

**PIAGET'S THEORY OF INTELLIGENCE: ITS IMPLICATIONS TO
SUSTAINABLE DEVELOPMENT OF PRIMARY EDUCATION IN
NIGERIA**

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Abstract

The crucial role that intellectual potential can play in the scientific and technological development of Nigeria cannot be dispensed with. The fact remains that the solution to Nigeria's current problems demand contributions from individuals with high intellectual prowess. The National Policy on Education(2004) has one of its objectives of special Education, as to provide opportunity for the gifted children to develop at their own pace. An attempt has been made in this paper to appraise the views of Piaget's theory with particular reference to its implications for sustainable development of Nigerian primary education. It equally highlights the implications of Piaget's theory and applies it to the learning environment in order to ascertain its usefulness to the sustainability of primary education in Nigeria. It concluded by making useful suggestions on how these ideas can be used to keep on improving the development of Nigerian primary education.

The term "intelligence" was not in widespread use until it was eventually popularized in the late 1800s by the writings of Sir Francis Galton. Since then,

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intelligence has been the subject of intensive research, theoretical pronouncements, as well as heated debate. In the 19th century, a number of scientists thought that differences in intelligence and ability could be explained in terms of physical attributes. Thus, Galton relied heavily on physical measures such as height, weight, strength, rate of movement, visual and auditory activity as well as reaction times. He believed that there was a consistent co-relationship between sensory and mental activity. (Hothersall,1995). Therefore, for centuries, people had thought of the mind or intelligence in vague, abstract terms. Great ideas were attributed to divine inspiration while success in society or even in battle field was considered as the result of good breeding. However, the views of intelligent theorist tend to be in sharp contrast to these earlier understanding of the term intelligence.

The Concept of Intelligence

Intelligence as a concept is very controversial. It means quite a number of things to people. when we say that someone is intelligent, it could mean that the person is able, brilliant, clever, expert, gifted, smart and so on. But the scholar's opinion on the concept of intelligence differ greatly. Spearman (1923) cited by Gregory (1992) opined that intelligence is a general ability which involves mainly the induction of relations and correlates. This implies that spearman is of the view here that intelligence is made up of two components: A g- factor or a general

intelligence and s- factor or a collection of specific cognitive intellectual skills. He believed that the performance on any intellectual task was determined by a person's general intelligence augmented by a variety of special intelligences that were unique to specific testing procedures.

Terman (1916) in his own opinion saw intelligence as the capacity to form concepts and to grasp their significance. This definition by Terman was further improved by Wechsler, when he postulated that intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with the environment (Wechsler, 1939).

Piaget (1972) from his own academic orientation defined intelligence as a generic term to indicate the superior forms of organization or equilibrium of cognitive structuring used for adaptation to the physical and social environment.

The above definitions of intelligence even though are representative but they are not exhaustive of the divergent opinions of scholars and experts on the concepts of intelligence. This sampling of views of scholars show that there are many definitions of intelligence as there are experts willing to define it. Nevertheless, despite these different opinions the two major recurring themes in all these definitions are: the capacity to learn from experience and the capacity to adapt to one's environment – these are most crucial to the concept of intelligence.

Piaget's Conceptualization on Child's Learning as an Individual

Piaget cited by Wood, (1998) believed that all children pass through a series of developmental stages before they construct the ability to perceive, reason and understand things in mature rational terms.

Piaget and Inhelder (1969) were of the view that the essential nature of human beings was their power to construct knowledge through adaptation to the environment. Therefore, this implies that through assimilation and accommodation, the child would be in a continual process of cognitive self-correction. Assimilation deals with the applications of a schema or an organized pattern of thought or behaviour that leads to knowing how to do something while accommodation is the adjustment of unsuccessful schema so that it works. This assimilation and accommodation are aspects of Piaget's theory that teach us clearly how children learn. In assimilation, children match information, concepts and skills arising from interaction with the environments as well as with previously formed mental structures. On the other hand, accommodation requires the children to modify structures in order to make sense of the new information or concepts or to represent new skills. Krogh and Slentz (2001) postulated that the ultimate goal of this activity is a better sense of equilibrium. Equilibration as an entire process is very fundamental to learning.

