Early Childhood Cognitive Science Development: Implication for Economic Development in Africa

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Abstract: Science and national development are quintessentially the two sides of the same coin and it goes without saying that the changing phases of education as a result of its paradigm shift of the 21st century necessitates a deeper consideration for laying a solid foundation for science education. It is globally accepted that science rules the world and a knowledge-driven economy demands a well-grounded knowledge in science and technology for scientific breakthroughs and technological advancement. Science, which has an ever present but subtle impact on virtually every aspect of modern life should be laid from the early childhood education level. This paper focused on the development of cognition and cognitive science as a problem solving skill which should be developed in every child albeit, in every human being. Some challenges in the process of developing cognitive science in the child include among others, the environment, inadequate facilities, the school curriculum, incompetent teachers etc. some suggestions were also made, among which are: provision of stimulating environment, mandatory school attendance by every individual child in the Nigerian nation in order to implement the equality of education policy, recruitment of qualified teachers, government placing more importance on the foundation laying education levels (Early Childhood and Primary) and vigorous funding of education at all levels in Nigeria.

Keywords: Science education, early childhood education, cognition and cognitive science, economic development.

1. INTRODUCTION

The changing phases of education as a result of its shift in paradigm in the 21st Century necessitate a deeper look into its achievements in the last half of the century in Nigeria, most especially in the areas of scientific breakthroughs and technological advancement. Science, as observed by McComas, Almazroa & Clough (1998) has an ever present but often subtle impact on virtually every aspect of modern life – both from the technology that flows from it and the profound philosophical implications arising from its ideals. Hence every learner, starting from the most basic level of education must be made to understand the tactics and strategies of science in an evolving society.

Generally, subjects are grouped in the school system according to the branches of knowledge they fall into in order to develop students in their specific areas of interest and intellectual capacity. However, it has been observed over the years from the results of general / public examinations in Nigeria (WASCE, GCE, NECO & NABTEB) that the performance of students has continuously

been below the expectation of stakeholders, especially in the sciences and science related subjects. Unfortunately, a country may not be able to progress or advance technologically if a large percentage of her young learners eschew the science based subjects in their choices of future careers which according to Murphy and Beggs (2003) may be due to their being turned- off science early in their academic journey.

Corroborating the statement above, Hadden and Johnstone (1983) reported that students' interest in science start to wane from the tender age of 9 up to 14 which is quite early in the child's journey of formal education. In the same vein, Schibeci (1984) found that the decline in the interest for the science - based subjects is an international phenomenon which he opined needs a serious attention. The general reasons put forward to explain the decline in science subjects from various research include: the natural tendency for science or love of the child's physical environment was never explored by the adults around, the transition from the primary to post primary schooling; the content-driven nature of the science curriculum (especially in Nigeria where rote learning and memorization still hold a centre-stage in the school); the perceived difficulty of science subjects; the ineffective science teaching methods; the absence of science teaching materials and inability of teachers to relate topics to real life situation; and home-related as well as social factors.

From the foregoing, it can be inferred that early solid foundation for the science- based subjects and scientific knowledge are the major tools needed by countries the world over to meet up with the challenges of technological advancement as an option in human endeavour. Therefore early childhood education and care should be attended to accordingly, thus in Nigeria and at the international level, early childhood development and education has become a theme for serious consideration in the recent years starting with the 1989 United Nation's (UN) adoption of the Convention on the Rights of the child and the 1990 world conference on Education for ALL (EFA) in Jomtien, Thailand, then the 2000 World Education forum in Dakar, Senegal up to the Millennium Development Goals (MDGs) in the United Nations, UN) as well as the most recent Sustainable Development Goals (SDGs), all of which have led to the heightened awareness of the importance of Early Childhood Education as a corrective measure for the decline in the standard of education globally. Research abound that the child's early years demand adequate protection, care and stimulation which according to UNESCO (2000) also act as the foundation for his or her well-being and development. Therefore, fulfilling the child's well-being and basic needs both in terms of nourishment and nurturing, particularly from pregnancy to about six years of age as opined by Paiva, Schneider, Machado and Perinazzo (2009) recurrently demands not only technical but, also more skillfully human knowledge of what a healthy and happy childhood actually means to everyone as both a right and absolute priority for the achievement of the goals of development.

