take-off of the country. The vision recorded gross

under-achievement due to non-existence of a National policy on S&TE. In addition, the vision perceived inappropriate priority accorded S&TE in the nation's socio-economic development processes.

It is on record that the independent communities that now answer the name Nigeria started operating missionary education with science component since 1842, without a robust National Policy on S&TE. This Policy has become imperative due to Nigeria's inability to have a clean technological take-off coupled with the consistently poor and unsatisfactory performances of students in Science, Technology and Mathematics (STM) in examinations conducted by WAEC, NECO, NABTEB and other bodies. Available data showed that the pass rates in Mathematics and the Sciences had been consistently less than 50%. Also, Nigeria is yet to achieve the 60:40 ratio in enrolments for the Science and Technology versus the Arts/Humanities as interest in Mathematics, Science and Technical subjects is decreasing.

Other evidences of unsatisfactory situation in S&TE is the 2005-2015 Global Competitiveness Index of 140 countries, in which Nigeria ranked 124 in Global Competitiveness Index (GCI). When various components of GCI was considered, Nigeria went down in ranking to 132 on the basis of quality of Mathematics and Science Education, 106 in availability of research and training services, 87 in technological adoption, 105 in ICT use, 129 in quality of research institutions, 108 in

company spending on R&D, 122 in University-Industry Collaboration in R&D, 100 in intellectual property rights and 113 in patents rights. However, in the African Scientific Research Output published by Africapaedia in 2015, Nigeria was ranked 5th in Africa. However, this 5th position in Africa has not been translated into quality inventions and innovations for global competitiveness. The poor state of S&TE could be attributed to several factors namely poor quality of teaching and learning, inadequate academic and professional qualifications, poor teacher welfare and salary, inadequate in-service courses and trainings, poor quality of instructional materials, ineffective Monitoring and Evaluation system among others. These situations underscore the need for a robust National policy on S&TE.

1.3 The Policy Environment

The issue of formulating a National Policy on S&TE in Nigeria has become more topical in recent times. Several initiatives and events at both national and international levels point to the imperative of a functional S&TE Policy. Other overbearing situations on the need for a policy on S&TE stems from pronouncements as enshrined in the National Policy on Education (NPE, 2004).

Since independence, the drive to attain Science and Technology effectiveness leading to economic prosperity and full industrialization, has led to a wide range of secondary

policies in support of the overall objectives in the NPE on this subject. This policy pronouncement has given birth to institutions and learning centres that have promoted S&TE to where it is today.

From Nigeria's progress in her activities in all MDAs towards robust trade, industry and investments, time is ripe for the country to come together to chart a course that can steer progress in S&TE towards the production of experts who will man the critical sectors of the economy for technological and industrial advancement of the country. Furthermore, Nigeria needs a road map that can guide all Development Partners (DPs) operating in the education sector. The projects and programmes include among others:

- i. Nigeria-UNESCO Special Science and Technology Project;
- ii. Strengthening Mathematics and Science Education (SMASE) in Nigeria in collaboration with the Japan International Cooperation Agency (JICA);
- iii. Science and Technology Education in Post-Basic (STEP-B) Project (World Bank Assisted);
- iv. Skills Training and Vocational Education (STVE) Project in collaboration with the African Development Bank (ADB);
- v. Partnership for Science, Engineering and Technology (PASET);
- vi. Federal Component of Lagos Eko project (World Bank Assisted); and
- vii. The Revised Convention on the recognition of studies, certificates, diplomas, degrees and other academic

qualifications on higher education in African States held in Addis Ababa on 12th December, 2014. All these require enabling policy to function properly.

Equally important, is the need to create an enabling environment amongst all tiers of Government for the purpose of harnessing advantages from the policy.

1.4 **Policy Process**

In a bid to formulate a National Policy on S&TE, the Federal Ministry of Education (FME) carried out the following activities:

- I. Meeting for the purpose of interacting with relevant stakeholders on the development of a draft policy from 29th-30th March, 2016 in which a communiqué was issued;
- ii. In-house strategic meetings, collaborations and planning activities from April to December, 2016;
- iii. 2nd Meeting from 16th - 21st January, 2017 for the inauguration of the Technical Working Group which developed the draft policy after presentation of papers on the subject by stakeholders and resource persons;
- iv. Critique Meeting of wider stakeholders of Technical Working Group and State Ministries of Education from 23rd - 28th January, 2017;
- v. Finalization Meeting with all stakeholders from 6th - 11th February, 2017;
- vi. presentation and consequent approval of the Draft National policy on S&TE by JCCE and NCE.

1.5 Direction for Science and Technology Education

The S&TE Policy resonates from the National Policy on Education (NPE), the fulcrum of which is trusted among others, on the expectations, goals, and standards for effective quality education delivery in Nigeria.

The essence of the policy direction is to make students and teachers to be self-adaptable to the requisite knowledge and skills in S&TE. The training and re-training of teachers in addition to incentives shall be given priority attention by all relevant stakeholders including all tiers of government in Nigeria.

S&TE of the 21st Century must emphasize on the method of teaching, which focuses on child-centred and hands-on techniques rather than the theoretical, abstract, and teacher-centred methods. These approaches were responsible for the decline in interest and consequently low enrolment and poor performance of students in S&TE subjects and programmes.

The policy shall provide enormous benefits that include:

- I. opportunities for students to think about and clarify their own values. This will also enable them to understand and appreciate virtuous values as a way of thinking that can give them resourcefulness and dignity for competitive advantages among their peers;
- ii. e-orientation for appreciation of the economic importance and

social context of S&TE because it focuses and addresses the social and societal needs and demands that provide opportunities for employment and wealth creation;

- iii. realization that the profound consequences of S&TE on the society demand divergent as opposed to convergent thinking;
- iv. passion for work and respect for laws and regulations that guide the growth and development of industries and technological advancement; and
- v. societal recognition and respect for vocational and innovative skills and training for the nation's industrial development.

The strong political-will with improved funding to facilitate the adoption, absorption and diffusion of the enormous benefits of S&TE for socio-economic development of the country, shall be made paramount and priority agenda by the Government.

Government has noted the gender gap engendered by abysmally low female participation rates in S&TE related studies and occupations. Consequently, Government shall harmonize, synergize, promote and popularize the programmes, plans and activities in all educational institutions and agencies related to the teaching and learning of S&TE that shall guarantee gender parity among citizens.

