

EDUCATION FOR RESEARCH AND INNOVATION IN SUSTAINABLE DEVELOPMENT

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Nigeria has made every attempt at development but the more the effort the further (he targets. It is time to take a reflective look at what have been achieved so far. I he process, the problems and lessons to learn. Many Asian countries with which Nigeria was grouped in the past arc now in the list of fast developing nations. Though belated, the theme of this conference is an opportunity for us Nigerians to be realistic in our expectations.

Change is inevitable and planned change is purposeful. Development is a desire for planned change which is fuelled by new knowledge and innovations from a people who arc empowered to support and participate in their own development process. It is mainly Education that builds the human capacity to support research and innovation for sustainable development. Nigeria's sustainable development is therefore, dependent on the human capacity built by Education to support research and innovation. Is Nigeria Education System designed to build human capacity to support research and innovation? is it possible for higher education to build such human capacity if the lower education is weak?

This paper will leave you to answer the above questions. It will simply examine the relationship among the major concepts; Sustainable development, innovation and research to give new knowledge its eminent position. It will examine die place of knowledge in sustainable development and the roles of higher education institutions in knowledge generation as well as some militating factors to

knowledge generation. It will look at human capability necessary for research and innovation; knowledge, skills, values and attitude. Some strategies will be suggested for repositioning higher and lower education levels for building human capacity for research and innovation.

Sustainable Development, Research and Innovation: The Relationship

One aspect of the concept of development that has never been contested in literature is that it is a process; a process in which the people or the beneficiaries are actively involved in deciding what they need and how to provide for them. "In order for the people to participate meaningfully, there is need lo equip them with necessary lifelong or process skills such as communication, collaboration or team skills, tolerance, decision making skills, information-searching and utilisation skills, thinking skills and leadership skills" (Nwafor, 2012;7). "Men, women, youths and children must be empowered to take control of their development, not just as beneficiaries but also as partakers in deciding the course of development" (Nwafor and Akpochafe, 2005; 10).

Development can be conceived as increase in the production of goods and services which will increase the GNP or income of a nation. It was based on this conception that the world introduced provision of technical and financial assistance to enable poor nations increase their production, hence income. It was based on this notion that the United Nations declared the 1960s as a development decade targeting 6% annual growth rate. This concept

worked for some nations but not all, especially the third worlds, where some reached the United Nation's targeted growth rate and increased their income, with majority of the people wallowing in ignorance, poverty and disease.

A new focus was needed to redefine the term development from a perspective that will place the focus on the people and their standard of living. This led to the conception of development as improvement in the social well-being of a people. It calls for reduction in social problems and vices and increase in provisions of social amenities. It will include elimination of poverty, reduction of unemployment, reduction of income inequalities, improvement in the general standard of living, increasing access to quality education, justice and so on. Development as improvement in the social wellbeing of a people must include Development as increase in GNP which provides the necessary income for the funding.

Yet this second conception of development is not satisfactory because existing institutions, structures and attitude were found to be obstacles. This will include existing financial institutions and policies that limit access to finance, education institutions with irrelevant curricular, gender issues, corrupt legal systems, land tenure systems and any such built-up pillars that work against efforts to reach all the people. Todaro (1977) in Nwafor and Aphochafe (2005;9-10) gave a definition of development that captured all these development perspectives with little modification as "A process involving changes in structures, attitude and institutions as well as the acceleration of economic growth, the reduction of inequality and eradication of absolute poverty", "taking into consideration the present and future generations".

The concern over the future generation was becoming obvious that some developed and developing countries would not be able to

maintain or sustain their level of developments and are likely to handover to the future generations incredible debt servicing responsibilities, devastated environment, devastated biological and cultural diversities etc, thereby making it impossible for the future generations to balance consumption and production.

This worry brought the inclusion of sustainability in the concept. Sustainable development has no generally accepted definition, conception or dimensions. However, the most popular of its definitions is as contained in the 1987 Bruntland Commission Report as

development that meets the needs of the present without compromising the ability of future generations to meet their own needs " while balancing society, environment and economy (UNESCO; 2012).

