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## CHAPTER 37

### ADAPTING CRITICAL AND CREATIVE THINKING SKILLS INTO SPECIAL NEEDS EDUCATION: IMPLICATIONS FOR WHOLE BRAIN LEARNING

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#### **Introduction**

Special Education, its concepts and practices have gone beyond dealing with those with obvious physical, sensory or intellectual disabilities and impairments to include majorities of children with less visible, but sometimes more telling problems, with other school needs and difficulties. In line with these aforementioned, Onu (2008) opined that educators are currently using all available resources to enrich and accelerate their curriculum to meet the needs of these children. This group of children, which includes the gifted, talented and creative children are currently underprovided for. Hence, the need for special needs education. Ozoji and Nugu cited in Unegbu (2006) defined people with special needs as those with significant sensory deficit or unusual high intellectual capabilities that are not properly addressed in the regular programme.

Moreover, this class of children who thrive better in smaller classes work better when individualized strategy is used to help their master skills with materials presented to them. Onu (2002) in her work with these group of children found out that, in teaching them to analyze, see relationships, make accurate judgment, learn to lead or follow, think critically, use scientific methods, be involved in creative arts and acquiring problem solving skills, their talents, skills, gifts, abilities and capabilities will develop. The question then remains, who are these gifted, talented and creative children?

Gifted children are said to be children who are naturally endowed, with higher degree of general mental or intellectual extraordinary ability. The recent definition currently uses multiple measures according to Britannica to identify those who are given to study, and score high academically. This group of children exhibit special traits and characteristics. They are equally seen as exceptionally brilliant children with superior intellectual potentials (Onu, 2008). They are generally seen as exceptional children who function with a high level of cognition, which reflects in their academic skills as having retentive memories, fluency, possessing abstract and deductive reasoning. Research has also proved that these groups of children are emotionally stable, mentally healthy and socially skilled (Sears, 1977; Gikenab, 1980; Onu, 2008).

The talented children on the other hand, are children with natural aptitude or skill according to oxford dictionary (2008). They have flair, ability which is

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superior and natural aptitude. This natural endowment and ability of superior quality make them different from others whose dispositions may not be extraordinary. These talents range from musical, science, art, business, media to sports equip them in learning other skills. Their effectiveness is second to none, and being natural in nature makes them different in outsmarting others without such innate ability.

The creative child is one who naturally uses imagination and original ideas to create something new. The child is noted as one who has varied ideas, highly impulsive, innovative, inventive, original and clever according Merriam Webster (2016). These ones end up using their imagination or ideas to create something different and new from every other child. The child can write, act, make dresses, be active in entrepreneurship intentions, etc. In being creative, the child is able to view problems differently, and generate ideas with an open mind. This creative child further shows competences, values, attitudes and characteristics that are natural and make every one wonder how a child of his age can engage his/her mind in such a way that he/she absorbs knowledge more easily and learn processes more efficiently, while utilizing alternative ways of thinking.

From the ongoing, it is clear that we have children who can use their abilities, hidden talents and inner capacities to create something new through critical thinking. A Critical thinker then is one who works with clear values, frames and reframes ideas, recognizes and utilizes useful information, has sound reasoning and is committed to follow through on a given assignment. He/she equally takes control of his/her thoughts, words, actions, behavior and feelings. In other words, a Critical thinker can be said to have emotional intelligence that helps him/her take responsibility for his/her actions, learns to respond appropriately to conflicts, maintains a positive attitude and uses active listening skills.

The question then could be, how do we help them connect with their inner passion? How do we nurture their gifts, talents and creative potentials to enable them learn new skills through team-work and cooperation? How will they learn to connect their reflections with their actions? How will we help them remain confident, take responsibilities, retain their curiosity and continue to give their creative expression, capture ideas, and visions while advocating for self and others? How can we ensure that our current school programmes will permit these ones to explore, discover, communicate while learning to listen to their teachers in the class? Put differently, how do we ensure that this crop of children will remain stimulated, motivated, enjoy fun, engage in problem solving activities with an open mind? Again, how can we train teachers to engage different learning styles of children, teach them to think critically and creatively so that Nigerian children will not lose touch with the rest of the world? How can we ensure that our children's minds are not closed, but broadened to see other people's perspectives while throwing off all sorts of prejudices? These and other reasons are why we need to infuse critical and creative thinking into our Special Needs Education to enable us



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to utilize these programmes to raise citizens who are resilient, global citizens who are not afraid to explore, reflect, and change their society for the good of all.