Supporting the foregoing, Lake (2014) said "we now know that it takes more than education (reading and writing in the class) for

a young child's brain to develop". Instead, learning should ignite a kind of revolution for learning in the child and in how the adults think about and act on early childhood development. It is a known fact that the developing brain needs multiple inputs in the area of health, nurturing care, protection and enrichment. Therefore, incorporating these multiple inputs will foster the developmental potentials of the young children. There is no gain saying that early childhood education is one of the most cost-effective strategies for solving most, if not all social challenges in the society as it is believed that the brain has a maximum capacity for development in the fullness of its complexity thereby allowing children to learn the skills that will help them flourish in a 21st century economy.

It goes without saying that the main object of education is to prepare the young to educate themselves throughout their lives having acquired an effective life-long education while the best educated human being is the one who understands the physical environment in which he finds himself and can contribute positively to the growth and development of such an environment. Against this background, cultivating the scientific tendency in children becomes a task for every adult around the child i.e. the parents, the teacher and the government in order to meet the demands of the 21st century world. Thus, in the submission of (NRC, 2012), humans have a need to know and understand their physical world. They also have the need to change their environment using technology in order to accommodate what they understand or desire. It is therefore generally agreed that a solid foundation in the knowledge of science would enhance the pursuit of explanations to the natural world while technology and engineering become the means of accommodating human needs, intellectual curiosity and aspiration.

It is apt at this point to note that the fundamental purpose for developing science in all children is to produce scientifically literates who can understand how nature works in their environment and the nature of scientific knowledge, while growing up with the characteristics of scientific knowledge across all disciplines as well as the knowledge that scientific knowledge itself is opened to revision in the light of new evidence. Therefore helping learners or young children to understand their natural world amounts to helping them to realize their futures by providing avenue for them to nurture their natural tendency towards scientific knowledge by providing them with enabling environment, facilities and instructions that give direction and allow them to use cognitive and technological skills which invariably lay the needed foundation for quantitative literacy from the earliest contact with formal education, thus allowing young children to understand and cope with their ever changing environment.

2. EDUCATION AND NATIONAL DEVELOPMENT

DeFillipi and Arthur (1994) attested to the fact that in the post-modern world, various changes in the social context and global perspectives have changed the properties of careers tremendously such that school administrators are challenged to realign school programmes to equip learners adequately to cope with these changing phases of the

society. Supporting the above, the quality of education according to Sulaiman (2019) determines the pace of growth and development of a country while also the leadership of an organization affects its productivity. To this extent, importance should be placed on the relevance of school programmes while also thinking of the type of future being prepared for various levels of learner. The 21st century according to Daggett (2010) demands specific skills from learners at all levels of education apart from the basic learning which focused traditionally on reading, writing and mathematical skills. The new education goals expect products of schools to possess skills in creativity, critical and logical thinking, nature appreciation, value orientation and collaboration exhibited in team work and group dynamics. Products of schools are expected to be capable citizens who can access and process information efficiently and effectively, they are also expected to exhibit quality leadership traits in order to harness, manipulate and use resources at their disposal adequately in their various environment and in the long-run contribute their own quota to the growth and development of their nation.

2.1. Goals of Early Childhood Science Curriculum

At the early childhood education level, science is simply explained as a system of knowledge that covers the general truth and laws about the physical environment as well as being aware of the fact that scientific knowledge is an open ended phenomenon which is opened to revision whenever there is new evidence as a result of research. Therefore, the goals of science at the early childhood level include:

- Fostering children's appreciation of nature and themselves because science stems from social and cultural traditions;
- Nurturing curiosity and providing opportunities to explore the world as well as explain natural phenomenon;
- Encouraging children to investigate the world by using their senses;
- Providing children with hands-on experiences that develop basic science concepts;
- Increasing children's ability to observe; describe, classify, see relationships, be creative and solve problems. (Karen Stephens 1996).