Very many issues are involved as principles of sustainability and nations address areas considered important to each. The issues include principles such as:

1. Healthy and productive life in harmony with nature;
2. Eradicating poverty and reducing disparities in living
3. Environmental protection; biodiversity, climate change, deforestation, desertification, draught, water scarcity, ocean rise and marine lives, consumption pattern, waste management and equitable management of natural resources
4. International actions that address the interests and needs of all countries.
5. Gender equity and women's vital roles
6. Warfare's destructive impacts on development.
7. Peace and human security
8. Cultural diversity. Minority and indigenous groups
9. Rural Development. Agriculture and land use

10. Human settlement. Population growth and Poverty
11. Urbanisation
12. Sustainable consumption pattern

Sustainable development will not end with addressing issues of sustainability. It will include involving the future generation in the on-going development process while preparing and empowering them with the requisite knowledge, skills, attitude and values that will enable them to take-over and continue the process.

Sustainable development will be here defined as an all citizen inclusive, empowered and participatory process that involves changes in institutions, attitude and structures in a society to increase the income of a nation (increase in the production of goods and services), improve the social welfare (by reducing inequality and eradicating poverty) and address local issues of global concern so as to provide for the needs of the present and build the capacity of future generations (rather than compromise their ability) to meet future needs. Note specifically that this definition of sustainable developments implies;

1. Development is a process
2. The citizens are expected to participate in the process; deciding what they need, how and taking part in providing what they need.
3. Empowering them to participate is not just creating their awareness but equipping them with the requisite knowledge, skills, values and attitude
4. The resulting change is expected to increase goods and services for the nation in a competitive globalised world or increase income
5. Improve social welfare of the citizen; eradicating poverty, ignorance, reducing inequality and improving the general standard of living
6. Addressing global challenges
7. Within supportive environment which

- demands change in existing institutions, attitude and structures
8. For the present generation without jeopardising the future generations' hopes
9. Building the capacity of the future generation to sustain and continue the development process.

In each of the bulleted, what is required is change. The denominator of sustainable development is "change", planned change which connotes innovation. One word definition of sustainable development is "innovation". Innovation is change that is deliberate, systematic, novel and specifically geared towards improving existing systems or creating new ones to meet the needs of particular society. OECD working paper notes thus:

Innovation is a key driver of economic and social progress in OECD countries. If absent, Innovation growth stalls; economies and communities stagnate. At the same time, Schumpeter's classic definition of innovation as "creative destruction" - that is, "...destroying in old combination and realizing a new one" — still pertains (Schumpeter, 1942) Indeed, successful innovation depends upon the human creativity, knowledge, skills and talents that are nurtured and developed, in large part, through education. (OECD, 2009; 7).

Swart, Clarke and Hooker (2011; 7) made several references relating innovation to development thus:

.....innovative society as one in which growth and development is based on continuous learning in which the stock of knowledge is continuously replenished and renewed (UNECA 2010). Innovation is therefore seen as the 'life-hood' of development and economic functioning in societies (Western 2004) and can be described as a process of creation, exchange, evolution, and application of knowledge to produce new goods. Innovation is fundamentally about risk

taking where "unplanned opportunities and previously unexpected linkages and synergies are to be expected" (DST-RSA, WB, FINNIDA 2007).

Between development and innovation, there is need for new knowledge which when applied, translate to technologies. Innovators will depend on the new knowledge created, generated or transferred to bring the planned changes that will be termed innovations. It is through scientific research (that these new knowledge will be created and the necessary enabling environment for change identified for the new knowledge to thrive or be acceptable).

Innovation and research will depend on education to develop the human citizens with the capacity to research and innovate in order to bring the necessary changes for development in any nation. Butcher (2010) in Swart, Clark and Hooker (2011) suggested that Education & Training, ICT and Innovation should not be seen as separate pillars but be viewed as interrelated drivers for socio-economic development towards 'Knowledge Societies'. A sustainable developing society is a knowledge-based nation which depends on the Education to develop human capacity that supports Research, Knowledge, Technology and Innovation. The question for this paper is "How can education build the required human capacities to support research and innovation for sustainable development?".

Knowledge Generation and the Role of Higher Education Institutions

Development in all areas of life demands innovation while innovation in turn depends on creation and utilisation of new knowledge through scientific research. Participants at the G8-Unesco World Forum held in Trieste on 10-12 May 2007, discussed how Education, Research and Innovation could be integrated for sustainable development agreed thus:

Knowledge is key for sustainable development. The North/South gap is knowledge-related, particularly for technological and scientific developments. It is essential to explore partnerships in science and innovation to meet the basic needs of developing countries. A multidisciplinary approach is required to integrate natural sciences with social sciences and humanities. Politically, there is a strong need for mutual recognition, in a spirit of cooperation among cultural, linguistic and historic diversities. If the knowledge divide is allowed to widen, the discontent of some parts of the world will eventually put the creative growth of all societies on a halt, or worse. Therefore, there is great urgency for action, (Vipriao, p2 "The G8-Unesco World Forum held in Trieste on 10-12 May 2007).

