FUNCTIONAL SCIENCE EDUCATION: THE CHALLENGES AND PROSPECTS IN A COMATOSE ECONOMY

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ABSTRACT

Science education is a key driver in the global economy. However, science education is perceived as secondary in many subjects in our educational system. Unfortunately this means that students leave school without knowing how to create and innovate, consequently they will be under prepared for challenges that our society and economies are facing. In today's world of global competition and complex problems, creative intelligence and innovative capacity are fast becoming requirements for personal and professional success. To cultivate and educate the right minds, we need educational curricula that include exploration, problem solving and diversity. It is important that school systems respond to the changing world. There is need for functional science education for the promotion of a progressive and United Nations in Africa and the world in general. To this end school programmes need to be relevant, practical and comprehensive for the acquisition of appropriate skills and the development of mental, physical and social abilities and competences as equipment for the individual to live in and contribute to the development of the society. The paper, therefore examined the concept of science education, comatose economy, the challenges of science education, comatose economy, the challenges of science education in a comatose economy and prospects of science education in comatose economy conclusion and recommendations were made in line with the discussion.

KEYWORD: Concept of Science Education, Comatose Economy, Prospects, Science Education

INTRODUCTION

As the world becomes more inter-connected and competitive and as research and technological know-how expands, new opportunities along with more complex societal challenges arise. Overcoming these challenges will require all citizens to have a better understanding of science and technology if they are to participate actively and responsibly in science-informed decision-making and knowledge-based innovation. It will involve input from user groups, specialists and stakeholder groups. Professionals, enterprise and industry have an important role to play. In this way, everybody learns and benefits from the involvement.

Global competition and technological developments are transforming the world economy and integrating the labour market while opening personal, professional and business

opportunities for all citizens, enterprise and industry across Europe. This has encouraged new patterns of social mobility and migration, greater inter-connectivity between and within societies and cultures and boosted individual and community empowerment. Our population is growing but it is also aging; more people are living in cities and in smaller households. Digital technologies are used intensively and extensively throughout all aspects of contemporary life. Children entering school now will live beyond the end of this century and are likely to change careers two or three times over their lifetimes.

As these developments quicken pace, there is much greater appreciation of the necessity to involve the entire pool of human resources and talent. They are placing new demands on our governments, educational institutions, businesses and civil society organizations to meet the evolving needs of society and the workplace. They are also straining existing resources, including, energy, environment, food water, housing, communication, social cohesion and culture.

To meet these scientific and technological challenges, Mba and Leghara (2008) has adopted a strategy based on three key drivers:

- Smart growth (fostering knowledge, innovation, education and digital society),
- Sustainable growth (making our production more resource efficient while boosting our competitiveness) and
- Inclusive growth (raising participation in the labour market, the acquisition of skills and the fight against poverty).

However, a functional science education is a holistic and educational experience that is focused on the identification of situational problems, gathering of information to make decisions in a world of challenges and realities of life, enhancing users and end users to acquire knowledge, skills, and attitudes to showcase new concepts as a vehicle of globalizing such countries or state for meaningful co-existence, sustainability and developments (Adewale, 2014). Functional science education should be capable of producing Nigerians who can manufacture raw materials, machines, and tools needed for local and international markets, invest new designs, discover drugs capable of curing diseases hitherto incurable and transform the nation from consumption to a manufacturing status (Udoh & Akpan, 2014).

Concept of Science Education

Science education is an integrated field of study which considers both the subject matter of science disciplines such as biology, chemistry, physics, agriculture etc as well as the processes involved in the learning and teaching of science. It implies exposing learners, usually prospective teachers of science to scientific and technological knowledge, to the nature of science, scientific processes, and attitude as well as equipping them with professional skills of a science teacher (Okeke, 2007). Consequently one cannot possibility discuss science education without talking about science teachers.