In addressing this theme, the following areas were considered.

- Thinking;
- Critical thinking;
- Qualities to raise in teaching critical thinking to children with special needs;
- Creative thinking;
- How to teach creative thinking to Gifted, Talented and Creative Children;
- The Human Brain and learning; and
- Implications for whole Brain learning.

Moreover, Nigerian education is currently under attack for its orientation towards theoretical paper work while ignoring the teaching of critical and creative thinking. In the process of time, the enthusiasm of teachers to create new ideas remains buried as they continuously produce "fast answer absorbers" who merely regurgitate facts. Again, the emphasis is currently on producing students who will get A1 in all subjects in WAEC or NECO, thereby relegating to the background these other important skills that will enable a nation to grow and compete favourably with other developed nations. That in-fact should be the basis for working extra hard with children who are gifted, talented and creative in a nation like Nigeria to reinvigorate her educational system and raise teachers who are critically creative in thinking. Teachers who are critically creative in thinking possess the skills to foster imagination, teach children appropriate ways of showing appreciation, think outside the box, provide time for children to think strategically and mental phonetically and as well, reward instead of punishing their curiosity. Nigeria needs to raise children with the mindset of taking calculated risk, create their work, and present it while getting feedback. Most often, lessons are taken within the four walls of the classroom, while the outdoors such as having conversations, group and team work are ignored. Sometimes, elements of a combination of teachable skill and practically unalterable traits in critical and creative thinking skills are ignored.

### **Concept of thinking**

Every progressive nation has and still utilizes functional education to raise children who can explain, find evidence, generalize, apply and analyze what they are taught in school. The teacher provides cognitive support during the learning processes while the children learn to personalize information and organize it around prior information. These activities according to Onu (2001) are what make children learn to think and become effective and productive thinkers.

Thinking is said to be a scientific process, a mental act by which knowledge is acquired (Harkings, 2010). A proficiency in mental cognition includes activities such as reasoning, problem solving, conception and discovery of ideas. It is equally said to be the act of using rational judgment intelligently. Oxford dictionary (2008) opined that, it is the process of considering or reasoning about something. Others



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say it is having a particular opinion, belief or idea about something, having imagined or expected. In the long run, the individual who has learnt to think learns to conceive, envisage, imagine, realize, reckon, judge, perceive, presupposes, deduce, infer and conclude. All of these and more are what every future looking and progressive nation should make their school to achieve with the children sent to schools.

Working with children who are gifted, talented and creative ensures making decisions concerning the subject matter to teach and effective instructional processes to be adopted to ensure that actual learning takes place. In reality, most developed nations have gone ahead to question the interrelatedness between the knowledge of subject matter, knowledge of instruction and knowledge of the learner. These three in reality account for the educational substance that eventually makes for what can and should be called 'successful learning' (Lowery, 1989; Onu, 2021). Until the learner is able to imagine the future and construct the past, he cannot be said to have learnt to think in school and might not learn to apply whatever learnt in school in the future when confronted with problems that demand thinking.

The contribution to human growth, development and civilization also since the pre-historic era till date has been attributed to the explosion of knowledge and innovation in different fields of endeavour. All these innovations are related to human ingenuity and creative potentials which are inherent in all human beings (Agbo, 2012). However, it takes a well-planned system of education to assist in the development of these innate abilities, talents and potentials in individuals.

Furthermore, the ability for rational thoughts, ability to analyze, categorize, and conceptualize are all functions of the left brain, while creativity which is embedded in the right brain enables the individual to explore, generate and produce new ideas (Onu, 2001; 2008; 2021). The problem then is, what value has Nigerian society attached to the concept of intelligence to ensure Nigerian children are trained to use their whole brain in the learning process? Moreover, when creative, talented and gifted children are viewed as I.T.K ( I too know), they get discouraged and try to work at the same pace as their peers thereby reducing their level of consistent remarkable performance.