Another document yet recognising the place of knowledge thus;

Knowledge is indispensable for understanding and promoting technical, economic and social change in societies. Scientific and technological knowledge is considered to be at the basis of development, both in the North and in the South, as a factor of production as important as labour and capital, (www.unesco.org/shs/most)

Higher Education Institutions (HEI) have the human and non-human resources for knowledge generation and translation into technologies. They have academic staff whose responsibilities are to research for knowledge, preserve and teach knowledge (Walshok, 2003). Also, HEI have large stock of students, who with the proper foundation from lower education institutions constitute abundant resources for, researches that generate knowledge in different disciplines and across discipline. HEIs have access to all sorts of information; primary and secondary, from the libraries, statistical units and communities. Hence no other section of the society is better ready or equipped for research

into knowledge and this has been age-long function of the HEI.

Higher education institutions are looked up to equip professionals and workers with the requisite skills, attitude, values and knowledge to create new knowledge and translate them into acceptable technologies. More so, prepare the community for adaptation and acceptance of new knowledge translated into technologies and innovations.

Factors Militating Against Research and Knowledge Creation in Nigeria

Research for knowledge generation in Nigeria has been on since the inception of such HEI in the country. Unfortunately, the rate and relevance have been too slow, resulting in the country's inability to take her rightful position in the affairs of nations among the international community. Sadly so, the country has been reduced to a nation of consumers of knowledge and technologies generated by other nations, thereby stalling the rate of her development. Some of the hindering factors are internal and external to the HEI.

Within-Constraints include;

- a) Nigerian university students and staff are products of lower education institutions that have focussed on transfer of contents or packed knowledge, especially from the developed countries; overwhelming book-dependent education. Little or no emphasis is given to the teaching of values, attitude and skills such as research and information handling, communication, thinking and ICT skills. Consequently the products of lower education institutions in Nigeria lack productive skills that will aid the production of new knowledge and adaptation. Like every building project, if the foundation is weak then the

structure is not likely to be strong.

- b) Typical African attitude towards what is not known is to interpret or attribute them to gods, goddesses, deities, and spirits. This superstitious culture limit the quest to find empirical explanations to what is not known, limiting the possibility of discovery.
- c) Consequently the typical Nigerian HEI staff and students had little or nothing to do with research skills and attitude before they entered the HEI. Unfortunately, also, there are no meaningful intermediary institutions to prepare the higher education customers with such skills and the existing pre-degrees and diplomas programmes are also content-transfer in their orientation.
- d) Teaching in the HEI is more of transfer of content. Hence, Nigerians have never made any remarkable breakthrough in any research or professional practice. Consequently reducing Nigerians to a nation of knowledge consumers (not producers of knowledge).
- e) Academic staff of HEIs in Nigeria are among the poorest paid in the continent and among countries that compare to Nigeria. Yet they are expected to invest this meagre income in conducting research and publishing the outcomes. Since their promotion is dependent on publishing of these pitiful research outcomes, they struggle to do so.
- f) Research trends follow the outcomes of research efforts conducted and published by western countries with little or no relevance to the immediate needs of the public and private sectors in Nigeria.

- g) Most research institutes, including those located in HEI are funded by governments and so employment of staff is controlled by indigenisation policy or federal character. Consequently, some of the employed researchers of these institutes do not have the capacity for research and therefore aspire to fall back into the traditional roles of regular academics or civil servants.
- h) Published research outcomes are not widely distributed and often designed for the consumption of academic staff in HEI.
- i) Recommendations of most HEI research outcomes lack practical perspectives, sometimes totally inapplicable. No efforts are made to encourage the researchers to try out their ideas and modify where necessary.
- j) The average Nigerian researcher lack access to relevant policy documents and statistical data required. Obtaining a relevant policy document may require the researcher to apply through the IIEI to the Minister for access. The statistical data are either unavailable or obsolete.
- k) There is wide communication gap between the HEI and private sectors, resulting also in the lack of relevant research.
- l) HEI do not have information about on-going researches in the country, hence there is little or no research collaboration among the HEI.
- n) The Nigerian governments are yet to realise the importance of research for knowledge as an important resource in development of sectors of the economy. Even though the most of the few available research institutes are under the governments' funding,
- o) Tertiary Education Trust fund is expected to provide finance for researches that yield knowledge and researchers apply through the political environment prevailing in each HEI.
- p) Recently, some HEI are calling for their staff to publish in foreign journals. What is not clear is how this criterion for academic staff promotion will improve relevance of their research outputs to the local needs of knowledge for development.
- q) There is little a no collaboration involving HFI, public and private sectors in research and innovation efforts; even in the workshops where the results of the efforts are shared.