Piaget's key contribution to child learning and development is his teaching that

Piaget's Theory of Intelligence: Its..... learning is a continual process of meaning making. It is not linear input and output process as favoured or acclaimed by the behavioural theorists such as Pavlov and Skinner. This means that information is not simply absorbed into a memory bank, which should be reproduced when needed but must be worked on by the child in order for it to make sense in terms of the learner's existing frame of references in the environment. Any form of learning activity which allows a child to learn with concrete real life object in the environment by touching, feeling, tasting and even smelling it will certainly avoid or negate abstract learning. Moyles (2001) in support of this assertion argued that children's thinking is embedded in a context which has some meaning to them whereas much school activity is disembedded.

Therefore, activities which involve the use of words only without the use of concrete objects or real life instructional materials would lead to greater abstraction as well as being removed from meaning and purpose to the children.

But first hand learning experiences fuel children's imagination and unquenchable thirst for understanding. This type of learning actually occurs in everyday context when children engage in activities which matter to them (Rich and Drummond, 2006). Children should be involved in their learning which has to be real and meaningful to them.

Child Learning With Significant Others

Dewey (1959) cited by French (2007) shared the same opinion with Piaget that learning is a continuous reconstruction of experience, even though he was more emphatic. Therefore, the optimal education is one that is both active and constructive. No doubt, this kind of education has a social direction through a joint activity whereby people consciously refer to each other's use of materials, tools, ideas, capacities and applications. The focus of Dewey was on designing a curriculum to reflect the circumstances children face as members of a community living in the modern world. His major goals were on fostering democracy, independence and real experience in the classroom. Therefore, true collaborative exploration takes place where all participants influence the direction, timing and outcome of the investigation.

Vygotsky (1978) equally stressed children's active role in human development, but unlike Piaget, he believed that children's development arises from the child's attempts to deal with everyday problems. Moreover, in dealing with these problems, the child always develops strategies collectively. That is in interaction with others. According to him, every function in the child's development appears twice. First on the social level and later on the individual level. A significant proportion of children's everyday activity takes place in what he called the zone of proximal development. This is the distance between the child's actual development level as determined by independent problem solving and the child's level of

potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.

Wood (1976) cited by French (2007) stressed the important role of the adults and other capable peers in child's early learning and development. He identified that the key challenge for adults then becomes one of defining the limits of the zone, matching or tuning the adult support or guiding the children in order to enable them to reach the next level of their ability beyond their own personal capability during the learning process.

Bronfenbrenner (1979) supported this view above when he said that child learning and development are facilitated by the participation of the developing person in progressively more complex patterns of reciprocal activity with someone with whom that person has developed a strong and enduring emotional attachment especially when the balance of power gradually shifts in favor of the developing person.

Therefore, in active learning of children, the adults, have a responsibility in providing a rich environment for children where they are able to explore, touch, manipulate and experiment with different materials. pertinently, children are able to involve themselves deeply in activities by asking questions, making hypotheses and forming new concepts. They have to construct learning for themselves with focus on the reasoning processes rather than on the end product.

They should be given some time to engage in this exploration (Smith, Cowie and Blades, 2005).

Brain Research

Bruce (2004) was of the view that research on brain development has actually made a useful contribution on the early learning and development of children even though it is still on its primary level. It has suggested that direct action both physical and intellectual engagement with experiences in addition to problem-solving and repetition ensures that the synapses or neural pathways become stronger. French and Murphy (2008) supported this by saying that this is particularly true of children from birth to three years and above. Early experience determines how neural circuits in the brain are connected. Children who are played with, spoken to and allowed to explore stimulating surroundings are more likely to develop improved neural connections which aid later learning. (Karrmorse and Willey, 1997). The stimulation children receive determines which synapses form in the brain. Therefore, through repetition these brain connections become permanently.