The gifted, talented and creative child who already operates on the positive side of the intelligence bell curve, needs further training to ensure the link between intelligence and knowledge (knowing and learning). In the course of study, they get trained to associate and apply what they have learnt in any given context. With training also, they go beyond mere knowing about a subject by reading, researching and memorizing facts to become people with understanding with practical sense to apply facts and truth not only rigidly, but know how to find relationships and contradictions in what they are learning. They also learn wisdom, learn to deal with mysteries of life, get a change of mind, learn to clarify issues, take calculated risks, gain inner strength that will enable them to prepare for the world of work or whatever the future may hold. These and more are all the human brains are capable

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of achieving. The question then is, how much of these take place in a regular classroom in Nigeria?

### **Understanding Critical thinking**

Critical thinking could be defined as the ability to think in an organized and rational manner to understand connections between ideas and facts for future growth and development. Critical thinking enables one to better express thoughts, ideas, and beliefs for better and improved communication. Critical thinking fosters creativity and out-of-the-box thinking that can be applied to any area of one's life. Critical thinking could equally be defined as the mental process of analyzing or evaluating information through concrete reasoning. Critical thinking has been defined by Bob, Patricia, Barrow and Ross (2018) as an intellectual discipline that utilizes processes to ensure the users actively and skillfully conceptualizes, applies, analyzes, synthesizes, and evaluates information gathered or generated by observation, experience, reflection, reasoning or communication, which eventually guides to form the bases for the individuals beliefs or actions. It has also been seen as a higher order thinking skill that enables one to recall information.

Furthermore, professionals looking at previously held assumptions concluded that, critical thinking is an ability to acknowledge, recognize ambiguity, examine, interpret, evaluate, reasons, reflect and make informed judgment and decisions which further empowers the individual to clarify, articulate and justify one's position over a matter (Paul & Elder, 2001; Petress, 2004; Holyoak & Morris, 2005; Onu 2021). These critical thinking skills enable one not only to read about a topic, but also look at the content in an objective and critical way, consider arguments when dealing with particular issues, evaluate other people's point of view, with a view to considering the merit or demerit of argument, pointing out weaknesses or negative points in an argument. In other words, one checks available facts, listens attentively, and addresses situations based on available evidence.

The use of critical thinking skills that enables individual process, organize facts, define problems and develop effective solutions make it one of the most essential skills that must be adapted into special needs education (Onu, 2021). These skills further help the owner set goals and adopt practices that will help him or her progress in life. Creative thinking on the other hand, is a skill that enables one to look at things in a new, unorthodox way, and come up with novel solutions. Some refer to it as thinking outside the box. One gets to think or perceive a new pattern that is not obvious to all (Doyle, 2021). Critical thinking is a high level skill that allows somebody to process information (especially external information) in order to make a decision, come to a conclusion, or solve a problem. It is the ability to think and analyze with an open, logical mind, to understand the logical relationship between ideas and, ultimately, make logical judgments. This implies that critical thinking requires the use of the ability to think, and one who has such skill must be an active learner rather than passively receiving information. The key critical thinking skills include: analysis, interpretation, inference, explanation, self-



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regulation, open-mindedness, and problem-solving. Acquiring these skills teaches one not to simply accept or reject anything, but think critically before taking action.

Moreover, creative thinking might mean devising a new way to carry out a task, solve problems, meet challenges and turn away from the conventional to innovative thinking. It is also the ability to think and analyze clearly and rationally regarding the questions raised to assess both the meaning and the significance of claims and arguments. In this way according to Doyle (2019) one is able to self-evaluate and make reasonable judgment. It is further eluded that a good critical thinker learns to draw reasonable conclusions from a set of information, learn to discriminate between useful and less useful details, solve problems or make decisions. Critical thinkers always seek to evaluate the comprehensiveness of ideas, arguments and findings, and are not surprised if the opposite proves true. They act systematically in identifying, analyzing, and solving problems, and are not dependent on their inner sense or instinct.

### **How do we Teach Critical Thinking**

In teaching critical thinking, the thinker is encouraged to improve the quality of his/her thinking by skillfully taking charge of the structures inherent in thinking (Paul & Elder, 2008); and the following areas are recommended.