Human Capability Necessary for Research and Innovation

It is no longer a saying that any nation that is not able to develop the human inhabitants or human resources will be unable to develop anything else. Nigeria is a good example of this saying, The country's inability to develop the human resources effectively is responsible for inability to effectively maintain any sector of the economy: starting from Education, to Agriculture, Petroleum and Power. Following the discussions here, it is obvious that where the nations' human resources lack the skills of research and innovation, she will also lag behind in creation of new knowledge and translation into technology and innovation. Hence, development or sustainable development will elude such a nation. Knowledge and innovation are deciding the competitiveness among nations. Africa in general and Nigeria in particular will continue to dream if their decision

External Constraints Include:

- m) Nigerian governments are perhaps aware of the quality- of these research outputs and therefore hardly incorporate them in their policy making process,

is to expect developed countries or even the fast developing nations to transfer knowledge to them. Knowledge is power. Every country's efforts at research to generate relevant new knowledge and share with others are unequivocally a priority to her sustainable development.

Research, is a scientific process that is systematic, objective, testable and replicable in seeking for knowledge or seeking for solution to problems, when the solution is found and applied to human tasks, it becomes technology, when adapted to the use of human beings and their communities, it becomes innovation. Research can be fundamental or action, quantitative or qualitative whichever, they are scientific in their process. Therefore to develop human capacity for research is to equip humans with the ability to plan and execute research or analyse, utilise and communicate research findings. Education for research equips one with the knowledge, skills, values and attitude that support planning and conducting research, interpretation, utilisation and communication of findings.

Knowledge for Research and Innovation in Human Capacity Building

Research capability is supported by disciplinary and multi-disciplinary contents or knowledge. These consist of existing

facts, observations, data, perceptions, discernment, sensibilities, designs solutions drawn from what mind of men have comprehended from experience and those constructs of the mind that reorganise and rearrange those products of experience into ideas, concepts, generalisations, principles, plans and solutions (Mkpa in Nwafor 2007:342).

These packaged experiences or knowledge support the creation of new ones It is the new knowledge that creates gaps among nations and the realisation are dependent more on

skills, values and attitude that support research than on existing knowledge.

Knowledge is a necessary condition in human capacity building but not sufficient. With globalisation and sustainability issues gaining ground, it is clear that comprehensive human capacity required in every situation consists of knowledge, skills, values and attitude. Most countries, especially poor or low income countries have invested so much in the past on Education for transfer of knowledge packaged by developed countries to their citizen. Consequently, reducing the citizens to mere consumers of packaged knowledge with no productive skills to generate and use own and new knowledge from their environment. Nowadays, the realisation is placing focus on comprehensive learning outcomes including knowledge generation.

Skills for Research and Innovation in Human Capacity Building

Skills are variously termed and categorized; basic skills (e.g literacy and numeracy etc), work related skills (technical, vocational and entrepreneurial etc), life and learning skills (inter-personal, personal, communication skill etc). Except for the basic skills, all the others have been neglected for a long time in Nigeria education system. The range of skills required for research and innovation to build a knowledge-based society is wide. The executive summary of OECD (2011) on skills for innovation and research notes thus:

Understanding the skill and attributes that can help people contribute to innovation is an important first step in the policy-making process. However, the wide range of skills identified in the literature as contributing to innovation does not provide much guidance for establishing policy targets. They include basic skills such as reading and writing, academic skills, technical skills, generic skills such as problem solving and "soft"¹ skills such

as multicultural openness and leadership. Managerial and entrepreneurial skills are also mentioned, as are creativity and design. People also need to: skills that enable them and their workplace to "learn". This can encompass competencies ranging from technical to interaction skills. There is also growing interest in consumer skills for coping with new technologies and contributing new ideas.