The teacher is an important factor in any educative process. Hence in Nigerian National Policy on Education, it is stated that no educational system can rise above the quality of its teachers (Federal Republic of Nigeria, 2014). So the quality of science teachers as a critical factor in student's science achievement is central. The teacher preparation institutions in Nigeria have not made deliberate efforts to produce teachers that are ICT compliant and teachers usually teach the way they are taught. This problem is more serious in science and technology education that emphasize knowledge creation, inculcation of critical thinking, problem solving and innovative abilities. Many teachers still use traditional methods to teach science and science is

still taught in single discipline approach not in integrated form. Kologa (2009) observed that chalkboard and textbooks have continued to dominate classroom activities in most schools and institutions in Nigeria. Science education is a process which involves the teaching, learning and applications of science.

The Comatose Economy

In spite of the good intentions contained in goals and policies, the economy is in a critical situation, with a combination of different factors such as depreciation of the naira, huge budgetary cuts, debt burden, high unemployment, investment contraction, banks speculation and lack of transparency. The economy is currently characterized by a modest inflation rate, high interest rate, low capacity utilization and high unemployment. The economy needs expansionary policies to stimulate economic growth and generate new jobs (Onyegu, Akinbode, Ugochukwu & Chukwuma, 2002). The economy is in shambles. We are indebted to the tune of $60b. While the federal government borrows money to pay workers, most states and local governments are owing workers' salaries for months (FWA, 2015). Inflation is at 16.48 percent and still rising, most Nigerians are finding it increasingly difficulty to meet their basic needs, as the economy entered into full blown recession following two quarters of consistent negative growth. Nigeria is facing unprecedented and tremendous political and economic challenges with global and local dynamics. As Nigeria's economy is contrasting, domestic and global headwinds ensure that downside risk will escalate. Without aggressive economic moves and harsh security measures, the economy could face a disastrous free fall. Nigeria has so far achieved theoretical quantitative macroeconomic fundaments, but a lot needs to be done particularly in stabilizing her bearish Naira currency. Although Naira is relatively stable it is weak when compared to major currencies like the Dollar and Euro. Presently, Nigeria is having one of the lowest debts to GDP ratio in the world. This is attributed to her recent payment of foreign debt and the reasonable macro-economic stability she achieved through economic reform measures with a huge foreign reserve. Yet the value of the Naira continues to be depressed (Chiakwel, 2016). Regardless of these challenges, opportunities and possibilities abound.

If we address some fundamental issues and have a development plan that is anchored on realizing inclusive and sustainable growth we will get out of the woods.

Impact of a comatose Economy on Science Education

The financial melt-down has ushered in dramatic shift in the economic landscape, with direct implication on education at all levels. The crises comes at a time of impressive progress in getting more children into school, with primary school enrolment across sub-Saharan Africa increasing at a much faster rate. This is especially true in the case of Nigeria which has made little progress to widen access to primary education. Low income countries face the challenge of expending access, building more classrooms, training and hiring more teachers and improving the quality of learning. The world's poorest children and youth are most at risk of dropping out of school because of poverty. Like much of the nations, our public schools are in dire financial trait nearly every state has less to spend on education. Already before this worldwide recession, the Nigerian educational system has been on the downward slope. A visit to any of our public schools at all levels will reveal a nation whose educational policy makers have perfected official deceit as an art. How could Nigeria possibly by among the world's twenty economies by 2020 with the state of our public education at all levels, vision 20:2020 amounts to a mirage (Bamigboye & Adeyemi, 2016).

The impact of the economic crises on higher education in Nigeria will even be more profound. Already, Federal educational institutions are facing continuous decrease in funding from the government. The national politics determines the quality of education policies, programmes and processes and eventually products. Government underfunding and commoditization of education is likely to worsen what crisis in education.

The current economic crisis confronting many governments are creating severs conflicts in the educational sector of many nations. On one hand they have to reduce, their budget deficits to avoid excess indebtedness. On the other hand they have to promote education firstly to alleviate unemployment as a short run crisis measure and secondly to avoid the deterioration of human capital in the long run. High percentage of national budgets focus on the public funding which greatly affects the education sector. Some governments carried out overall budget cuts. These had negative effects on teachers, students and families (Bamigboye & Adeyemi, 2016).