1. The elements of thoughts which include:
  - ability to figure something out, settle some questions, solve problems;
  - considering assumption;
  - considering point of view;
  - concepts and ideas;
  - inferences, interpretations and conclusion; and
  - considering implications and consequences.
2. The use of intellectual standards to determine the quality of reasoning. The standards according to Paul and Elder (2006) is the ultimate goal for the standards of reasoning to become infused in all thinking and these are **clarity**: Ability to elaborate, illustrate, and give examples. **Breadth**: looking from another perspective, considering another point of view, looking at it from another way or angle. **Accuracy**: check on the fact, is it true, verifiable or tested? **Precision**: Can you be specific, give more details, be exact? **Relevance**: is it related to the problem, how does it affect the question, how does it help with the issues? **Depth**: what factors make this difficult, what are the complexities, are there some difficulties to be dealt with? **Fairness**: is my thinking justifiable in context? – Am I taking into account the thinking of others? – Is my purpose forgiven? – AM I using my concepts in keeping with educated usage? – Am I distorting them to get what I want? **Logic**: does it make sense together, does the first paragraph fit with your last one, does what you say follow from the evidence? **Significance**: is this the most important problem to consider? – Is this the central idea to focus on? – Which of these facts are most important?



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3. Intellectual Traits: When the individual consistently applies the standards of thinking to the elements of thinking, the result is the development of intellectual traits according to Paul & Elder (2010). Intellectual traits consist of:

- Intellectual humility;
- Intellectual courage;
- Intellectual empathy;
- Intellectual autonomy;
- Intellectual integrity;
- Intellectual perseverance;
- Confidence in reason; and
- Fair mindedness.

Qualities and characteristics to raise in teaching critical thinking to children include:

- Children who can raise vital questions and problems, formulating them clearly and precisely.
- Ability to gather and assess relevant information, using abstract ideas to interpret it effectively.
- Come to well-reasoned conclusions and solutions, testing them against relevant criteria and standards.
- Think open-mindedly within alternative systems of thought.
- Leaving to recognize, assess as the need may be their assumptions, implications and practical consequences.
- Communicate effectively with others in figuring out solutions to complex problems.

By implication, children need to be taught to identify parts of their thinking as well as be capable of assessing their use of these parts of thinking. Critical thinking then must be seen as an art of thinking in an intellectually disciplined manner as we assess what he thinks in order to improve on how one thinks. Furthermore, in teaching children, Paul and Elder (2010) were of the opinion that certain steps must be taken as suggested by Bloom's taxonomy to include the need to define the main topic covered (knowledge). They are:

- understanding the issue through researching the topic (comprehension);
- analyzing the data to link the collected data (Application);
- solving problem or the issue investigated (Analysis);
- turning the solution into an implementable action plan (synthesis); and
- Test and evaluate the solution (Evaluate).

In utilizing the above, Paul and Elder (2010) stated that, the essential part of teaching critical thinking will be to build a framework that represents clear and coherent reasons when solving problems, and the training will equally ensure that the topic is addressed using the critical thinking stages, thereby helping the children master their thinking dimension. Furthermore, through identifying the thinking parts, they learn to evaluate the parts, and use the framework to improve

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their own thinking. Critical thinking also helps the learner to identify the topics, goals and objectives. It helps the user attempt to solve problems and work on assumptions by using inductive inferences, while using data to validate the assumptions. Critical thinking can also help one to develop one's personal perspective over issues, while providing data as supportive evidence.

In using critical thinking, they also learn to deal with principles, models, theories that relate to issues one is handling to find a specific solution; while making inferences and interpretations, and relating them to suggested solutions or specific problems. A good critical thinker then utilizes a good quality benchmark to achieve their goals by ensuring they get accurate results in all they do. They ensure clarity, accuracy, precision, relevance, depth, breadth, logic, significance and fairness (Rafiq&Elmansy, 2020).

### **Creative Thinking**

Creative thinking is a term derived from the word 'creativity'. Creative thinking has been subjected to various definitions ranging from the ability to consider something in a new way, approaching a problem from a new dimension, ability to perceive patterns that are not obvious, devising a new way to solve a task, and meeting personal and group challenges. According to Doyle (2022), creative thinking means 'bringing a fresh something from orthodox'. Wool (2021) calls it 'the deliberate' or 'intentional gaining of new insight', generating different ideas through existing information. She alluded that it is using different styles of thinking to examine information from different viewpoints to see new patterns.