Business strategies also drive demand for skills, as they provide a framework for decisions about investment, research and development (R&D) and human capital. As a result of these factors, while there will be differences in the specific skills needed for innovation, in practice, many skills will be relevant across the innovation spectrum. As the demand for knowledge sharing and learning increases, "soft" skills such as communication and teamwork may gain in importance. Nevertheless, technical skills will remain an essential part of many types of work. Continuing globalisation may lead to greater emphasis on adaptability and skills that facilitate collaboration across firms and countries. The ability to work in multidisciplinary teams may also rise in importance. The growing interest in environmental and sustainability issues is another trend [that will have an impact on the set of skills for innovation and research. Definitions of a "green economy" and "green jobs" are not yet settled, but there may be a need for broader skills in existing jobs as well as some new occupations. (OECD, 2011;2)

Work related skills are neglected because of disdainful perception of manual or technical/vocational schools, so much that the Nigerian governments segregate technical/vocational from general secondary schools and parents prefer their wards attending the latter. Apart from this poor public perception (ADEA,2012), there are issues relating to low quality of training, inadequate industrial exposure, lack of collaboration between training institutions and the industrial firms,

inability to integrate ICT and generic skills in the technical skill training, lack of interest in middle level technical manpower development, lack of appropriate guidance and counselling services for youths and gender stereotype. Swarts, Clarke and Hooker (2011;3) referred to World Bank (2008) report entitled "Youth and Unemployment in Africa: The Potential, The Problem, The Promise", which described youths as the most "abundant asset" of the African continent, adding that leaders would have to "create conducive environments and direct the re-engineering of their education and training systems for responsive, relevant and sustainable youth skills development not only to avert disaster, but also for robust socio-economic development".

Generic or Life and learning skills are ignored in the Nigerian education system both by the curriculum planners and the teachers. Hence they are neither taught nor assessed, but assumed to have been taught. Life skills or process skills or generic skills that support research for production of new knowledge and innovations are many and can be attained by different age groups at different degrees. Some of these skills include:

1. Thinking skills (critical, creative and imaginative thinking, information handling, reflective thinking, dialectical thinking.)
2. Communication skills (oral and written presentation, active listening, negotiation, non-verbal and intercultural/ethnic)
3. Personal skills (co-operation, adaptability, patience, self-discipline and self-control, interaction, responsibility and respect)
4. Problem solving skill
5. Decision making skill
6. Leadership and visionary skills
7. Meta-cognitive or self-learning skills
8. Information acquisition skill; reading, reference, information searching, etc
9. Information Communication Technology

- skills and other technologies
10. Specific process skills for Science. Mathematics. Technologies and Arts
 11. Skills in the use of basic statistics
 12. Skill of planning and managing research and innovation
 13. Collaboration and competitive skill, embarking on teamwork and networking

Acquisition of these skills will determine whether a learner will be able to generate new knowledge or remain a consumer of already packaged knowledge, innovate to change the environment or remain complacent with things as they are. "These skills are not limited to any specific content but cannot be learned without contents and to learn these skills, Gagne (Nwafor, 2012;13) recommends frequent opportunities to practice these skills which in the course of practice get refined and improved". Skills are not taught by memorisation of contents in textbook and are more effectively learnt when they are explicitly taught and assessed (Scot, 2005) using constructive instructional strategies as recommended by Association for the Development of Education in Africa (ADEA,2012). They are generic and so can be acquired from any learning experience and used in diverse situations throughout life. Hence some refer to them as life-skills.

ICT among other technology skills are listed already but for more emphasis must be an indispensable integral part of any effort at developing human capacity for research and innovation. Butcher (2010) in Swarts, Clarke and Hooker (p.6) cautioned that "ICT use in education and training plans not to be seen as vehicles for teaching ICT literacy', but as a means to build higher-order skills and provide alternative ways to reverse youth employment trends while producing a more effective, productive and innovative workforce".

Values and Attitude fur Research and Innovation in Human Capacity Building

Research values and attitude are that of a continuous questioning and searching for answers. This is where education is expected to confront African common attitude of mystical and superstitious explanations for the unknown. Values are 'set of beliefs or principles of behaviour accepted by individuals or groups' and attitude (affective, cognition and conative/action) are predispositions of individuals to behave in a certain way. Gagne (1977; 44) defined attitude as an "internal state that influences (moderates) the choices of personal action made by (he individual" and "acquired throughout life from situations encountered in the home, in the streets, in the church and in the school".

Every school child comes to school with already built up values and attitude from both experiences and family values. Values and attitude that will support human capacity for research and innovation arc many and diverse.