The gross underfunding of the educational sector in the country in general and the neglect of the maintenance of the physical facilities, instructional and living conditions have deteriorated in many of the public schools. Classrooms, libraries and laboratories are nothing to write home about, all leading to decline in academic standards (Odia & Omofonmwan, 2007). The ever-rising population and the economic crisis are the main cause of Nigeria's deplorable educational scenario, about 40 percent of the total population in the country is aged between 6 and 11, and do not attend primary school. More shocking about 4.7 million children who are of primary school age do not go to school. In an age where education in catered through technological advanced tools, Nigeria is still witnessing classes beneath trees with one teacher assigned to 100 publics. To reveal a more dreadful estimate 10 million of the total Nigerian children are deprived of formal education.

Nigerian education has been experiencing a geometric setback since the past two decades. Its' pathetic situation has always been a source of concern. Classes are always crowded with up to ninety students in a class designed for about thirty students. In most cases especially in public secondary schools chairs are not enough, students share seats and desks, some will and receive lectures. Nigerian schools at all levels are lacking the essential materials for learning, especially for science practical classes. This, no doubt affects the learning process. Most secondary schools lack science materials, and those that claim to have are managing the old outdated available ones.

Hence, the students only cram theoretical steps rather than carrying out practical. Education for All and assurance of quality education should be the prime objectives of any government (Barnamala, 2015). Education is the basic human right that should be feasibly accorded to all human beings. It is the key index to economic and social development of a country (Ekanem, 2015). No nation can develop beyond its educational standard or level. Thus, education is a catalyst for socio-economic and political development of a nation. The success of many nations in tackling major developmental problems such as poverty, unemployment, among others can be traced to their educational system. Today, we are facing major challenges in our global economy, in our environment and in social issues. The need for creativity in education has never been greater.

Prospects of Science Education in a Comatose Economy

This is a really exciting time to be involved in science. Are we preparing all our citizens sufficiently now and for the future? Knowledge of and about science are integral to preparing our population to be actively engaged and responsible citizens, creative and innovative, able to work

collaboratively and fully aware of and conversant with the complex challenges facing society. It helps us to explain and understand our world, to guide technological development and innovation and to forecast and plan for the future. This puts science education at the centre of broader educational goals for society as a whole.

Research clearly shows that educational attainment is linked to better health, personal empowerment and active engagement in public affairs and civil society, being more trusting and supportive of other people, as well as enhance employability. Society faces a range of challenges, such as feeding and housing our population, healthy living, protecting our environment, generating sufficient energy, supplying enough clean water, urbanization and global climate change. We have a much better chance of tackling these challenges if all societal actors understand the issues and their consequences and are actively involved in helping identify and monitor society's responses.

By working together in an inclusive participatory way, we can better align the goals and outcomes of science education and research with the values, needs and expectations of Nigerian society. Democratic societies require an engaged and responsible citizenry contributing at all levels of society, across Nigeria, Africa and the world.

Science Education is Vital

- To promote a culture of scientific thinking and inspire citizens to use evidence-based reasoning for decision making;
- To ensure citizens have the confidence, knowledge and skills to participate actively in an increasingly complex scientific and technological world;
- To develop the competencies for problem-solving and innovation, as well as analytical and critical thinking that is necessary to empower citizens to lead personally fulfilling, socially responsible and professionally-engage lives;
- To inspire children and students of all ages and talents to aspire to careers in science and other occupations and professions that underpin our knowledge and innovation-intensive societies and economies, in which they can be creative and accomplished;
- To enable public, private and third-sector organizations, based in Nigeria, to find appropriately skilled and knowledgeable people and to promote and nurture an innovative Nigerian environment where companies and other stakeholders from around the world want to invest, work and live;
- To empower responsible participation in public science conversations, debates and decision-making as active engagement of Nigerian citizens in the big challenges facing humanity today. Science learning helps us to interpret and understand our world, to manage risk and put uncertainty into perspective, to guide technological development and innovation and to forecast and plan for the future. It improves job prospects, cultural awareness and our ability to act as well-in-formed citizens in solidarity with citizens around the world.