Furthermore, Onu (2021) in her definition of creative thinking submitted that it is the ability to develop ideas, think divergently, and solve problems differently. It is also said to be the power to connect the unconnectable, bring into being, departure from the conventional to produce new ones. These mental processes are undertaken by individuals or as a group to produce new ideas, new concepts, new designs, process information in such a way that alternative ways of solving problems emanate (Baer, 1996; Onu, 2001). Creative thinking has also been defined by Anmashau (2002) as consciously using cognitive processes stimulated by problematic situations, guided by interest to generate statistically infrequent, valuable and appropriate ideas useful in turning challenges of life into fruitful, beneficial and profitable outcomes. Creative thinking is a skill which allows one to consider things from a fresh perspective and different angles. It is an inventive thought process which results in surprising conclusions and new ways of doing things. Creative thinking can be aided by brainstorming or lateral thinking to generate great ideas. Creative thinking is the ability to consider something in a new way for improved productivity.

In summary, these inner drives and energy driven forces that enable one to explore and produce new things usually reflect themselves in the presence of problems, deficiencies and gaps, and most often do not stop till a novel solution is found. Creative thinkers utilize different strategies which focus mainly on



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divergent thinking. These thinking emphasized fluency, flexibility, originality, and elaboration. These strategies also help children develop their diverse talents; generate new and original solutions to given and ungiven problems (Onu, 2001). Creative strategies also enable children not only to think of many and different ideas, but to think of these ideas in unusual ways according to Starko (2010).

### **How do we Teach Creative Thinking**

Many ideas have emanated on how to infuse creative thinking into school curriculum. Such ideas range from creating a compassionate and accepting environment, to the presentation of student ideas that encourage autonomy, rewarding assignments to promote creative thinking, and giving children feedback on their work. However, the greatest is getting children to keep notebooks where they can record new ideas, write down questions, freely design, sketch, write down poems, and make insightful notes from what they see not only in their classrooms, but also what they observe from day to day activities. This creative chaos helps children lodge their curiosity and passion as they get re-immersed in the joy of learning.

In schools, children and teachers get engaged in the discovery of new and novel things as well as develop creative attitudes. They develop the spirit of Da vinci who was able to fill over 7000 notebooks pages with questions, doodles, observations, sketches and calculations. Furthermore, he nurtured creativity as a habit and as an everyday skill (Davis, 2022). Schools can allow creativity and the attitude to take a look in their classroom and reduce the current creativity gap. Creativity then, must not be seen as the one that must be experienced outside the classroom only, but should be a definable, teachable, measurable set of psychological skills that must be used to improve learning in the 21<sup>st</sup> century. Children must be encouraged to generate ideas, where they learn something new and use their understanding to change their world. In the course of teaching, the teachers allow the children to become embedded with everyday creative thoughts and actions.

Creativity has been said to enhance motivation, deeper understanding and promote the joy of learning hence, the teachers must work to help the children learn independently, constantly adapt and innovate, and creatively solve problems. It is no wonder then that researchers opined that teachers must work to promote intrinsic motivation needed to help children pursue meaningful goals, create broader patterns that will help them connect materials across academic disciplines, think creatively solve problems, explore multiple options, learn inquiry, while supporting depth of understanding (Stark, 2010). Creative thinking then can be used to make learning fun, lead to joy and promote positive emotional engagement in children. The question then is how can we achieve this? The following suggestions from researchers like Cassani (2022) have been sent to help develop and nurture creative thinking in children.



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- Creation of a compassionate, accepting environment that will help students trust that they can make mistakes without being crucified.
  - Be on the same page with student's ideas as you find out what their passion areas are and build those into the approach you use.
  - Re-word as youths to promote creative thinking by using and adding such words as create, design, invent, imagine, suppose, to your assignments.
  - Give students direct feedback on their creativity. Explore the idea of creative competence while not learning out of academic competence. Show you value both.
  - Encourage children to come up with imagination and creative situations to solve problems.

### **The Human Brain and Learning**

1. The human brain according to Nancy (2022) is seen as an intricate organ with more than 100 billion neurons and 100 trillion connections, which acts as the command center for all thinking, feels and does. Though the brain is said to look alike yet, they differ in how they process information. Nevertheless, the two halves of the brain don't work independently of each other as nerve fibers connect the different parts of the brain. Hence injury to any part is said to cause impairment anytime there is the lack of integration between the two parts.