2.2. Goals of Early Childhood Mathematics Curriculum include:

- Identifying and classifying shapes;
- Understanding concepts of size and space;
- Sorting objects based on specific characteristics;
- Using mathematical vocabulary that relates to number and establishing relationship between objectives;
- Mastering one-to-one correspondence, which will lead to the ability to count;
- Organizing mathematical information and relating it in an understandable way;
- Establishing relationships between objects through comparison;
- Using mathematics concepts and applying them to everyday life.

2.3. The Young Child and Science

Naturally every child is born with a spark of science. What the adults do is just to kindle such spark through encouragement, care,

patience, understanding and love. Nurturing each child holistically brings out the latent scientific knowledge in him or her as they grow up and become clear thinkers. The young child naturally observes, explores, imagines, discovers, investigates, gathers information and shares knowledge through interaction with his environment. The child listens to different sounds around him, observes every object, learns about his environment quietly and consistently and grows to develop various skills which include reasoning and inquiry.

Stephens (1996), noted that children are always curious about things in their environment especially nature. She says further that they are excited about exploring even though much information is beyond their understanding. She believes that it is always good to lay a solid foundation for curiosity and confidence in the child and that these would go a long way in developing the love of science in the young child. Nature, according to Kellert (2005) is important to children's development in every major way, be it intellectually, emotionally, socially, spiritually, and physically. He said further that "play in nature, particularly during the critical period of middle childhood (4-8) appears to be an especially important time for developing the capacities for creativity, problem solving, emotional and intellectual development. Supporting the view above, Cherry (2018) posits that early cognitive development involves processes based on various actions which later manifest into changes in mental operations resulting in the creative abilities.

In the same vein, Chawla (1999) posits that creativity, physical competence, social skills, environmental knowledge, confidence, and problem-solving ability are among those benefits to children's development. She also specified the experiences provided for children when adult mentors take them out-of-doors, such include, being given attention to their surrounding in four different ways i.e. care for the land as a limited resource essential for family identity and well-being; a disapproval of destructive practices; simple pleasure at being out in nature; and a fascination with the details of other living things and elements of the earth and sky. The above experience of the children according to her suggests not only care for the natural world, but also care for the child, which form part of the ingredients needed for laying solid foundation for learning science on the part of the child.

Children in recent times don't play in the woods, the natural water or in the sand as everything learnt now is carried out in the confinement of classroom blocks and narrow passages of the school buildings. In Nigeria, curriculum overload has taken away the natural means of learning from the school system and as observed by Maduewesi (2005) in her statement that children below the age of school already experience real or concrete academic rigours with homework and assignments, where the children do not even have contact with any natural learning facilities such as gardens, natural play grounds etc. This situation according to NLI (2007) is known as nature-deficit disorder where children spend more time viewing the television and playing video games in computers than they do being physically active outside the classroom or homes. This ugly situation has affected so many children

by turning them into obese and overweight children which also affects their brain. An in-active brain or an unchallenged brain cannot produce a creative thinker needed in the 21st Century/ technological age.

3. LEARNING SCIENCE AT HOME

Everything in the home of the child can be used to encourage scientific knowledge. Parents are to prepare their children for a world vastly different from the one in which they grew up. Every citizen needs to become scientifically literate in order to make informed decision about their health, safety and citizenship, therefore children need adults (guardians, parents and other relatives) to prepare them for the world that awaits them. Vigotsky (1997), in his socio-cultural theory explains the effects of the environment on the child by laying much emphasis on the roles played by parents, relatives and the entire society in assisting the child to develop higher level of functioning based on the quality of interactions they share with him. Wilder (2014) corroborates the earlier opinion by his submission that parental involvement is one of the integral parts of major educational reforms and initiatives recognized and embarked upon by school administrators and policy-makers.