1.6 Strategic Thrust for S&TE Development

The main thrusts for the development of S&TE include:

- i. enhancing skills for application of science among the young

- from all social strata;
- ii. making careers in TVET attractive for talented and bright minds;
 - iii. establishing world class infrastructure for TVET and S&TE for gaining global competitiveness;
 - iv. linking contributions of S&TE, research and innovation systems with the inclusive economic growth agenda and combining priorities of excellence and relevance;
 - v. creating enabling environment for enhanced private sector participation in S&TE;
 - vi. facilitating the conversion of S&TE outputs into commercial applications by replicating hitherto successful models as well as establishing new Public Private Partnership (PPP) models;
 - vii. stimulating changes in the value system of the citizenry to recognize, respect and reward performances which create wealth from S&TE derived knowledge;
 - viii. encouraging strategies for government/public private partnership for intervention in TVET institutions; and
 - ix. creating a platform to enhance the quality of skills of TVET and S&TE teachers and learners through co-operative education between industries and TVET institutions in Nigeria.

CHAPTER TWO

THE PHILOSOPHY, MISSION, VISION, GOALS AND OBJECTIVES OF S&TE

2.1 Philosophy

The S&TE Policy of Nigeria stipulates the guidelines, objectives, standards, structures, strategies and management for achieving the National S&TE goals in Nigeria. The policy must be operated within the framework of the National Policy on Education (NPE), National Policy on Science, Technology and Innovation, bilateral agreements and all international treaties that directly or indirectly affects S&TE, to which Nigeria is a signatory.

2.2 Mission Statement

Evolving a nation that harnesses and utilizes S&TE for sustainable development.

2.3 Vision

To become a key player in S&TE among developed nations for global competitiveness.

2.4 Goal

To produce the critical S&T workforce in Nigeria that can transform the nation's economic landscape to a world-class economy.

According to the National Policy on Education (2004 edition), the goals of S&TE are as follows:

- i. Goals of Science Education
 - a. The acquisition of knowledge and understanding of a range of concepts, principles, and laws through systematic study and experience of aspects of the body of knowledge called science;
 - b. The acquisition of a range of cognitive, affective and psycho-motor skills and processes which results in direct involvement in science activities, procedures or applications in the laboratory or the field;
 - c. The utilization of scientific knowledge and processes in the pursuit of further knowledge and deeper understanding and the development of an ability to function autonomously in an area of study to solve practical problems and to communicate that experience to others;
 - d. The attainment of a perspective or way of looking at the world, together with some understanding of how it complements and contrasts with other perspective ways of organizing knowledge and inquiry;
 - e. The attainment of a basic understanding of the

- interaction between science and society and the contribution science makes to our cultural heritage; and
- f. In addition, provides man-power in the pure and applied sciences.

ii. Goals of Technology Education

- a. Understanding the principles and dynamics of technology;
- b. Understanding the principles of construction processes of technology and modes of dissemination;
- c. Developing intellectual processes of technology and their relations with other systems such as communication, economics, science, industry and society;
- d. Acquiring skills such as instrumentation, production, maintenance, creativity, designing and communication;
- e. Mastering of technology-oriented forms of general and specific problem-solving;
- f. Producing technologically literate people;
- g. Producing products that are employable and equally those who would proceed to higher education; and
- h. Producing a critical mass of technopreneurs that can innovate the country out of dependence on foreign technological artefacts and services.

iii. Goals of TVET

- a. Provide trained manpower in the applied sciences, technology and business particularly at craft, advance craft and technical levels;
- b. Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and
- c. Give training and impart the necessary skills to individuals for self-reliance economically.

2.5 Specific Objectives

Based on the foregoing, the specific objectives of S&TE shall be to:

- i. promote S&TE;
- ii. facilitate mastery of scientific and technological capabilities;
- iii. provide frameworks for inter-institutional efforts in developing S&TE programmes in all sectors of the economy;
- iv. create the conditions for the improvement of scientific and technological infrastructure for research, development and innovation in our institutions of learning; and
- v. ensure that products of S&TE programmes support Nigeria's economic endeavours for global competitiveness.

2.5.1 Short Term Objectives

In the short term, within the first five years of implementation,

the objectives shall be to:

- i. restructure the teaching of Science and Technology and initiate curriculum reforms at the basic, post-basic and tertiary levels of the educational system;
- ii. review and update TVET laws to accommodate the provisions of the S&TE Policy. Such laws should include those of NBTE, NABTEB, NCCE, TETFund, ITF, NDE, SMEDAN etc.
- iii. ensure adequate budgetary provisions by exploring alternative/non-traditional sources of funding that would help drive the S&TE subsector;
- iv. initiate masteries of known and emerging technologies that would equip teachers and trainers for more effective delivery of knowledge and information;
- v. streamline and redefine the mandates of the various TVET programmes of the different MDAs for more productivity; and
- vi. strengthen existing monitoring and evaluation systems to ensure efficient utilization of available resources and effective implementation of strategies.

2.5.2 Medium Term Objectives

In the medium term, within the first ten years of implementation, the objectives shall be to:

- i. achieve an enrolment quota of 70% of candidates in science and technical institutions;
- ii. achieve a gender balance in the participation of students in Science and Technology disciplines at the basic, post-basic and tertiary levels;

- iii. implement curriculum reforms that support the vision of Nigeria becoming one of the top 20 economies of the world;
- iv. provide material and human resources with the capacity to support the delivery of functional and effective curriculum; and
- v. create partnerships among schools, companies, scientists and research centres.

2.5.3 Long Term Objectives

- i. To ensure that young people entering the Nigerian workforce of the 21st century have the knowledge and skills necessary to promote economic, scientific and technological development;
- ii. To give the citizens of Nigeria an understanding of scientific and technological approaches and evidences, so that they will be able to make informed decisions on scientific and technological issues;
- iii. To ensure that products of Nigerian S&TE programmes can compete favourably at the global level; and
- iv. To provide employers with a range of skills and competences required for competitiveness and sustainable economic self-reliance.

Action Statement

Government shall set the framework for classifying, implementing, assessing and reviewing the levels of achievements of targets in this regard.