Some of them include values and attitude relating to:

1. Enquiry, investigation and curiosity
2. questioning and searching for answers
3. continuous search for improved forms, designs and practice
4. accepting diversity or different ways of doing same thing
5. making mistakes and taking risks
6. use of internal and external resources and energies available to a people
7. identifying and solving personal and common problems
8. global sustainability issues and the quest for solutions; human rights, population, environment, democracy etc
9. openness to criticisms and continuous learning
10. cooperation, collaboration, solidarity and competition
11. Arts. Science. Social Science. Technological and Vocational areas and other areas of

human endeavour.

Values and attitude cannot be taught by memorisation of contents and verbal transfer of meanings. These values and attitude are not contained in any discipline but are taught through processes that explicitly expose the learners to them. Learning the values and attitude that will support research and innovation requires; "

1. Modelling of the required behavior
2. Direct experiences or observation of the success of the behavior
3. Long time practice with several opportunities

Strategies of Education for Research and Innovation

Education has major roles to play in building human capacity for research and innovation. However, there is need to reposition the present system to prepare the general citizens. "Human capital is the essence of innovation" (OECD, 2010;11) and Education is the major tool for the development. Useful strategies are discussed here in two segments; Strategies for strengthening Higher Education and (ii) strategies for strengthening the other levels.

Strategies for Strengthening Higher Education for Research and Innovation

The World Declaration on Higher Education (WDHE) (UNESCO,1998), with respect to the roles of HEIs in 'Advancing knowledge through research in science, the arts and humanities and the dissemination of its results' made several proclamations in article 5. To meet the expected roles of HEIs, the WDHE required HEIs to adopt innovation approaches in its teaching and made several decrees in article 9 (Innovative educational approaches: critical thinking and creativity). Some of the affirmations are:

1. Promote research of all types from first year in the HEIs to the postgraduate programmes

2. Encourage multi-disciplinary and interdisciplinary studies
3. Encourage all members of the academic community to engage in research, and he provided with appropriate training, resources and support.
4. Protect rights of intellectual and cultural rights of the results of research
5. Research must be enhanced in all disciplines, humanities, sciences and social sciences
6. HEIs should find the material and financial support required, from both public and private sources.
7. Use innovative instructional approaches that should be student-oriented,
8. Diversification of contents, methods, practices and means of delivery to cater for diverse categories of people
9. Formation of new types of links and partnerships with the community and with the broadest sectors of society,
10. Production of well informed and deeply motivated citizens, who can think critically, analyse problems of society, look for solutions to the problems of society, apply them and accept social responsibilities.
11. Review curricula, using new and appropriate methods, so as to go beyond cognitive mastery of disciplines and teach for generic skills and competencies
12. Teach issues of sustainability at each level of tertiary education
13. Increase the use of new types of teaching-learning materials including intensive use of ICT
14. Use of alternative new methods of testing that will assess knowledge, skills, values and attitude.

The emphasis on research efforts of Nigerian academic staff is more for publication and promotion rather than research for national development. Teaching, apart from seldom term papers and seminars, is largely directed towards

mastery of contents of disciplines. Evaluation in Nigeria HEI is geared towards memory contents while skills, values and attitude are yet to be assessed. Certainly there is need for some adjustments which will include in addition to the afore-referenced WDHE the following:

1. Higher institutions academic staff should be encouraged to engage in exchange programme within and outside the country.
2. TET fund for research provided with less stringent measures but more monitoring to ensure accountability and relevance of research, greater autonomy to higher institutions required.
3. Preparation for students for higher education; Polytechnics to prepare students for the award of HND and BTech only and universities for degrees only but admissions into both only by direct entry with ND, NID and NCE. This means that direct admission from secondary schools into polytechnics and universities should be limited.
4. Private tertiary institutions with funding support from FG to prepare students for ND, NID and NCE with emphasis on entrepreneurial skills, research skills, innovation skills, industrial experience, in-depth knowledge in science, humanities, social science, technical and vocational skills.
5. Post graduate researches that are closely related to important or relevant issues, to be funded by TET, monitored process and outcomes critically used to improve the system
6. Post graduate research programmes should encourage international collaboration especially for comparative and (ethnology studies inter-institutional collaboration, multi-disciplinary, business-requested, open

access to scientific information, data and government policies.