When parents prepare meals at home, it should be an avenue for them to explain some facts about food to their children, such facts include nutrients required for good nutrition, role of nutrition in the development of humans, how to prepare a balanced diet for children, teach classes of food, explain how to prepare healthy food, teach about food poisoning and safety, teach eating habits and etiquette, teach chemical reactions in food. Over time, parents could teach children about over eating and indiscriminate eating. Children should be taught about fluid intake, especially water. The usefulness of water in the life of an individual, sources of water and how to purify and save water etc. So much scientific knowledge can be acquired from home by the young child if the adults around understand the role such scientific knowledge plays in the life of the young child.

Other items in the home e.g. clothes are also scientifically based as most clothes are made from raw materials harvested from trees e.g. cotton which is gotten from the cotton pods and processed into thread and later woven. Trees are planted, cultivated and harvested for further processing. Trees have other benefits in the life of human beings; all these could be explained to the young children. Other things about the trees include: being felled as timber, being used as furniture, being used as raft and roof and even houses. Everything in the home of a child could be used to develop scientific knowledge in him. The bulb which supplies electricity, the stove and fire have their own scientific components and children should be exposed to such knowledge early in life in order to develop the tendency for creating their own knowledge. The car or any other means of transportation in the house could be used to teach the young child about transportation. Better still, the adults around the child could ride in a taxi or train with the child so that he acquires a first - hand information about road transportation, while other means of transportation could be explained to the child. Every home uses soap and re-agents, the simple knowledge of how these products work will help the child to

learn about chemical reactions and different components of chemicals.

Parents can also take children out into the garden or a farm to explore nature-the plants, the flowers, different colours etc., Children could be made to pick different types of flowers to compare their sizes and colours, they could be asked to weed the garden or till the flower beds etc., children could be trained to use the watering can, whatever the child is made to do in the garden should be explained to him while this forms a basis for learning science.

Parents could also take a walk with children around their homestead and take a stock of the types of houses in the neighbourhood for comparison. Children could be told stories about some of the ancient buildings in the neighbourhood and also why those buildings are different from their own either from the materials used or the architectural designs or cultural values promotion. All these information should be given to the children while playing with them. They should also be allowed to see the scientific knowledge in all the things they have been shown. While taking such walks, parents could encourage children to note the different types of animals passing by and to count the frequency of the appearance of one or two of such animals. In this way, mathematics concepts could be taught as well as the information on the animals that have been sighted. There are a lot of scientific concepts that could be taught while taking a walk in the neighbourhood. There are may be rivers or a big farm or vegetation in the community of the child which may act as a source of teaching some scientific concepts. Spellings (2005) submits that the child should be encouraged to ask questions when the parents give them information during an outdoor exercise. However sometimes, when children ask questions adults around them may ask them about their own opinion on the issue raised and a collective answer may be arrived at.

4. ENHANCING CHILDREN'S POTENTIALS THROUGH THEIR MULTIPLE INTELLIGENCES

Children learn through all their sense organs i.e. sight, touch, sound, smell and taste. Everything learnt in all the domains of learning falls within one or more of the sense organs, below is a table of what can be achieved and method in the course of laying a solid foundation for science in the child.

Table 1. Enhancing Children's Potentials Through their Multiple Intelligences (*Adapted from NAEYC – Young children 2005, page 50)*

Skill to be developed	Means of reinforcement
Logical/Mathematical skills	Itemizing; numbering, counting anything and everything they come across e.g. stones, sticks, bottle-covers. Adding and subtracting numbers from objects collected previously, dividing and multiplying items etc.
Spatial	Describing the characteristics of their physical environment, describing the nature of animals sighted, drawing pictures of home pets or any object in their environment etc.

Naturalistic	Children could be asked to compose stories about their homes, they can be asked to describe their experience in the hot sun, in the rain, or when it is windy.
Bodily kinaesthetic	There are specific movements of the body that could be encouraged for developing the bones, muscles etc. using outdoor games for improving children's physical growth, interpersonal relationship, emotional balance etc. walking in the garden in groups, dancing to different beats and so on.
Sensory Awareness	Olfactory organs development – smelling flowers, comparing their scents etc. Visual – learn colour from various objects around, cars, flowers, buildings etc. Auditory – listen to the sound made by different animals e.g. birds, dogs, cats etc. Feeling/touch – heat from the sun, candle light, iced block etc., wetness from swimming or rain drenched clothes etc. Taste – sweet taste from cake, salt from food, bitter from herbs etc.