Furthermore, the human brain is said to constantly reorganize itself, learns to adapt to changes, whether physical or experiential and can be trained to learn. Interestingly, the human brain is said to be fully formed at 25, yet the storage capacity is considered virtually unlimited. This makes it possible for all humans to have the capacity to learn (Onu, 2021). Research also has proven that the human brain has the capacity to provide answers to a number of compelling questions. However, the extent to which an individual learns or uses his brain depends on what is taught, how it is taught and how assessments are carried out to know what was learnt.

Recent researchers also have been marked by large discoveries to show insights on the potentials of the brain in learning. These insights have been used by teachers in designing better classroom environments and to also encourage all learners (disability notwithstanding) to believe in their capacity to learn skills that will enable them to use strategies to improve their overall learning (Bavinckshool,2020). Again, research has also shown that learning changes the physical structure of the brain. These changes have been shown to alter the functional organization of the brain. Evidence is bound to show that learning organizes and reorganizes the brain and that different parts of the brain may be used to learn at different times.

Hence, the importance of teaching which ensures that learning takes place in an academic environment becomes eminent. In teaching critical and creative thinking to children, both special needs, one provides opportunity for knowledge management, ask open ended questions, help them develop hypotheses, encourage

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them to think in new and different ways, make them ask questions, encourage them to express themselves, teach them the different ways to solve problems, give them free time and space and teach them to read for pleasure.

2. The human brain is divided into two parts. Left brain and right brain. According to Sperry (1960), the left brain is more verbal, analytical and orderly than the right brain. Hence, it is called 'the digital brain'. It is needed and does well at reading, writing, and computation. This part of the brain, according to Nancy (2022), enables one to be methodical in thinking, logical, sequential, linear thinking, mathematical, deals more with facts and thinks in words.

3. The Right brain on the other hand according to Sperry's research aids in imagination, holistic thinking, intention, arts, rhythm, nonverbal cues, feeling visualization, daydreaming. People who are right brained tend to be more creative and emotional. They are innovative and often perform best in fields where they can freely express themselves. The brain then, which is said to be the motherboard, storage and operating system, has these two hemispheres.

4. In the classroom then, it is best that both the left and right hemispheres of the brain be taught together in order to maximize the effectiveness of learning. Since the human brain regions develop synchronously, educational objectives that address both regions of the brain should be emphasized according to John, Ann, and Rodney (2000).

In teaching children then, especially those with special needs, care must be taken to mind how instructions are given to ensure learning takes place and that the child's brain develops. Special attention needs to be paid also to the child's development. Emphasis must be given to the psychological development processes as these eventually will ensure continuous interaction between the child and external environment. The brain also is that which initiates, coordinates movements, regulates temperature, enables speech, judgment, thinking and reasoning, problem solving, emotions and learning. Hence, the importance of the brain in teaching critical and creative thinking cannot be overlooked.

### **Implications for whole Brain Learning**

It is important that one keeps the brain active by engaging in activities that are mentally challenging, and learning new skills that may benefit one both on the long term and short term basis. Hence, the use of whole brain teaching and learning in education is the idea to activate the students' brains for maximum involvement in the learning process. The idea is based on finding the best strategies to use to ensure that the children are reached in the course of their stay at school each day. The classroom then, is one that uses teaching to engage, synchronize and ensure that collaboration is taking place in the classroom.

Hence, whole brain learning is a model where learners learn concepts by using both parts of the brain and not just the left or the right brain. It includes the teaching or training of children not only to learn facts, be analytical, logical and

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quantitative according to Vinukonda (2018), but also the ability to get organized, be detailed, work with plans and be sequential in one's life. The second quadrant however, is integrating, synthesizing, holistic and intuitive. It is such that permits one to be emotional, feel best and be excellent at interpersonal activities that make them appear very social and kinesthetic in actions.

As teachers who work with children with special needs, the learning environment must be such that children are engaged, and emotionally involved in what they are learning. We must ensure that the children's attention is retained. You may start teaching by stating the facts, but also ensure that you provide cues that will enable the right-brained learners to keep in tune with the main subject. By doing so, the children are maximally engaged in the learning process as the classroom has turned into a highly energetic learning environment.