Competition and Collaborative Strategies of HEI

Some of the areas of priority for collaboration and partnership include;

1. Reinforce links between research and higher institution
2. HEIs to serve as catalyst for the entire education system '
3. Establish links between HEI and oilier research institutions
4. Collaborate with different sectors of (he society, including the culture
5. Collaboration and affiliation among higher institutions in Nigeria and global institutions leading in higher education and research (international partnership and collaboration)
6. Peace and security to encourage collaboration and competitions among regions and ethnic groups. Eliminating policies that encourage uncompetitive tendencies such as quota systems, educationally disadvantage etc
7. National Network for Research and Innovation to work with HEI, independent research at state and regional level to facilitate planning and execution of researches relevant to national /regional/state LGA and dissemination of the result through publications, seminars, workshops, fairs, competitive exhibitions etc.
8. HEIs to ensure that results of efforts are in line with areas local needs, preserve the findings, facilitate access to research and innovation outcomes, disseminate and incorporate the findings in teaching.

9. HEIs to ensure that new research and innovation efforts recognize what exist and build upon previous efforts.
10. Shift emphasis from research and publication for promotion to research and innovation for sustainable development.

Public-Private Investment in Education

1. Combined investment in education, research and innovation by all stakeholders; public and private (within partnership and collaboration arrangement)
2. Collaboration of public and private sectors in the formulation of policies and execution of same
3. Government incentives in the form of tax rebates, grants and subsidies for private investors, including investors in education at all levels

Strategies of Developing Human Capacity for Research and Innovation at other Levels of Education

Like every strong building, higher education designed to develop human capacity for innovation and research would also require strong foundation in the lower education institutions; Education in the pre-primary, primary and secondary that prepare the recipients with the necessary knowledge, skills, values and attitude. The WDHE in its article 3 states thus:

Higher education institutions must be viewed as, and must also work within themselves to be a part of and encourage, a seamless system starting with early childhood and primary education and continuing through life. Higher education institutions must work in active partnership with parents, schools, students, socio-economic groups and communities. Secondary education should not only prepare qualified candidates for access to higher education by developing the capacity to learn on a broad basis but also open the way to active

life by providing training on a wide range of jobs.

Empower generality of people's participation as innovators, generators of new knowledge and users or consumers: Basic education in research and innovation skills for the general populace, small and medium entrepreneurs will encourage awareness, generation, sharing and adoption of new knowledge. The rate of innovation can be increased through an all-citizen inclusive, participatory and empowering universal basic education on knowledge, skills, values and attitude that support innovations and the processes. Swarts, Clarke and Hooker note thus:

It is the embodiment of life-long learning which is the key to keeping pace with a constantly changing global job market and rapid technological advancements. Preparation for lifelong learning requires increased emphasis in primary and secondary schools on learning general skills and competencies, in particular communication, mathematics and science skills, new literacy skills, problem-solving and interpersonal skills, as well as skills needed to learn other subjects.

Assessment and evaluation for all learning outcomes: Teachers major concern in the Nigeria Education system is to cover the prescribed contents in the curriculum or syllable of external examination bodies so that *their* students will do well in the internal and external examinations, the results of which are used to promote or select students. Consequently learning strategies that encourage the acquisition of research and innovation supportive skills are ignored and emphasis is on acquisition of prescribed and packaged knowledge.

This abuse of comprehensiveness quality of continuous assessment and over emphasise on end-of term/session assessment are major barriers in the development of human

capacity for research and innovation in Nigeria. Curriculum content focussed on examinations which neglect alternative assessments techniques and assessment of values, attitude and skills.

That examination malpractice is a big market in Nigeria education industry and does not lack demand or willing labourers is devastating. It is undermining even effort to improve the quality of education and teachers efforts. There is no room for teachers to innovate in educational practices or to encourage students to acquire the skills of innovation and research. Consequently, the Nigeria education system as it is now can neither support innovative educational practices or development of skills for innovation and research.

Education for equity: Education for higher levels of achievement for all students irrespective of ability levels is highly desired. It is not education that selects the higher achievers some of which are fraudulently produced but one that gives every learner the opportunity for success. The more the rejects selected out of the system the lower our level development will drop. Every learner must count and every learner must succeed.

Decentralised education system for relevance: over-centralised education system that dictate contents, methods of teaching with assessment focussed on content coverage will give way to more decentralised system, given greater autonomy to innovation in response to local needs and to equip the learner with the necessary skills to local environment.

There is need for National Educational Evaluation Centre with sole responsibility of conducting and reporting on national evaluation of educational programmes at all levels, from pre-primary to HEI, to employers of labour to communities. The Centre will

provide empirical evidence to support curricular reviews rather than reviews based on speculations.