4.1. Objectives of Early Childhood Education in Nigeria

- Effecting smooth transition from home to school;
- Prepare the child for primary level of education;
- Provision of adequate care and supervision for children while their parents are at work;
- Inculcate social norms;
- Inculcate in the child the spirit of inquiry, critical thinking and creativity through the exploration of nature, environment, art, music and playing with toys;
- Developing sense of cooperation and team spirit;
- Learning good habit, especially good health habit;
- Teaching of rudiments of numbers, letters, colours, shapes, forms etc. though play. FRN (2013)

4.2. Objectives of the Primary level of Education in Nigeria

- Inculcating permanent literacy, numeracy and ability to communicate effectively;
- Laying a sound basis for scientific and reflective thinking;
- Giving citizenship education as a basis for effective participation in and contribution to the life of the society;
- Moulding character and developing sound attitude and morals in the child;
- Developing in the child the ability to adapt to his changing environment;
- Giving the child opportunities for developing manipulative skills that will enable him function effectively in the society within the limits of his capabilities;
- Providing the child with basic tools for further educational advancement including preparation for trades and crafts of the locality.

4.3. Interplay Between ECE, Primary Education Objectives and Science

The interplay between the objectives of science and mathematics curriculum and the objectives of early childhood and primary education can be easily observed in the presentation of the learning outcomes of the two crucial levels of education attended by children during their formative years.

From the objectives early childhood and primary education, the foundation for the acquisition of science and mathematics as learning constructs are clearly stated. Learners at both the pre-primary and primary education levels are still in their formative years when scientific knowledge can be encouraged easily. The early years are known to either bring about the educational success or failure of the child in later years, depending on how the adults around the child see and use the period with such child. Thus, in the views of Sulaiman (2012), building on the natural tendency of science in the child is very important as such will lead to the achievement of the identified objectives of Pre-Primary and Primary Science and Mathematics contained in the Nigerian Policy document on education.

4.4. Teaching Science in the Early Childhood and Primary Education Classrooms

Science concepts and contents could be taught or encouraged using various methods of teaching based on the fact that, dynamism and flexibility in teaching strategies' applications enhances goals achievement to a large extent. Activity based methods include project method, team, deductive, inductive, group field trips etc. which could be interchangeably used according to the objective of the lesson, while materials for teaching science and mathematics include all the sense organs and the environment of the learners which the teacher should be well informed about.

Teachers should provide contexts for developing learners' curiosity, creativity, discovery and delight. This can be done by using physical materials around the child's environment, such include, the sun, the moon, the sky, the rain, the human body, animals, food types or plants etc. Planning activities to cater for different levels of ability and development

- Every programmer in school is planned to meet the needs of individual learner
- Developmental stages of Piaget are reviewed with respect to the concepts to be taught at the early childhood and primary education levels.
- Activities should include all the domains of learning i.e. cognitive, affective and psychomotor. This is what is referred to as educating the whole child.
- Inclusive, exceptional, multicultural etc.

4.5. Science Concept development through questioning

A teacher could ask a learner to mention some of the things in his room at home. Another child could be asked to mention the items in the kitchen while another could mention some of the things in the living room. Here, the concept of family science could start developing where the teacher classifies the items mentioned by the learners and their uses.

Everything in the learners' homes as opined by Sulaiman (2012) could actually be used to teach science and mathematics concepts at the early childhood and primary levels of education based on the fact that knowledge should be built on familiar concepts, from known to unknown, from near to distance and from simple to complex. A bulb in the bathroom gives light – a lesson on how light is produced can be given. The gas cooker in the kitchen produces heat which is used to cook the family food as some certain foods cannot be eaten raw. The number of beds counted by the learners could start their numerical skills while teaching about relationships could start by comparing the small and big items in the house. The shapes of the beds, the tables, and mirror in the house can be used for teaching the concept of shapes while colours the rooms or the toilet and bathrooms are painted as well as the lawns or gardens can be used to teach colours. Young learners can be taught classification with their mothers' cutlery sets by being asked to sort the different sizes out.