In a nutshell, education is foremost a human basic need. Any country can reach the peak of development if it can educate its citizenry. In the global knowledge economy education has a crucial role in nurturing human capital. Education has enormous potential to promote prosperity in the developing nations (Mobasser & Muhammed,) as cited in Barnamala (2015). It ensures economic growth, leads to social transformation and finds solutions to national developmental challenges. Education endorses social mobility and a high standard of living (Chaudhary,) as cited in Barnamala (2015). The development of a modern society depends to a large extent on

the nature and standard of education. By educating an entire population, economic growth is a natural effect. A country Gross Domestic Product can increase by 1 percent annually by providing education to its entire population. Increasing a country GDP creates innumerable opportunities for trade and development. No country in the world has achieved rapid and consistent growth without at least 40 percent of its adult population being literate. Education can motivate people to become harder workers and can give people the drive to move up in workforce. Increasing literacy rate in a country can drastically improve economic development. Education is the key to giving poor farmers the tools they need to increase their yields, maximize profits and limit waste.

Education in every sense is one of the fundamental factors of development. No country can achieve sustainable economic development without substantial investment in human capital. Education enriches peoples understanding of themselves and the world. It improves the quality of their lives and leads to broad social benefits to individuals and society. Education raises people's productivity and creativity and promotes entrepreneurship and technological advances. In addition it plays a very crucial role in securing economic and social progress and improving income distribution.

The economic growth of a country largely depends on technological improvement and on its scientific and technical manpower. Technological education therefore has a crucial role in speeding up a country's industrial development. It provides one of the most potent means for development of skilled manpower as required by various sectors in a country's economy. Technical and vocational education has been an integral part of national development strategy in many societies because of its impact on productivity and economic development. Vocational technical education gives individuals the skills to live, learn and work as productive citizens in a global society.

Problems and Challenges in Science Education

Science education in Nigeria sits at an important crossroads. Despite public and policy emphasis on the importance of science and technology and substantial improvements in participation and performance, importance deficits and wide differences in educational outcomes and public understanding exist across Nigeria, both within and across countries.

Research is telling us that our future could be undermined by:

- Unevenness in basic science literacy across Nigeria which is necessary to ensure a rigorous understanding and we use of scientific knowledge in decision-making, particularly in domains such as health, the environment, food, energy and consumptions;
- Wide disparities in participation in science education, in formal, non formal and informal settings, across regions, cultures and gender which are blocking full involvement in society of all citizens and talents;
- Declining interest in science studies and related careers that are essential to meet the demand for well-prepared graduates (at all levels) and researchers, especially amongst women, necessary for our knowledge and innovation-intensive societies and economies;
- Concerns about quality arising from a mismatch between demand and supply of qualified teachers and about the gap between science education research findings and what happens in the classroom;
- Insufficient understanding of the breadth of competences required of teachers and teachers educators for enhancing personal and collaborative achievement, innovation and cultural and economic sustainability;

- Inadequate teaching and insufficient family involvement needed to inspire children's curiosity and the need to shift the emphasis from knowing facts to doing innovative and enjoyable things with knowledge, including being creative with the application of ideas;
- Short-fall in skills and competences required to identify early-stage global trends necessary to reach Nigeria targets for smart and sustainable growth and high value-added jobs responding to the need to design science-based solutions to the global challenges;
- Insufficient investments in strategic co-operation and development of ecosystems that would foster effective adoption of latest re-search findings and emerging technologies in industry and enterprise, particularly SMEs;
- Inadequate public knowledge about and understanding of the complexities of the scientific and social challenges facing humanity, across Nigeria, Africa and globally;
- Little involvement of stakeholders in science education policy, development and innovation, particularly between students, families, teachers, employers and civil society in the formal education system;
- Inadequate teacher compensation and professional development to attract, prepare and retain high-quality teachers;
- Insufficient number of science and technology teachers' taking active role in the preparation of the programs;
- The Insufficient in-service training of the science teacher in the transition state of new program;
- Compartmentalized subjects taught by teachers isolated within and across departments;
- Students generally lack motivation and have low self-confidence in learning;
- Persistent achievement gaps in science and math among many student subgroups; demographic changes;
- The huge numbers of the students in the class;
- The informational education orienting students towards only exam achievement;
- Insufficient physical conditions of schools (less laboratory opportunities);
- The intensive curriculum but sufficient time allocation for science education and;
- The instruction of lesson in an information level and student in passive position (only listening an writing), teachers in active positive (writing on the board and teaching in a classical way).