Furthermore, in engaging the whole brain in the classroom, there will be less distraction as the professional teacher nurtures the brain of the children at an early stage. The teacher employs the use of innovative teaching approaches where the motivation to learn is high. The teacher equally uses strategies like verbal prompts to keep the classroom interactive. In teaching for whole brain learning according to Jay and Clio (2022), not just attention getter is used, but also what they call 'Brain stimulant' where diverse information is given using a variety of ways and students are expected to absorb them. The use of powerful visual and motor cortex amplification can be done where the students mirror the teacher, or horror words, especially when reading fluency where emphasis is placed on phoneme and grapheme relationships or simple word to visual association for meaning. They equally use their voice or change the pitch which students can learn to mimic, especially during reading where words or phrases are emphasized.

Another implication of teaching for whole brain learning is the use of 'Direct Instruction'. This is done when deliberate instruction is carried out by breaking the content to be taught into little bits or chunks, while using mirror words or key-words, as well as assigning gestures where certain actions are linked to certain words and vice-versa. This enables the child to remember as a direct connection is made between action and the word or the concepts being taught. Like making the sound of swiping while bending down and moving the hand forward. Collaborative learning also occurs when whole brain teaching is done as an active exchange of ideas between children. Children are selected to teach each other while he/she keeps track of the time and provides support for the whole class. The teacher however, moves around to ensure all the children are participating effectively.

In whole brain learning, children are involved in the planning for reward systems, designing classroom rules as the use of scoreboards are said to increase the motivation of the children and increase whole brain learning. Also in the class where whole brain teaching is done, there is clear evidence of unity between the teacher and the students. The children also are more focused on learning as they understand the teacher's verbal prompts and respond.

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Specifically then, in working with children with special needs, this research-based approach shows that the use of whole brain teaching strategy can have a positive influence on the academic achievement of students as it aids remembrance and retention of information. Therefore, children with intellectual and learning disabilities will learn a set of rules that will remind them of teacher's expectations (Onu, 2008; 2021). They equally learn rules that are sequentially taught and equally show the processes. These maximized engagement strategies emphasized task analysis where even difficult tasks are broken into chunks for all to participate effectively. Furthermore, the principle of socio-emotional learning has transformed all classrooms where the whole learning is taught into an energetic learning environment.

Finally, the Nigeria educational system must give way to something different to ensure the acquisition and integration of knowledge that will make children develop through the help and support of good teaching and well-planned curriculum. The gifted, talented and creative children must then be deliberately trained and groomed to develop their capacity to deal with ideas and relate them to solving the problems of Nigeria. The children must be taught processes, compare situations more from concrete to abstract ideas as they work with problems that need to be logically addressed. Progressively, they will use the training to help them convert science fiction to facts, deconstruct, reverse and event solutions to the numerous problems of our country. This can only be possible when we have raised our own progeny who are fluent, flexible and original, and can use their diverse gifts and talent to create and originate solutions.

### **Conclusion**

This study addressed the adaptation of critical and creative thinking skills into special needs education: implications for whole brain learning. It presented the concepts of thinking, critical thinking, qualities to raise in teaching critical thinking to children with special needs, creative thinking, how to teach creative thinking to Gifted, Talented and Creative Children, the Human brain and learning, and implications for whole brain learning. Thus, the study had shown that critical thinking is the ability to think in an organized and rational manner to understand connections between ideas and facts for future growth and development. While, creative thinking is a skill which allows one to consider things from a fresh perspective and different angles. It is an inventive thought process which results in surprising conclusions and new ways of doing things.

### **References**

- Agbo, O. E. (2013). Effects of mind mapping and synaptic of the creative products and whole brain learning of high ability pupils. Unpublished Ph.D. Thesis submitted to the University of Nigeria, Nsukka.
- Baer, F. (1996). Introduction to creation questions. Retrieved from <http://www.bemorecreative.com/89-introdhtml>.