Every concept can be taught by asking learners questions. Questions at this level should be leading in nature i.e. answer given should generate further inquiry whereby the learners supply the most important parts of the information needed in the concept development e.g. Jide, what did you eat this morning?

I ate yam and egg

The teacher asks again – what class of food is yam?

- What class of food is egg?
- What does yam do in the body?
- What does egg do in the body
- How is yam produced?
- How is egg produced?

The questions above can answer various areas of knowledge, they include:

- Food and Nutrition;
- Agricultural Science;
- Commerce i.e. buying and selling etc.

The teacher can turn the same answers given by Jide to numerical skill development by asking – Jide how many slices of yam did you eat?

I ate three slices.

If you and your and sister ate three slices each, how many slices would you eat? Or if mummy and daddy ate four slices each, how many slices would they eat? or remove the slices you and your sister ate from what mummy and daddy ate, how many slices will remains?

Critical Thinking Activities- curiosity in the child is a natural phenomenon that can be positively tapped by the teacher to help the learner become critical thinkers. Children are fond of asking questions of how, where and why, this indicate their examination of the cause and effect relationship in all life's situations.

- A question often asked by young children – where does a baby come from, here the teacher teaches human reproduction in the appropriate complexity. A chart can be brought as teaching material or if a pregnant woman is available, she can be used.
- Usually a hands-on approach is prescribed for teaching science concepts to the young learners. Teachers should make sure that the science concepts to be taught are understandable in accordance

with the developmental stages of the learners. Principles and concept should be related to everyday life experiences. E.g. breathing, eating, bathing, walking, and things around the child's environment.

- Concepts should be arranged about broad themes e.g. "the story of fish", "The green forest and its inhabitants" The sky and the rain etc.
- Teaching mathematics concepts should be done mostly practically. Fractions can be taught by cutting oranges e.g. 1 whole = the whole orange, ½ by cutting the orange into 2, ¼ by cutting the orange into four pieces etc. volume can be taught by using a cylinder filled with water and another empty cylinder.
- The young learners' class should have a corner for science and mathematics activities. This corner should have materials that can be used as teaching aids such as seeds, nuts, shells, rock types, sand types, leaves, plants, bird nests etc. Measuring devices for mathematics should include rulers; balance scales etc. play money, registers, shapes, puzzles and different items for counting.

4.6. Multimedia/Technology at the early childhood and primary levels

- Instructional materials in the teaching and learning process include video tapes, audio cassettes, music machines etc. the most widely used multimedia is the computer since it has the screen for showing any concept to be taught as well as the sound to explain what is being taught.
- Young children can be taught how to use computers at very early stages of their education.
- All subjects can be taught with the use of the computer. Graphs, charts, angles, parallel lines etc. can be taught using the computer.
- The teacher should know the types of computer that could be used for specific subjects at the early childhood and primary levels. The desk top will be most serviceable at these levels. The Laptops are for grown- ups.

4.7. Challenges of Teaching Science and Mathematics at Early Childhood & Primary Education Levels

The challenges of developing science in children shall be organized under three sub-headings as follow:

Home-related challenges

- The inability of adults around the child to understand signs or gestures made by children when they want to explore their environment. Children like to see things by themselves, touch, feel, smell objects since they learn a lot with their sense organs but most often the adults especially parents fail to recognize when the child is restless and wants to get some things done as learning, rather the adults prevent such actions in children.
- Most of the time adults ignore children when they ask questions and it is a known fact that curiousity is natural with children. In fact all scientists are first of all curious about an issue before developing hypotheses to form the framework for their investigation.
- Some homes are not stimulating enough to trigger inquisitiveness in children.

Plain homes or houses without gadgets or natural scenes may constitute hindrance to children's learning of science.

- Dull adults around the child will definitely affect all the natural tendencies in the child since there will be no one to interact with.
- Strict adults around the child will not give him enough freedom to explore his environment.