On the other hand, a connection that is not used at all or often enough is unlikely to survive. Thus, children who learn actively have positive dispositions to learning. These set of children are those who are really interested in what they are doing, experience enjoyment and with repetition they experience the probability of success. They develop competence and confidence as well as being heavily

Piaget's Theory of Intelligence: Its..... motivated to learn. (Hohmann and Weikart, 1995).

Piaget's Theory of Intelligence

Piaget during the 1920s proposed a theory of cognitive development of children. He caused a new revolution in thinking about how thinking develops. In 1984, he observed that children understand concepts and reason differently at different stages.

The concept of cognitive structure is central to his theory. Cognitive structures are patterns of physical or mental action that underline specific acts of intelligence and correspond to stages of development. There are four primary cognitive structures or development stages Piaget put forward. They are the sensor motor, preoperations, concrete operation and formal operations. In the sensor motor stage (0-2 years), intelligence takes the form of motor actions. Intelligence in the preoperation period (3-7 years) is intuitive in nature. This is the stage of conservation of concept not yet developed. Their ability here is to mentally symbolize things with words and images. The concrete operational stage (8-11 years), intelligence takes the form of logical reasoning but still depends upon concrete referents. In the final stage of formal operations (12 years of age and above) thinking here involves abstractions.

Pertinently enough, cognitive structures change through the processes of adaptation: assimilation and accommodation. Assimilation involves the interpretation of events in terms of existing

cognitive structure whereas accommodation refers to changing the cognitive structure to make sense of the environment. cognitive development here consists of a constant effort to adapt to the environment in terms of assimilation and accommodation. Therefore, in this sense, Piaget's theory is similar in nature to other constructivist perspectives of learning like Bruner and Vygotsky. Strikingly, it could be seen that while the stages of cognitive development identified by Piaget are associated with characteristic age spans, they can vary for every individual. Moreover, each stage has many detailed structural forms. for instance; the concrete operational period has more than forty different structures covering classification and relations, spatial relationships, time, movement, chance, number, conservation and measurement.

Application of Piaget's Theory to the Sustainable Development of Nigerian Primary Education

Applying Piaget's theory, results in specific recommendations for a given stage of cognitive development. For instance, with children in the sensor motor stage teachers should endeavour as much as possible to provide a rich and stimulating environment with ample objects to play with. Montessori cited by smith, (2005) advocated that the learning environment should be carefully planned to meet children's needs by providing them with the optimum opportunity to work independently, to make choices, decisions and to solve problem. Its space should be inviting for children and organized into

well- defined areas of interest to encourage definitive types of play.

Therefore, to teach our primary school children daily personally task such as weight learning, they should be provided for example with equal wooden rectangles of different thickness whose weight has to be matched. To teach them size, they should be made available cylinders with knobs that would be fitted into corresponding holes. Each set of cylinders will have equal height but may be differing in diameters. To teach them other concepts like length and elementary addition, the teacher should make available to them different structured teaching materials they would work with that will unfold their initiative skills and improve their reasoning ability. At the sensor motor stage as the case may be, the role of the teacher here may not be to teach per se, but to carefully and scientifically observe the child in order to introduce materials when he is ready for them. The presentation of wide assortment of learning materials to children at this stage, is to catalyze them into an inner discipline that comes from a self-corrective learning materials and tasks. This will speed up their physical manipulative skills for grasping number concepts, mastering shape, form, colours, size, length, sound and so on at play.