DATA ANALYSES AND RESULTS

Answering the Research Questions

Research Question 1

What is the effect of a comatose Economy on Science Education?

In order to answer the research question, descriptive analysis was performed on the data collected as shown in table 1.

Table 1
Descriptive analysis of the effect of a comatose Economy on Science Education.

Variable	N	Arithmetic mean	Expected mean	R	Remarks
Comatose Economy	250	12.26	12.5	0.95a	*Moderately Strong relationship
Science Education		14.01	12.5		

Source: Field Survey

Table 1 presents the result of the descriptive statistics of the effect of a comatose Economy on Science Education. The two variables were observed to have strong to perfect relationship at 95%. The arithmetic mean for Comatose Economy 12.26 was observed to be slightly greater than the expected mean score of 12.5. In addition to that, the arithmetic mean as regards Science Education 14.01 was observed to be greater than the expected mean score of 12.5. The result therefore means that there is significant effect of a comatose Economy on Science Education.

Hypotheses 1

The null hypothesis states that there is no significant difference in people perception of the prospect of Science Education in a Comatose Economy. In order to test the hypothesis regression analysis was performed on the data, (see table 2).

TABLE 1
Regression Analysis of the difference in people perception of the prospect of Science Education in a Comatose Economy

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.95a*	0.90	0.90	0.75	0.90

- ***Significant at 0.05 level; df= 248; N= 250; critical R-value = 0.139**
- The table shows that the calculated R-value 0.90 was greater than the critical R-value of 0.139 at 0.5 alpha level with 248 degree of freedom. The R-Square value of 0.90 predicts 90% of the difference in people perception of the prospect of Science Education in a Comatose Economy. This rate of percentage is highly positive and therefore means that there is significant difference in people perception of the prospect of Science Education in a Comatose Economy.

Conclusion

Schools are one of the most important institutions in which citizens have the opportunity to engage with structured science learning. The last 25 years has seen an expansion in the numbers of children accessing science education across Nigeria.

School science is just one part of the learning continuum. Underpinning personal achievement throughout one's life and meeting the needs of society and the economy into the future will require on-going life-long learning. Achieving long-term, sustainable change requires a whole-of-education and a whole-of-society approach. This involves all societal actors, building stronger links between knowledge and skills and encouraging careers in science and from science, from an early age. This includes encouraging more Ph.D. graduates to take up positions in industry and particularly in the private sectors, which are the backbone of the Nigerian economy. There is a strong need to relate science education to the innovation system.

Transforming new ideas gained from research into useful knowledge, products and services depends upon deeper and on-going connectivity between schools and non-formal and informal learning environments, families, enterprise, civil society and government.

At the same time, more must be done to close the gap between our highest and our lowest achievers by taking steps to reduce socio-economic, gender and regional disparities across Nigeria and within member states. Education systems and working life should provide inspiring challenges, learn opportunities and learning paths to help citizens reach their full potential. Ultimately, we must ensure that all citizens have the same opportunities so that out societies can benefit from all talents.

Recommendation

- Government and the private sector should pull in more effort and resources towards the development of science education in Nigeria.
- Promote partnerships between teachers, students, researchers, innovators, professionals in enterprise and other stakeholders in science-related fields, in order to work on real-life challenges and innovations, including associated ethical and social and economic issues.
- Actions should be taken to continually improve teaching quality, with greater focus on teacher competences, disciplinary knowledge, avoiding gender stereotyping and on students and teachers learning together.
- Efforts should be undertaken to attract more highly qualified and motivated people to become teachers and to boost the status and prestige of the profession.
- Education policies an systems should:
  - Ensure that science is an essential component of compulsory education for all students;
  - Support schools, teachers, teacher educators and students of all ages to adopt an inquiry approach to science education as part of the core framework of science education for all;
  - Address socio-economic, gender and cultural inequalities in order to widen access and provide everyone with the opportunities to pursue excellence in learning and learning outcomes;
  - Create mechanisms to foster individual reflection and empowerment.
- Science education should balance requirements of breadth and depth of knowledge about science to ensure young people and adult learners are both motivated to learn and equipped to fully engage in scientific discussions and decisions and to facilitate further and deeper study.
- There should be economic diversification in the Nigerian economy.

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