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- Bavinckschool, H. (2020). *Understanding your brain to help you learn better*. Frontiers for young minds. Kids. Retrieved from Fontiersin.org.
- Bob, G., Barrow, P. P. & Ross, E. (2013). *What is critical thinking?* Louisville: University of Louisville Press.
- Boulder, C. (2002). Thinking styles and conceptions of creativity among University students. *Educational Psychology*, 3(31), 361-375
- Cassani, D. (2002). *Creativity in the classroom: Psych learning curve, where psychology and Education connect*. Retrieved from APA psychlearningcurve.org.
- Carson, J. (2022). *Why is creativity important, what does it contribute?* National Youth Council of Ireland Youth.
- Debono, E. (2001). *The direct teaching of creativity*. Retrieved from <http://www.edwdtono.ca/wrt/foward.htm>.
- Doyle, A. (2022). *What is creative thinking? Definitions & examples of creative thinking*. Retrieved from thebalancecareers.com
- Doyle, A. (2022). *Critical thinking implementation daily life of student*. Retrieved from <https://edibirdie.com/examples/criticalthinking-implementationindaily-life-of-students>.
- Hammond, N. (2022). Left brain vs. right brain: What does this mean for me? *Medical Review*. Retrieved from healthline.com/health.
- Hurkings, J. (2010). *The New Plantation*. Doc-2021 04 17.
- Ivy Exec (2022). *Seven Elements of Creativity*. Retrieved from Ivyexec.com
- Jared, A. N., Brandon, A. Z., Michael, A. F., Janet, E. Z., & Jeffrey, S. A. (2013). An evaluation of the left brain vs. right brain hypothesis with resting state functional connectivity *Magnetic Resonance Imaging Journals*. Retrieved from plos.org/plusone.
- Jay, G. & Clio, S. (2022). *What is whole brain teaching?* Retrieved from Study.com/academy/lesson
- John, D. B., Ann, B. & Rodney, C. (2000). *How people learn: Brain, mid, experience and school, expanded edition*. Washington D. C.: National Academics Press Washington D.C.
- Lowery, L. (1989). *Thinking and learning: Matching development stages with curriculum instruction*. Markurdi: Midwest Publication.
- Oak, H. & Morris, B. (2005). *What is critical thinking? Ideas to action*. Louisville: University of Louis Ville Press.
- Onu, V.C. (2001). Effect of Blooms Taxonomy based teaching strategy in high ability learners' cognitive skills. An unpublished Ph.D. Thesis submitted to University of Nigeria.
- Onu, V. C. (2006). *Skills for gifted and talented learners' multi-education services*. Nsukka: University of Nigeria Press.
- Onu, V.C (2007) Creativity and entrepreneurship: Solution to poverty eradication. A paper presented to members of Home Economics Research Association of Ghana. Herag June 14-16.
- Onu, V. C. (2008). *Special education services*, 2<sup>nd</sup> ed. Nsukka: Great AP Press. Nsukka
-



- 
- Onu, V. C. (2008). A handbook on gifted education, creativity and thinking skills.
- Onu Victoria (2020) *Special Education Services*. Nsukka: Multi-Educational Services Trust.
- Onu, V. C. (2021). *Infusing Critical and creative thinking skills into Nigeria educational system: Implication for raising a re-engineered generation in a competitive world*. 173<sup>rd</sup> Inaugural Lecture. Nsukka: UNN Press University of Nigeria.
- Paul, C. & Elder, G. (2001). *Critical thinking framework*. LouiseVille: University of LouiseVille Press, Delphi Centre.
- Paul, C. & Elder, G. (2010). *The miniature guide to critical thinking concepts and tools*. Dillon Beach: Foundation for Critical Thinking Press.
- Pretrass, K. (2004). Critical thinking: An extended definition. *Education*, 124. Retrieved from <http://journals825.home.mindspring.com/csj/html>
- Rafiq, E. (2022). *How to apply Paul–Elder Critical Thinking Framework*. Retrieved from Designorate.com.
- Starko, A. J. (2010). *Creativity in the classroom: Schools of Curious Delight*, 4<sup>th</sup> ed. New York City: Routledge.
- Sardeephu, A. (2012). *Creativity components psychology: The creativity Post*. Retrieved from [creativitypost.com](http://creativitypost.com)
- Thomas, T. & Ryan, L. (2018). *Why our creativity Masters to Christ*. T.G.C
- Torrance, E. (2000). *Pre-school's Creativity*. Psycho-Educational Association of Pre-School's children, BossonAlign& Bacon
- Vinukonda, P. (2018). *Whole Brain Learning to enhance your learning experiences*. Retrieved from [E-learningindustry.google.com/amp/s/ele](http://E-learningindustry.google.com/amp/s/ele)
- Wooll, M. (2021). *What is creative thinking and why does it matter?* Retrieved from [Betterup.com/blog](http://Betterup.com/blog)