CHAPTER THREE

THEMATIC AREAS OF THE POLICY

This chapter addresses the macro-economic and social challenges of the thematic sectors of the S&TE. It has given direction to how the thematic areas shall be strategically integrated to create S&TE platforms for enhanced productivity, national growth and knowledge economy. The areas covered are Agricultural Education, Health Education, Energy, Industry, Technical and Vocational Education and Training (TVET), Environmental Education, Information and Communications Technology (ICT) and Emerging Technologies.

3.1 Agricultural Education

Introduction

Agricultural research is recognized as a critical enabler of economic growth. It is therefore prioritized by the constitution and explicitly assigned as the primary responsibility of the Federal Government on the concurrent Legislative list. In this regard, institutions and organizations owned by the Federal Government which comprise 15 Commodity-based Research Institutes, 11 Federal Colleges of Agriculture, a specialized National Agricultural Extension Institute, over 50 Faculties of Agriculture in regular Federal Universities and 3 specialized

Universities of Agriculture make up the National Agricultural Research System (NARS) whose activities come under the purview of Agricultural Research Council of Nigeria (ARCN).

Over the time, the policy guidelines aimed at increasing private sector investment and competitiveness in agro-business in the economy, are serially enshrined in the core contents of the 1988 Agricultural Policy of Nigeria and the 2001 Agricultural Thrust, as well as the Medium Term Policy Frameworks of the 2007 Five Point Agricultural Value Chain Agenda, the 2010 Comprehensive African Agricultural Development Programme (CAADP) and the 2011 Agricultural Transformation Agenda (ATA). The entire Nigerian R&D system possesses a repository of research results with potency for commercialization, if the various policies and strategies for research-industry-linkage, novel funding instruments and general enabling environment are effectively actualized. Consequently, it shall be the role of the government to strengthen the existing institutional capacity of the NARS to significantly achieve increased productivity to ensure food security, wealth creation, employment generation and make Nigeria a competitor in the global food market.

3.1.1 Objectives

- I. To reposition Nigerian Agricultural Education System and its programmes to be industry driven to meet societal needs.
- ii. To guarantee sustainable partnership and funding.

3.1.2 Strategies

- i. Ensuring Universities of Agriculture and other Agricultural Education Institutions strictly adhere to their statutory mandates;
- ii. Providing incentives to Agricultural Education System to improve its ability to attract talents, increase and sustain productivity, partnership and enhance extension services;
- iii. Expanding agricultural research community's capacity to leverage on digital innovation to lower costs of field work;
- iv. Resuscitating the competitive Agricultural Research Grant Scheme;
- v. Encouraging technology uptake and diffusion of agricultural innovations to farmers;
- vi. Developing appropriate and innovative technologies for breeding, feeding, health and management of livestock, fisheries and poultry;
- vii. Developing appropriate and innovative technologies for crop production and post-harvest loss prevention; and
- viii. Providing entrepreneurship agricultural education for establishment of farms and agro processing industries.

Action Statement

All stakeholders shall engage proactively in agricultural education programmes so as to improve and advance production and productivity that is geared towards sustainable

food sufficiency.

Governments at all levels shall provide adequate incentives to attract the youths into this sector.

3.2 Health Education

Introduction

The World Health Organization (WHO) defined 'Health' as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Health education on the other hand could be regarded as the process of inculcating into the youth and the general society, the value of good health and how to maintain a healthy life. Health education is very vital for socio-economic development of the nation as it ensures a healthy population of productive and efficient citizens. Health education, in its various nomenclatures, has been a part of the school curriculum in Nigeria.

3.2.1 Objectives

- i. To strengthen health education processes at all levels.
- ii. To provide effective, efficient, accessible and affordable health education that will improve the health status of Nigerians.

3.2.2 Strategies

- I. Promoting effective linkages and collaborations among knowledge institutions and industries engaged in the health education sector.
- ii. Conducting health education Needs Assessment to guide National Health Education Planning (NHEP).
- iii. Coordinating school health programmes to ensure the inclusion into schools' curricula, teaching of current and emerging health issues.
- iv. Training and re-training of research scientists, technicians and other support staff especially in the priority disciplines where there are marked shortages.
- v. Promoting Physical and Health Education at all levels; and
- vi. Promoting Personal and Environmental Health Education at all levels.

Action Statement

Government shall continue to strengthen the link between the States and Federal Ministries of Health and Education for the effective training of health educators and health care service providers for a healthier nation.

3.3. Energy Introduction

The Energy Commission of Nigeria (ECN) is the apex

government organ empowered to carry out overall energy sector planning and policy implementation, promote the diversification of the energy resources through the development and optimal utilization of all, including the introduction of new and alternative energy resources like Solar, Wind, Biomass and Nuclear Energy. The ECN is also charged with the responsibility of promoting training and manpower development in the energy sector.

3.3.1 Objective

To produce appropriate human resource to address the needs of the energy sector.

3.3.2 Strategies

Teaching the knowledge and skills for R&D, demonstrate and deploy capabilities in fossil fuels (coal, oil and gas), nuclear, solar, wind, biofuels, hydro and other renewable energy technologies.

3.4 Industrial Research, Development and Production Introduction

Industrial research, development and production through effective training of scientists, engineers, technologists, technicians, and craftsmen is key to achieving global industrial competitiveness. To achieve an effective and efficient

manpower for manning industrial machinery and equipment that guarantee adequate product skills and knowledge-based training is the right focus of this policy.

3.4.1 Objectives

- i. To train citizens who can initiate, create and develop innovative micro and macro industrial systems; and
- ii. To train scientists, technicians and engineers that are capable of manning micro and macro industrial systems and processes.

3.4.2 Strategies

- i. Ensuring R&D activities are directed towards the learning of appropriate technologies for the production of industrial goods and services in small, medium, and large-scale firms.
- ii. Building capacity in design and fabrication of machines, tools and spare parts for a more rapid industrial growth and development.
- iii. Fostering collaborations among universities, or higher education research institutions, industries and investors to generate innovations.
- iv. Fostering the acquisition of technological entrepreneurship by students and trainees to facilitate innovation.

Action Statement

Government shall scale up support towards capacity building for industrial research activities and entrepreneurship drive in all areas of industrial needs.

3.5 Environmental Science and Technology

Introduction

The Federal Ministry of Environment was established to ensure effective coordination of all environmental matters which include science and technology. The concern to protect the environment gave rise to the establishment of the following agencies:

- Environmental Health Officers Registration Council of Nigeria (EHORECON)
- National Environmental Standards and Regulations Enforcement Agency (NESREA)
- National Oil Spill Detection and Response Agency (NOSDRA)
- Forestry Research Institute of Nigeria (FRIN)
- Nigeria National Park Service (NPS).