Social Factors

- **The Nature of the Curriculum**- Content-driven curriculum has always laid emphasis on facts already accomplished and supporting only cognitive growth. Children confronted with these types of situations have no option but accept whatever has been presented to them. In this case using all sense organs, exploring their environment, manipulating and inquiry become difficult to experience. It should be specifically noted that very young children according to Gelman and Brenneman (2004) are perception-bound and as such may not be able to form abstract concepts which usually accompanies school subjects.
- **Children's Curriculum Designers/Developers-** The designers and developers of children's books in Nigeria are most often not professionals in field of Childhood Education. Most of them do not have the understanding of the nature of children and how they learn; this will constitute a serious challenge for midwifing an age appropriate science learning materials for children.
- **The Nation's Education Policy**- This does not really capture the appropriate nature of the teacher training programmes purported for early childhood education teachers.
- **University Teacher Education Programme**- Teacher training in Nigeria focused more on basic and secondary education while the training of teachers for the formative years of children (0-4) is left majorly in the hands of a very few and expensive private organizations.

School-Related Factors

- **Teaching Materials**- The school environment is the major teaching aid needed for laying any concrete foundation for science teaching. The environment is conducive when it has a good landscaping, playground, gadgets and other age appropriate materials that will stimulate learning in children.
- **Employment Criteria**- Organizations employ staff based on relationships rather than on qualification. This is a case of square pegs in round holes. This definitely will not allow for the achievement of the goals of education.
- **Funding**– Schools are generally underfunded in Nigeria. Children's education in particular according to Sulaiman (2004) has not been adequately provided for.

Teacher Related Factors

- **Teaching Method-** Most of the time the teachers employ ineffective methods to teach science. Such methods include:

rote learning, cramming, and regurgitation of facts which would not allow for any form of expansion of the child's natural potentials for science learning.

- **Teachers' inability to relate topics to real life situations-** In most cases teachers teach science concepts as if such do not have any relationship with real life of humans and as such end up confusing learners.
- **Teacher's Attitude-** A lot of learning takes place when the teacher understands the nature of children. It is not a gain-saying that the attitude of the teacher greatly impacts upon his teaching.

5. CONCLUSION

This study has been able to establish the fact that children have potentials for learning science from the earliest period of their development. They are naturally born with a spark of science and all the adults around them need to do is to build on such spark by creating an enabling environment for such seed to grow adequately. The role of early childhood education, starting from the home cannot be over emphasized anytime matters relating to children are raised.

6. RECOMMENDATIONS

Building on the natural science tendencies in children demands that adults around the child have full understanding of the nature of children, their features and how they learn, therefore the following recommendations are made:

- The parents or caregivers should observe and identify the needs of the child especially when all the sense organs are involved;
- Children should be patiently addressed by the adults when they need clarification on their physical environment;
- The home of children must be conducive enough for science to become a part of their daily activities;
- Home should have stimulating gadgets for children to build on their inquisitive nature;
- Curriculum designers and developers, political leaders and citizens and in fact all stakeholders should make changes in the modern built environment to provide children with positive contact with nature where they can play, live and learn;
- Teachers should make learners understand the nature of science, a hybrid field blending of various social studies of science such as history, sociology and philosophy of science with research from the cognitive science into a rich and useful description of what science is and how it functions. This will facilitate direct experiences that will promote conceptual learning;
- Homes and schools should encourage the use of scientific inquiry and practices in the early childhood education classes;
- Schools should plan in-depth investigations involving children;
- Teachers training programmes should be reviewed to capture the ideal training for Early childhood education teachers;
- Admission requirements into teacher education programme should be based on merit, with English and mathematics

as well as a science subject as requirements.

- Developmentally appropriate programmes should be developed and used in pre-schools to foster science learning;
- Teachers should help learners to connect science learning in school with their real world outside the school environment;
- In-service training for teachers of children should be organized frequently in order to update their knowledge;
- Supervisory outfits of government should monitor the activities of schools both in the private and public schools;
- School and home environment should be created for science learning.

REFERENCES

Colette M. and Jim B (2003). Children's Perceptions of Schools Science. School Science Review.