Methods and materials for teaching all levels: a move away from traditional learning approaches (direct teaching, controlled by teacher, less attention to learners' motivation, disciplinary with summative assessment) must give way to constructivist learning approaches (students controlled learning, acquisition of skills, construction or generation of knowledge, multi-disciplinary, teacher facilitator, coaching and formative assessment).

Constructive teaching with focus on teaching and assessment of process/generic skill and ICT integration in the learning process should be made compulsory at all levels of learning, including primary and secondary schools. Teacher centred use of learning resources must give way to learner centred use with integration of ICT and community resources. Teachers should be given legislated training to demonstrate the requisite teaching skills.

Education that addresses sustainability issues; issues such as entrepreneurship, consumer, environmental, peace, cultural and biodiversity etc should be introduced into the curricular. Integration of education, research and innovation to address the global issues bothering on the principles of sustainability: environmental, economic and society issues.

Strategies of Developing Human Capacity for Research and Innovation at Non-formal Education

If "Innovation depends on people who are able to generate and apply knowledge and ideas in the workplace and in society at large" (OECD,2011;1) then human capacity building for research and innovation must extend into the work place and continuing education programmes. It will call for production of reflective workers, practitioners or professionals who are able to seek

for ways of improvement on practices as against routine workers who do continuously same thing not minding the outcomes of their production efforts. It will call for training for research and innovation in the non-formal sector which will include adult education, informal learning, and workplace-based learning with an appropriate mix of knowledge contents, generic skills with ICT skills, technical/vocational skills, general skills, values and attitude, providing opportunities for immediate employability, and the development of basic transferable skills to support occupational mobility" (Swarts, Clarke and Hooker;6). As the executive summary of OECD on innovation and research puts it:

Beyond the Initial learning gained through school and tertiary study, people must now increasingly upgrade their skills throughout their adult lives. Training at work plays a key role, as it builds work-related competencies and helps workers cope with change. It also contributes to the technological capabilities of firms and is positively related to innovation. (OECD, 2011;5)

There is need for complete reformation of adult education programme in Nigeria, encourage public and private employers to provide opportunities for inside and outside work-based trainings and worker's to be encouraged to utilise the opportunities available.

Reformed Teacher Recruitment, Training, Evaluation and Continuous Professional Development

Lecturers, instructors and teachers in both higher and lower education are not magicians. They cannot give what they do not have: consequently no education system can be greater than its teachers. If the education system is to build human capacity for research and innovation, then the teachers must be trained to teach for the knowledge, skills, values and attitude.

Lecturers, instructors and teachers at all levels require training and retraining on how to constructively, teach for skills (basic, generic and technical skills), values and attitude. And how comprehensively assess for all the learning outcomes; not only memorised knowledge content. Teachers must be encouraged to allow for guided risk-taking, enhance the relevance of learning to the needs of the immediate community and generation of knowledge. Likewise, incentives, training and facilities will be required by the teachers to properly integrate ICT and community resources in the learning process. This means that teacher training institutions will need complete reformation, to train this modern teacher. The atomised behaviour practised in the micro-teaching will give way for reflective microteaching where teaching and assessing generic skills, values and attitude will be practised as 21st century teaching skills. These will include research and information skills, ICT skills and innovation skills.

Entrepreneurship as is taught now in our schools is still focussed on memorisation of contents. Teachers may need to combine major teaching subjects with technical/vocational skills while in training and learn to collaborate with artisans and industrialist to enhance practical and industrial experience.

Conclusion

Sustainable development is heavily dependent on innovation while innovation depends on research to generate new knowledge and all reach out to Education to build the human capacity for research and innovation. The way out is through comprehensive Education. Comprehensive Education for this capacity building will not only teach for knowledge consumption or memorisation but also for knowledge generation/production and sharing, for basic, work-related and generic skills, for values and attitude that support innovation and research beginning from birth, through pro-

primary, primary, tertiary to non-formal/continuing education for every citizen of this nation irrespective of diversities/differences. Higher education can only build on the foundation laid by lower education. Nigerian education programmes at all levels need to be re-positioned to develop human capacity for research that generates relevant knowledge; and innovation that adapts the new knowledge to use. There is need for complete reformation of the curricular guiding education endeavours at all levels of Nigerian education system. And also multiple-stakeholder approach to integrate all concerned.

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