Collaborations among these governmental bodies, International Development Partners and Non-Governmental Organization will promote the drive of Environmental Science and Technology in Nigeria.

3.5.1 Objectives

- i. To produce citizens with basic knowledge and skills in coping with and managing the physical environment.
- ii. To develop appropriate human resource with adequate knowledge on environmental protection and conservation.

3.5.2 Strategies

- I. Promoting the integration of environmental concerns in all development policies and ensuring public understanding of the scientific basis of their actions on the environment.
- ii. Promoting basic knowledge and skills on environmental issues and how to manage the environment.
- iii. Developing capacity to monitor, predict and mitigate adverse effects of natural phenomena such as climate change.

Action Statements

Government shall support efforts towards developing capacity to monitor, predict and mitigate adverse effects of climate change in line with Sustainable Development Goals (SDGs). The Federal Ministry of Education (FME) shall also interface with the Ministry of Environment and other relevant agencies to promote global learning for the benefit of the environment.

3.6 Technical and Vocational Education and Training (TVET)

Introduction

Technical and Vocational Education and Training (TVET) is the aspect of educational process involving the study of technologies and related sciences and acquisition of skills,

attitudes, understanding and knowledge relating to various occupations in various sectors of the economy and social life (UNESCO, 2010). The 21st century world of work is knowledge and skills driven and very competitive requiring globally competitive skilled workforce. Government recognizes TVET as pivotal to rapid economic and industrial development of the nation. The neglect of this vital education sector in Nigeria is a primary factor in the nation's delayed industrialization. Government shall give priority attention to the revitalization of the TVET system through aggressive stakeholders' engagements and provision of critical infrastructure to enable effective teaching and learning at all levels of education.

TVET shall cover the following:

- i. Vocational Centres;
- ii. Technical Colleges;
- iii. Vocational Enterprise Institutions (VEIs);

3.6.1 Objectives

- I. To provide training and exposures that will impact the necessary skills for the production of craftsmen, technicians, technologists and other skilled personnel who shall be enterprising and self-reliant.
- ii. To teach and prepare individuals who can apply scientific knowledge to solve environmental problems for the convenience of mankind.
- iii. To promote knowledge, skills acquisition and positive attitudes through continuing education in technical and vocational trades

towards employment and wealth creation.

3.6.2 Strategies

- i. Training and retraining of TVET teachers in pedagogical and practical skills to update their knowledge and competencies for effective TVET delivery.
- ii. Organizing technical and vocational exhibitions that will promote innovations and harvest talents.
- iii. Providing necessary infrastructure, tools and equipment for the teaching and learning of technical and vocational trades.
- iv. Establishing and strengthening the World Skills Clubs at all levels of education for the attraction of talents to TVET.
- v. Attracting Public Private Partnerships (PPP) and collaborations for fostering skills excellence against global benchmark.
- vi. Using mass media and NGOs to popularize key skill-sectors in TVET for public awareness.
- vii. Bench-marking of TVET funding mechanism.
- viii. Periodic review and updating of vocational and technical trades curricula for technical and vocational institutions.
- ix. Ensure the establishment of at least one technical college and four vocational training centres in each local government area.
- x. Ensure the establishment of Science and Technical Education Board in each state.
- xi. Ensure the use of master plan for the establishment of TVET institutions in line with best practices.

Action Statement

All tiers of government shall encourage the education sector to give priority attention to Technical and Vocational Education and Training (TVET) in the development agenda.

3.7 Information and Communication Technology (ICT)

Introduction

Advances in information and communication technologies have made the world a global village and transforming the world economy. It occupies a very strategic place in Education in the country. Despite milestone steps taken to enhance ICT in Nigeria, there are severe shortages of ICT skills and personnel necessary for sustainable development and global competitiveness. The sector has the potential of generating more employment and wealth creation which various stakeholders can tap into. The development of human capital, needs to be improved by a new set of knowledge, skills and attitude, and the learner equipped to be globally competitive, towards meeting the challenges of the evolving environment. The National Council on Communications Technology acts as a consultative body for the governments at all levels in matters pertaining to ICT, with a view to achieving some degree of uniformity in the sector.

3.7.1 Objective

To promote Information and Communication Technology Education for the Country's socio-economic development and prosperity.

3.7.2 Strategies

- i. Undertake aggressive and intensive capacity building in ICT usage and application in S&TE.
- ii. Encourage software and hardware development by supporting collaborative R&D activities among industries, higher educational institutions as well as private and public research institutions.
- iii. Training for development of indigenous local manufacturers of ICT hardware, software and other accessories through technological substitutions and creative innovations.
- iv. Encourage ICT education through deliberate programmes of collaboration.
- v. Creating ICT education data-banks in support of S&TE.
- vi. Facilitating National ICT Innovation Competition at all levels of education.

Action Statement

Government shall vigorously pursue ICT Education through its objectives and strategies to achieve an ICT compliant nation.

3.8 Emerging Technologies

Introduction

In the context of this policy, Emerging Technology is viewed as any novel technology currently being developed, that is

expected to substantially affect the social, educational, business and economic landscape of the society. The 21st century is a media, information and technology rich era. The competition for learner's attention has become ruthless, thus students today are bombarded with distractions which are much more appealing than the traditional classroom activities. There is a clear need for critical thinking, and problem-solving approaches in teaching and learning in S&TE.

With jobs prioritizing creativity, critical thinking, and problem-solving, the traditional methods of teaching, such as routine memorization is no longer sufficient to teach students, especially with the availability of information online. S&TE Budgets are shrinking and the nation is faced with a shortage of S&TE teachers in Nigeria. Students need to learn more every year in the same period of time. There is a need to put into action new learning solutions that will enable teachers teach more with less - time, money, and experience. Nigeria needs a learning system that is scalable, widely engaging and will awaken curiosity for learning. It is imperative therefore, to use emerging technology, to prepare students for the future by making learning more friendly.

3.8.1 Objective

To explore and adopt emerging technologies and alternative tools for instruction in the S&TE and other general applications as they emerge.