Chawla, L. (2006). Learning to the Natural World, Enough to Protect it. An Article written in honour of the Norwegian Child Psychologist – Per Olav Tiller.

Cherry, K. (2018). What is socialcultural theory? Retrieved on 07/03/2019 from https://www.verywellmind.com

Daggett, W.R. (2010). Preparing Students for their Technological Future: Rigor, Relevance and Relationships for All Students. A paper Prepared for International Centre for Leadership in Education.

DeFillippi, R.J & Arthur, M.B. (1994). The boundaryless career: A competency-based perspective. Journal of Organizational Behaviour, 15, 307-324.

Federal Republic of Nigeria (2013). The National Policy on Education. NERDC Lagos.

Gelman, R. and Brenneman K. (2004). Science learning Pathways for Young Children. Early Childhood Research Quarterly, Rutgers Centre for Cognitive Science, Rutgers University, USA.

Hadden, R.A & Johnstone, A.H. (1983). Secondary School Pupils attitude to Science: the years of erosion. European Journal of Science Education, 5, 309-318. In Colette M. and Jim B. Children's Perceptions of Schools Science. School Science Review, March 2003, 84 (308).

Kellert, S.R. (2005). "Nature and Childhood development". In Building for Life: Designing Understanding the Human-Nature Connection. Washington D.C. Island Press. In Current Issues in Comparative Education, Teachers College, Colombia University. Vol. 11.

Lake, A.K. (2004). "Frontlines" (http://www.usaid.gov/news-information/frontlines/child-survival-ethiopia-edition/intervies-anthonry-lake-executive).

Maduewesi, E.J. (2005). Benchmarks and global trends in Education. Benin city: Dasyera Influence Enterprise.

McComas, W.F., Almazroa, H & Clough M.P. (1998). The Nature of Science in Science Education: An introduction, Science & Education 7:511-532.

National Association for the Education of Young Children (NAEYC) (2005). Young Children. Journal of the National Association for the Education of Young Children, January, 2005.

National Research Council (2012). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, D.C: The National Academy Press.

Natural learning Initiative (2012). Benefits of Connecting children with Nature: Why Naturalize Outdoor learning Environment. North Carolina State University.

Palva, Scheneides. Machado and Perinazzo (2009). A New Look on Early Childcare and Education (ECCE) as Joint Responsibility. UNESCO, PORTO Alegre Brazil.

Schibeci, R.A. (1984). Attitude to Science: An Update Studies in Science Education, 11, 26-59 in Colette Murphy and Jim Beggs' Children's Perceptions of school science. School science review, March, 2003 84 (308).

Schutte, H., & Ciarlante, D. (1998). Consumer Behaviour in Asia. Beijing: Macmillan Press Limited.

Spellings, M. (2005). Helping Your Child Learn Science. U.S. Department of Education-Office of Communications and Outreach. Washington D.C.

Stephens, K. (1996). The Child care Professional. Glencie/McGraw-Hill. USA.

Sulaiman F.R. (2012). Teaching Science and Mathematics at Early childhood & primary Education levels. Course materials developed for ECP 208 Department of Early Childhood and Primary Education, Kwara State University, Malete.

Sulaiman, F.R. (2004). Funding Public Primary education in Evaluation of Public Primary Education Programme in Ogun State 1985-2000. A PhD Thesis Submitted to the Department of Teacher Education, Faculty of Education. University of Ibadan.

Sulaiman, F. R. (2019). Reconceptualising School Leadership For Achieving Education Goal. In

Effective Leadership in Education. A book of reading in honour of AbdulRasheed NA'ALLAH. Edited by: Awodun, M., Adedigba, o., Odinko, M.N.& Bipath K. Lampstand Publishing. Lagos

United Nations Educational Scientific and Cultural Organisation (UNESCO) (2005). Sciences Perspectives on Children. Brasilia: UNESCO, Banco Mundial, Fundacao Mauricio Sirotsky Sobrinho.

Vygotsky, L.S. (1997). Educational Psychology. Boca Raton: St. Lucie Press

Wilder, S. (2014). Effects of parental involvement on academic achievement: A meta-synthesis. Educational Review 66, 377-397.