Piaget explored the implications of his theory to cover all aspects of cognitive, intelligence and moral development. Many of his experiments were focused on the development of mathematical and logical concepts. Therefore, any creative primary

school teacher in Nigeria can appropriate it in his daily teaching by following its principle and providing the required as well as the diverse teaching and learning materials at each stage to achieve both the specific and general objective of education. The very poor performance of Nigerian students in mathematics and sciences as well as other core subjects like English attest to the fact that our nursery and primary education system which form the bedrock of higher education need to revisit the revolutionary ideas of Piaget. Its curriculum should be re-designed based on Piaget's ideas. His theory has been applied extensively to teaching practice and curriculum design in elementary education.

Pertinently, with children in the concrete operational stage, learning activities for these set of children in our primary schools should involve problems of classification, ordering, location, conservation using objects. The Nigerian primary school teachers should be keenly concerned about this stage as well as other significant figures involved in children's education. This is the level whereby science subjects should be gradually introduced to the children. The majority of the adolescents function very well at the concrete operational level on their understanding of science subject matter. Therefore Nigerian's dreams for technological and scientific breakthrough can be realized if our primary schools are properly equipped with assorted scientific and technological equipments. Moreover, their teachers should be re-trained on the current and innovative methods of teaching

which allow the students to search, discover and solve problems by themselves with the teacher only serving as a facilitator of learning.

One aspect of intelligence on which every society including Nigeria has placed great emphasis is mathematical proficiency. Approximately a lot of time is spent in our primary school on its study. Piaget's study on how children develop an appreciation of quantitative relationships show that there is gradual unfolding system of awareness of relationships between things, their number or quantity, weight, shape, and size. He believed that before the age of 2 years, the child's concepts of number relationship are undifferentiated. But from 2^{1/2} years to 3 years and above the dawning number concepts should include coordination-counting objects in sequence and the process of classification (a dog is an animal).

The primary school teacher should appropriate the required and necessary teaching materials here like the ones advocated by Maria Montessori to teach these number concepts and their relationship. The teacher and other significant figures involved in children's education should understand that an excellent time to help teach your child concepts about more or less, full and empty, and the like is when you are measuring the ingredients of a recipe (Theresa & captain, 1983). Therefore frequent exposure and repetition will enable your child learn these things, and

once learnt, they become permanent concepts.

Conclusion

A high degree of commitment and resourcefulness is required by all the stakeholders-the primary school teachers, the parents, the education authorities and the government in the education of our children in order to unleash all the potentialities in them. The core teaching in Piaget's theory is the development of knowledge. Knowledge cannot be developed unless you know how to develop it. Therefore, the primary school teachers and parents should always give their children opportunity to discover things by themselves so as to develop their real knowledge of solving problems in the macro society.

Recommendation

The Nigerian primary education is the bedrock of higher education. Its quality determines ultimately the quality of our university education and its product. Therefore, any wrong move made towards the training and graduating of its pupils will no doubt have multiplier effects to the university education, which will in turn, negatively affect the entire development of the nation. Thus, the following recommendations are made for its continuous improvement from the study:

1. There should be adequate spacious, rich and stimulating environment for teaching and learning in the primary school.
2. Teachers and parents should create and allow children to enjoy as well as experience enough organized play. Through this they construct the ability to reason by giving meaning to place, people and things.
3. There should be provision and availability of concrete, real and life instructional materials which would give the pupils ample opportunity to interact meaningfully with the environment.
4. The primary school teachers and other significant figures involved in children education should always prepare the environment for the children by equipping it with enough learning materials that are attractive and challenging.
5. The overzealous parents and teachers should not unnecessarily push their children to higher class or give them tasks beyond their current cognitive capacities. The pupil's neural connections which make them proficient in life as experts in their field of specialization later in life are heavily aided by challenging learning environment.
6. The teaching of science and mathematics should be given greater attention and boost by all the stakeholders especially at the prime age of adolescence (8-12 years).
7. The primary school teachers should allow the children time always for an uninterrupted free-play with their real world.
8. There must be proper supervision and committed guidance of pupils at play and learning activities as well as their

teachers to ensure proper realization of educational specific objects.

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