3.8.2 Strategies

- i. Developing a supportive attitude in S&TE sub-sector for change through increasing awareness of new and emerging technologies.
- ii. Appreciating programmes that are crucial towards engendering a climate for invention, innovation and technopreneurship.
- iii. Introducing innovative learning and teaching delivery methods that awaken curiosity, creativity, critical thinking and problem solving.
- iv. Strengthening institutional education approach to new and emerging technologies to offer solutions to the nation's socio-economic development and knowledge transfer problems.
- v. Promoting technopreneurship and skills competence through the infusion of new and emerging technology courses (such as Augmented/Virtual Reality Technology, Satellite Communication Technology, Biotechnology etc) into the Nigerian Educational Curriculum at all levels of education.
- vi. Prioritizing research programmes in the new and emerging technologies to ensure focus in areas that yield the highest economic pay-offs.
- vii. Building skills, competencies and develop a secured knowledge base in key emerging technology areas to sustain technology support for Nigerian industrial sector.

Action Statement

Government views the embracing of Emerging Technologies as a responsibility for all and shall do all that is necessary for the deployment of the technologies into the Nigerian Education system to enhance knowledge creation and transfer.

CHAPTER FOUR

HUMAN RESOURCE DEVELOPMENT

4.1 Introduction

Human Resource Development (HRD) is a key task of the policy. The policy recognises research, training and re-training with skills development in all their ramifications as key in all educational endeavours. In view of its importance, focus is hereby given in this chapter on human resource development as a thematic area that should be addressed exhaustively.

Given the abundant natural resources available in Nigeria, S&TE has been considered key as it relates to addressing the hydra-headed socio-economic challenges facing the nation. Indeed, the success of S&TE as a critical engine for development and industrialization depends on the quality of human resource availability. Therefore, it has become compelling for government to spearhead the strengthening of capacities of Universities, Polytechnics and Colleges of Education (Technical) in the areas of engineering, science, medicine, agriculture, ICT, S&T teacher education, entrepreneurship and TVET, while continuing to support the S&TE in technical colleges, basic and post-basic schools,

which are the feeders to these tertiary institutions.

For S&TE to be the critical ingredient in the transformation that is being sought, the first major input must be on the nation's workforce. The workforce capability must therefore show outstanding skills upgrade in the following:

- i. Knowledge transfer
- ii. Technology utilisation and adaptation
- iii. Innovation i.e. transforming new technologies that meet market needs.
- iv. Entrepreneurship
- v. Adding value to product and services
- vi. International market development.

4.2 Objectives

S&TE is designed to equip the citizens with the scientific and technological skills needed for the sustainable socio-economic development of Nigeria. The emphasis is on training and retraining of citizens for self-employment and job creation.

Specifically, the following are the key objectives:

- I. to introduce policies and incentives that will increase private sector participation;
- ii. to build leadership and management capacity to drive S&TE;
- iii. to invest in training materials, tools and equipment that will build capacity;
- iv. to train learners on the development of business plans that will support training activities; and

- v. to institute bursary schemes to motivate trainees.

4.3 Key Issues

Human capital is of essence as it plays a major part in the achievement of S&TE objectives. This policy identifies the following issues as critical to addressing the challenges of Human Resource Development:

- i. Staff training
 - a. Industrial training;
 - b. Pedagogy;
 - c. Skills development; and
 - d. Career development.
- ii. Infrastructure
 - a. Accommodation (Workshops, laboratories, S&TE resource centres, office spaces, hostels, staff quarters etc).
 - b. Equipment and tools
 - c. Training materials and facilities
- iii. Standardisation
 - a. Qualification and Certification e.g. National Skills Qualifications Framework;
 - b. Professionalization;
 - c. National benchmark for career progression and mobility; and
- iv. Staff Welfare and Incentives especially at basic and post basic levels.

4.4 Implementation Strategies

It shall be the responsibility of all tiers of government to:

- i. provide enabling environment to support implementation of S&TE policy;
- ii. strengthen Monitoring and Evaluation (M&E) processes;
- iii. ensure adequate budgetary allocation and release for human resource development;
- iv. strengthen the management of S&TE programmes and institutions;
- v. establish strong linkages and collaborations with employers, industries and other relevant bodies/training providers;
- vi. support the industries and establishments to provide hands-on training experiences to trainees, interns and apprentices from S&TE Institutions. Such supports could be in form of payment of stipends or tax waivers that will be determined by the number of trainees, interns and apprentices taken by the industries. This is to take care of wears and tears in their machineries, equipment and additional burden of training; and
- vii. provide trainees and interns from technical and vocational institutions on Industrial Training (IT) with stipends from the Industrial Training Fund (ITF).

4.5 S&TE Teacher Education

The National Teacher Education Policy (2014) as amended states that: “In recognition of the pivotal role of quality teachers in the provision of quality education at all levels, S&T education

teachers at all levels shall continue to be emphasized in all educational planning and development.” It is thus classified as a critical human resource aspect in this document, which shall be accorded its due place. To this end, the following are important for effectiveness and efficiency of S&TE teachers:

- i. appointment and recruitment of staff shall be on merit;
- ii. all science and technical institutions should be headed by relevant professionals;
- iii. S&TE teachers shall be given mandatory continuous professional development;
- iv. there shall be a strong tie between pre-service and in-service teacher education curricula and programmes;
- v. opportunities for re-tooling, re-training and professional support should be available for S&TE teachers; and
- vi. every S&TE teacher in Nigeria shall be entitled to not less than forty (40) hours of staff development training programme locally or internationally per year. Consequently, there shall be a regular sponsoring of S&TE teachers, education planners and managers to attend training workshops, professional conferences, seminars and associations' meetings.

4.5.1 Implementation Strategies

The incentives for attraction and retention of personnel into S&TE teachers programmes and profession shall include:

- i. scholarship schemes and allowances for S&TE trainees;
- ii. rural school S&TE teachers' allowances;
- iii. teaching practice allowances for S&TE trainees on teaching

practice;

- iv. a special salary scheme shall be adopted for S&TE teachers;
- v. housing/rent supplementation, health insurance, hazard and other allowances shall be provided for S&TE teachers; and
- vi. mandatory one-year classroom attachment for S&TE graduates with monthly stipend.

Action Statement

Government considers HRD as a critical means of scaling up the quality of S&TE. Consequently, the stated strategies in this chapter shall be implemented.

CHAPTER FIVE

ROLES OF STAKEHOLDERS

5.1 Introduction

A stakeholder is a person, group of persons or organisations with a direct interest, involvement or investment in something. In the context of this policy document, stakeholders are those individuals, groups and organizations whose activities either derive from or affect the S&TE subsector. These groups or organizations are the primary stakeholders linked to this policy development and its implementation.

5.2. Categories of Stakeholders

The products of S&TE often transcend national boundaries. Consequently, the development of S&TE calls for collaboration among scientists, technicians, technologists, engineers, entrepreneurs and governments within as well as at inter-country, regional or global levels. These include but not limited to the following:

- i. Federal and State Ministries of Education, Health, Science and Technology, Environment, Agriculture, Industry Trade and Investment, Labour and Productivity, Youths and Sports, their

- relevant departments and agencies;
- ii. International donor agencies like UNICEF, JICA; UNESCO; DFID; UNIDO; etc.
- iii. NGOs, CSOs, FBOs;
- iv. Industries (small, medium and large scale);
- v. Multinational Corporations;
- vi. International Development Partners and Donors.

5.2.1 It shall be the role of the Federal and State Ministries of Education to:

- i. ensure minimum standards in S&TE at their various levels;
- ii. assure appropriate curricula for S&TE at their levels;
- iii. provide funding for S&TE;
- iv. encourage and popularize S&TE through regular Science and Technology fairs, exhibitions, quiz competitions, S&TE clubs, and mass media;
- v. encourage and support research activities in various institutions and agencies;
- vi. monitor and evaluate S&TE programmes;
- vii. provide incentives for teaching and learning;
- viii. ensure availability of qualified personnel to handle Science and Technology in schools;
- ix. provide requisite infrastructure, equipment, tools and conducive environment for effective teaching and learning in S&TE;
- x. facilitate collaboration among schools, industries and other employers;

- xi. facilitate collaboration between schools and donor partners;
- xii. advise government at all levels;
- xiii. train and retrain personnel; and
- xiv. coordinate various programmes.

5.2.2 It shall be the role of the Federal Ministry of Health to:

- i. promote effective linkages and collaborations among institutions and industries engaged in health education sector;
- ii. conduct health education Needs Assessment to guide National Health Education Planning (NHEP); and
- iii. coordinate health programmes to ensure its inclusion into schools curricula and teaching of health issues.

5.2.3 It shall be the role of the Federal Ministry of Science & Technology to:

- i. provide incentives to Nigeria youths for career development in S&TE fields;
- ii. encourage and support research activities in various institutions and agencies;
- iii. encourage and popularize S&TE through regular Science and Technology fairs, exhibitions and mass media;
- iv. encourage promotion of inventions and innovations that address local needs from science and technology institutions; and
- v. liaise with Federal Ministry of Education on issues relating to S&TE.

5.2.4 It shall be the role of the Federal Ministry of Environment to:

- i. encourage technology and science intervention that promotes sustainable development;
- ii. encourage the use of clean technologies in production system;
- iii. collaborate with S&TE institutions to develop an appropriate and effective waste management system to reduce pollution from waste generation and promote wealth creation; and
- iv. collaborate with the Federal Ministry of Education on emerging environmental issues in education sector.

5.2.5. It shall be the role of the Federal Ministry of Agriculture to:

- i. encourage development of indigenous technologies for value addition of agricultural produce;
- ii. ensure that ARCN sponsored researches in agriculture are industry driven;
- iii. ensure resuscitation of the Agricultural Research Grant Scheme;
- iv. provide incentives in the agricultural education system to attract talents, sustain and maintain productivity and enhanced extension services; and
- v. encourage technology uptake and diffusion of agricultural innovation to farmers.

5.2.6 It shall be the role of the Federal Ministry of Industry Trade & Investment to:

- i. ensure proper funding of ITF for effective Students Industrial Work Experience Scheme (SIWES) delivery in S&TE;
- ii. ensure proper synergy between industries and S&TE institutions to close skills-gap; and
- iii. encourage industries to accept S&TE students for SIWES through provision of incentives.

5.2.7 It shall be the role of the Federal Ministry of Labour and Productivity to:

- i. collaborate with S&TE institutions to ensure mastery of skills relevant to the needs of the labour market; and
- ii. ensure that trade test graduates possess the requisite skills commensurate to their certificates.

5.2.8 It shall be the role of the Federal Ministry of Communications Technology to:

- i. encourage the development of indigenous capabilities for the local manufacturing of ICT hardware, software and other accessories through technological substitution and transfer;
- ii. encourage ICT capacity building in S&TE;
- iii. encourage knowledge in ICT as a critical component of S&TE; and
- iv. establish S&TE parks with ICT backbone and software development.

5.2.9 It shall be the role of the Federal Ministry of Youth and Sports Development to:

- I. promote S&TE among youths, especially females;
- ii. institute Youth Science Awards at all levels of education;
- iii. support the UNESCO World Youth Skills Day;
- iv. encourage S&TE Clubs and Societies within schools with a view to supporting peer networks and interest groups around S&TE;
- v. foster collaboration between Science and Technology Education agencies and appropriate sports bodies; and
- vi. promote Science and Technology Education in recreational activities to enhance healthier and physically strong citizenry.

5.2.10 It shall be the role of the Collaborators and Partners in the S&TE sub-sector to:

- i. provide support and funding for S&TE research;
- ii. provide instructional materials;
- iii. support human capital development in institutions that are engaged in S&TE programmes;
- iv. provide opportunity for workplace experience for S&TE teachers and learners;
- v. promote international exchange programmes and linkages for S&TE staff and students; and
- vi. offer expert advice on S&TE development.

Action Statements

Government shall encourage the signing of Memoranda of Understanding and Agreements on

S&TE collaborations with stakeholders.

Government shall strengthen the culture of documenting, assessing and promoting the use of database in S&TE subsector.

CHAPTER SIX

FUNDING FOR S&TE

6.1 Introduction

Science and Technology Education (S&TE) is capital-intensive, and requires adequate financial provisions from all tiers of government. In addition to this, assistance from private sector, donor agencies, as well as Development Partners (Local & International) shall form part of the funding strategies for sustainability.

In this respect, government welcomes and encourages the participation of local communities, individuals and organisations in funding S&TE. The rationale is to ensure investment of adequate resources in critical areas such as the provision of essential teaching and learning resources, internship as well as in demand driven scientific and technological researches.

6.2 Objective

To provide the necessary funds to ensure a successful implementation of Government policy towards S&TE.

6.3 Strategies

Efforts towards adequate funding of Science & Technology Education at all levels shall include:

- i. the establishment of a National Science, Technical, Vocational Education and Training (STVET) Fund to guarantee funding of S&TE in the country;
- ii. 0.5% of Consolidated Revenue Funds (CRF) shall be dedicated to the STVET Fund;
- iii. provision of substantial budgetary allocations by Federal, States and Local Governments for S&TE at all levels of education. UBEC and TETFund to also support;
- iv. participation of ALUMNI bodies in the funding of Science, Technology and Vocational Education and Training (STVET);
- v. strengthening and harnessing policy and capacity to mobilize and effectively utilise resources from international and local development partners;
- vi. enlisting funding commitment of corporate bodies including Organised Private Sector through a well-articulated framework to:
 - a) establish, equip and staff Science and Technology laboratories and workshops in Basic, Post-Basic and Tertiary Institutions;
 - b) establish, equip and staff “in-house” Research and Development (R&D) units;
 - c) give grants and endowments competitively to individuals and institutions to actively engage in R&D in Nigeria;
 - d) promote local and international competitions in STVET

at all levels.

Action Statement

Government shall continue to explore non-traditional sources of funding to drive the development of S&TE subsector.

CHAPTER SEVEN

SCIENCE AND TECHNOLOGY MANAGEMENT PLAN

7.1 Introduction

The success of Science and Technology Education (S&TE) is hinged on proper planning, efficient administration, Monitoring and Evaluation (M&E) and adequate financing as stipulated in the National Policy on Education (NPE).

To enhance effective coordination, direction and management of S&TE activities in Nigeria, it is essential to establish and strengthen relevant institutions and structures needed to provide sound S&TE administration, good management as well as quality leadership in all S&TE institutions.

7.2 Management Mechanism for S&TE

The administrative mechanism for S&TE delivery shall be based on the following cardinal principles:

- I. shared responsibility for the funding and management of basic education as provided for in the Constitution;
- ii. close participation and involvement of the communities in the administration and management of their schools;
- iii. effective communication shall be maintained between

- primary stakeholders and national machineries for policy formulation and implementation;
- iv. devolution of S&TE functions and responsibilities to appropriate organs of government and their partners in S&TE;
 - v. internal quality assurance mechanism for self-monitoring and evaluation; and
 - vi. put in place strategies to motivate and sustain activities of S&TE at all levels.

7.3 National Steering Committee on Science, Technical, Vocational Education and Training (STVET)

A National Steering Committee (STVET) shall be established to position S&TE as a national priority endeavour for fast-tracking industrial and economic development of Nigeria.

7.3.1 Composition of the Committee

The committee shall consist of the following members:

i. Honourable Minister of Education	-	Chairman
ii. Honourable Minister of State for Education	-	Vice Chairman
iii. Chairman, Senate Committee on Education	-	Member
iv. Chairman, House Committee on Education	-	Member
v. Federal Ministry of Science & Technology	-	Member
vi. Federal Ministry of Industry, Trade and Investment	-	Member
vii. Federal Ministry of Budget and National Planning	-	Member
viii. Federal Ministry of Agriculture & Rural Development	-	Member
ix. Federal Ministry of Finance	-	Member
x. Federal Ministry of Youth and Sports	-	Member
xi. Federal Ministry of Information and Culture	-	Member
xii. Federal Ministry of Health	-	Member
xiii. Federal Ministry of Communication	-	Member
xiv. State Commissioners of Education	-	Member
xv. Director Technology and Science Education	-	Secretary.

7.4 National Implementation Task Team on S&TE

As a result of the neglect of the STVET sub-sector, the government shall establish an Implementation Task Team to manage and regulate the activities of STVET Institutions, various public and private skills acquisition centres, coordinate the activities of Vocational Enterprise Institutions (VEIs) and reinvigorate STVET at Craft and Advanced Craft levels (without prejudice to NBTE Act CAP 39 of 1979). The Implementation

Task Team shall be charged with the responsibility of setting out standards and quality assurance criteria for all STVET Institutions and various public and private skills acquisition centres. Consequently, the National STVET Fund shall fund the activities of the Implementation Task Team.

7.4.1 Composition of the Implementation Task Team

The Task Team shall consist of the following members:

- i. Permanent Secretary of Education - Chairman
- ii. NUC
- iii. NBTE
- iv. NCCE
- v. NMC
- vi. UBEC
- vii. TETFund
- viii. NABTEB
- ix. WAEC
- x. NECO
- xi. NERDC
- xii. ITF
- xiii. CVC
- xiv. Co-Heads Polytechnics
- xv. Co-Heads Colleges of Education
- xvi. Dean of SUBEB Chairs
- xvii. Chairman ANCOPS
- xviii. STAN
- xix. COREN

- xx. NATT
- xxi. MAN
- xxii. Organised Private Sector
- xxiii. Department of Basic & Secondary Education
- xxiv. Department of Educational Planning Research and Development
- xxv. Department of Finance & Account
- xxvi. Department of Tertiary Education
- xxvii. Department of Federal Education Quality Assurance Service
- xxviii. Department of Educational Support Services
- xxix. Department of Technology and Science Education.

The State governments are also mandated to replicate the establishment and constitution of their respective States' STVET Committees.

7.5 The State Steering Committee (SSC) for the Implementation of the Policy.

The Committee shall be responsible for:

- i. providing general oversight and strategic direction on the implementation of the policy at State level;
- ii. reviewing the implementation report for State & Local Governments;
- iii. ensuring availability of funds and other resources for the implementation of the policy; and
- iv. deliberating and making decisions on any other issues that will ensure smooth implementation of the policy at State level.

7.5.1 Composition of State Steering Committee;

- | | | |
|------|---|--------------|
| i. | Honourable Commissioner of Education | - Chairman |
| ii. | Chairman State House Committee on Education | - Member |
| iii. | State Ministry of Science & Technology | - Member |
| iv. | All Relevant Ministries, Department & Agencies (MDAs) | - Member |
| v. | Permanent Secretary | - Secretary. |

7.6 The State Implementation Task Team

The State Implementation Task Team shall be charged with the responsibility of ensuring standards and quality assurance criteria for all STVET institutions and various public and private skills acquisition centers.

7.6.1 Composition of the State Implementation Task Team

- | | | |
|------|--|---------------|
| i. | Permanent Secretary of Education | - Chairman |
| ii. | Permanent Secretary of Higher Education- | Co-Chairman |
| iii. | Permanent Secretary of Science & Tech. Education | - Co-Chairman |
| iv. | Relevant Parastatals | - Member |
| v. | Relevant Bodies & Association | - Member |
| vi. | Relevant Departments in the Ministries | - Member |

Action Statements

Government shall endeavour to put professionals in the management of S&TE programmes and institutions for effective delivery.

Government shall establish an inter-ministerial platform to coordinate and appraise the various S&TE related activities and programmes, under the flagship of FME.

CHAPTER EIGHT

S&TE INFRASTRUCTURE

8.1 Introduction

The production of adequate and competent technological manpower is a major challenge in the Nigerian education system. The system has been battling with various aspects of infrastructure development challenges for improving the quality of education and expanding access especially in S&TE.

S&TE infrastructure comprises all resources required for effective teaching and learning. Most of the existing laboratories and workshops in the institutions of learning are in the state of decay due to inadequate maintenance and repairs. The present conditions of facilities impact negatively on the quality of education offered. Such conditions have encouraged brain drain of teaching and administrative personnel out of S&TE to other sectors of the economy. Dilapidated school environments contribute to the high drop out of learners from schools. The provision of adequate S&TE infrastructure at all levels of education is essential.

8.2. Strategies for improving Infrastructure Provision in S&TE

- i. Improved Funding – there is a need to provide adequate funds to meet S&TE infrastructural needs;
- ii. Provision of necessary amenities – there is a need for adequate electricity and water supply for effective S&TE delivery;
- iii. Rehabilitation and upgrading of existing facilities in S&TE Institutions;
- iv. Provision of adequate classrooms, laboratories and workshops in S&TE institutions;
- v. Establishment of central science laboratories and multipurpose workshop with modern equipment;
- vi. Establishment of standard ICT centres/laboratories, E-Library facilities and provision of multimedia and requisite facilities for access of available resources;
- vii. Establishment of S&TE Resource Centres in each geo-political zone;
- viii. Establishment of entrepreneurship and skills development centres in S&TE institutions;
- ix. Regular capacity building of S&TE teachers, laboratory, workshop and ICT attendants;
- x. Good maintenance culture and improved security of school properties; and
- xi. Encouragement of increased private sector participation in the development of S&TE infrastructure.

8.3 Expected Outcomes

The development of S&TE in the Country depends on the availability of infrastructural facilities. The expected outcomes when functional facilities are provided are as follows:

- i. improved teaching and learning environment;
- ii. increased access in S&TE;
- iii. promotion of Science and Technological innovation;
- iv. effective dissemination of S&TE information;
- v. increased networking among S&TE teachers and students;
- vi. enhanced business interaction, acumen and promotion of self-reliance;
- vii. improved knowledge and skills of S&TE personnel;
- viii. enhanced students' academic achievements in S&TE; and
- ix. increased job creation and employment opportunities.

Action Statement

Government shall continue to strengthen partnerships with all stakeholders for the provision of requisite S&TE infrastructure.

CHAPTER NINE

STANDARDIZATION AND QUALITY ASSURANCE IN S&TE

9.1 Introduction

Quality assurance in education is the means by which an institution confirms to itself and to others that conditions are in place for it to achieve set standards. It is about how an institution of learning assures itself that the structures and mechanisms for monitoring its quality control procedures are working.

Quality Assurance in S&TE is, in most cases, under the purview of national bodies or agencies such as NUC, NCCE, NBTE and Federal Education Quality Assurance Service (FEQAS). Similarly, State governments have departments, programmes and instruments that are dedicated to monitoring quality within the educational system.

It is worthy of note that primary education stakeholders/ custodians of schools are at liberty to design and implement instrument for monitoring quality of some sort within their schools. Therefore, quality assurance is a responsibility placed on the shoulders of all the aforementioned stakeholders.

9.2 Standardization

Government shall ensure the standardization of the framework of agreements to which all relevant stakeholders must adhere in the implementation of quality assurance to ensure that the processes associated are performed within set guidelines. In this regard, government shall regularly monitor the activities of relevant agencies to ensure that the outcomes are consistent with government expectations of quality and that any conclusions made are comparable with all other equivalent practices in the same class worldwide. The following are generally accepted guidelines in S&TE:

9.2.1 Induction

Professional bodies complement the efforts of government agencies in achieving the desired goals of quality assurance. Government shall continue to provide guidelines to support prospective candidates seeking induction into professional bodies as required by law. However, it shall continue to be the responsibility of professional bodies to provide the appropriate learning experiences under the supervision of the appropriate government agencies. In this regard, government shall continue to collaborate with professional bodies such as Science Teachers Association of Nigeria (STAN), Mathematics Association of Nigeria (MAN), Nigerian Association of Teachers of Technology (NATT), Nigerian Vocational Association (NVA), Council for Regulation of Engineering in Nigeria (COREN), The

Nigerian Society of Engineers (NSE), Teachers Registration Council of Nigeria (TRCN), Home Economics Teachers Association of Nigeria (HETAN), Council of Registered Builders of Nigeria (CORBON), Nigerian Institute of Builders (NIOB), Computer Professional Registration of Nigeria (CPN), among others to provide the requisite knowledge, skills and attitudes needed by the candidates.

9.2.2 Certification

Issuance of certificates shall be in accordance with the stipulated criteria by the relevant government agencies at various levels of education such as:

- I. Basic and Post Basic Education as stated in the National Policy on Education; Other non-formal certification categories like the trade test certificates from the Federal Ministry of Labour and Productivity, National Vocational Qualification Framework (NVQF), and many more from the Organised Private Sector.
- ii. Tertiary Education as stated in the Benchmark for
 - a. Colleges of Education by NCCE
 - b. Polytechnics and other similar institutions by NBTE
 - c. Universities by NUC

9.2.3 Activities in Quality Assurance

The activities in Quality Assurance include but not limited to the following:

- i. continuous setting and improving of best practices

- standards;
- ii. specification compliance, monitoring and evaluation of skill standards;
- iii. regular school visits in formative evaluation of implementation strategies;
- iv. effective and efficient accreditation of institutions; and
- v. constructive feedbacks to the respective operating organs

Action Statement

Government shall continue to review quality assurance standards and mechanisms as a way of attaining global competitiveness in S&TE output.

