



SECTION TWO



SPECIAL NEEDS EDUCATION DIALOGUE WITH REGULAR EDUCATION

Section two has twenty-eight chapters roughly categorized into three parts. The first part centres on adaptation of methods and strategies used in regular education that ought to work when used for children with special needs. Some of these adapted pedagogies include creative thinking, concept mapping, KWL strategies, mini-anchor chart, jigsaw cooperative learning strategies, think-pair-share, numbered head together strategy and problem solving. These strategies are mostly used in teaching sciences in regular schools. The authors made efforts to demonstrate how these strategies can also be successfully used on children with special needs. The second part harbours contributions/domestication of practices/courses in regular education to specially benefit special need learners. Some of these practices/courses include measurement and evaluation, assessment of learning outcomes, political education, literary studies, language learning, agricultural economics, moral and values education and educational psychology. The third part is a potpourri of issues in regular education as they relate to special needs children and include interest in basic science, adult education, productive curriculum, UBEC role in inclusive education. Happy reading!

CHAPTER 27

ADAPTING CREATIVE-TEACHING OF BASIC SCIENCE IN SPECIAL NEEDS EDUCATION

Geoffrey Aondolumun Ayua Ph.D

*Department of Science & Mathematics Education,
Benue State University, Makurdi.*

Joel Obo Eriba Prof

Federal College of Education, Odugbo, Benue State.

Introduction

In ideal situations, the educated fit meaningfully into the society. This is because programmes in special needs education are similar to those in the regular education system but only take individuals' peculiar needs into consideration by using suitable personnel, equipment and environment besides modified content and learning objectives (Ministry of Education, Culture, Sports, Science and Technology –Japan, 2022). This could be why Okeke (2007) defined education as the process individuals undergo to acquire knowledge, skills, abilities and attitudes leading to a relatively permanent change in behaviour that is necessary for effective and functional living in the society. This implies that education aims at arming every individual (including persons with disabilities) with the needed knowledge and skills for worthwhile living instead of being beggars.

The pursuance of this worthwhile goal should start at the basic education level. Mohammed and Funtua (2009) maintained that functional education is crucial for societal survival and development; and that unless a proper foundation is laid at the basic education level, the efforts at the post-basic and tertiary levels of education may be futile just like a poorly founded building. Basic education is not only the foundation upon which the rest of the education system is built, but also the key to the success or failure of the whole system. Ode, Ayua and Alabi (2019) lamented that the desired results of scientific, technological and entrepreneurial development through science education (Basic Science being the foundation) is yet to be realized; as many persons with disabilities in Nigeria are beggars and her jobless youths involved in one form of vice or the other.

Basic Science is a core subject offered at the basic education level in Nigeria. Danjuma (2015) referred to it as approaches in which the concepts and principles of science are presented to express the fundamental unity of scientific thought and to avoid premature or undue stress on the distinctions among the scientific fields. It is the elementary teaching of science to formative children in basic schools for laying the foundation on which the rest of science education at the post-basic and tertiary school levels would be built (Ayua & Jato, 2012).

In the National Policy on Education (Federal Republic of Nigeria, 2013), the government also emphasized basic education and spelt out its goals: part of which



supports the teaching and learning of science and development of skills. These include laying of a sound basis for scientific, critical and reflective thinking, adaptability, manipulative skills, wealth generation, educational advancement, independent thinking and dignity of labour. However, these goals cannot be achieved with teaching methods that are neither hands-on nor minds-on. Opatye (2012) stated that if Basic Science is taught using appropriate methods, students' acquisition of knowledge and skills for self-reliance in adulthood would be assured. Sagiru (2015) lamented that Basic Science is not taught in a way that gives room for students' acquisition of skills, arousing interest and improving academic performance.

Teaching methods comprise the principles and practices used by teachers to enable students' effective learning. Methods of science teaching could be determined partly on subject matter to be taught and also the nature of the learner. Ideal science teaching methods according to Ayua (2019), seek to meet the curriculum goals designed to serve the aspirations of the learners, community and the global society. Such teaching methods should be child-centred, activity-based and rich in scientific knowledge and skills needed for scientific and socio-economic development for survival in the 21st century. Innovative teaching methods used in the regular education system can be adapted in special needs education.

Special needs education is intended to ease the learning of those who, for some reasons, need some support and adaptive teaching methods in order to actively participate and meet the learning goals. Some of these reasons may be difficulties in emotional, social, physical, intellectual and behavioural capabilities. Programmes in special needs education are similar to those in the regular education system but take individuals' peculiar needs into consideration by using suitable personnel, equipment and environment besides modified content and learning objectives (Ministry of Education, Culture, Sports, Science and Technology – Japan, 2022). Special needs education programmes according to United Nations Education, Scientific and Cultural Organisation (2012) can be offered to individual students within a regular school as a special class or run separately as a special school using suitable teaching methods.

Special Education methods are those modified to accommodate students with special needs or persons with learning disabilities like the blind, deaf and dumb, physically challenged or deformed. Others according to Positive Action (2021) include: difficulty in organizing information, speaking, reading, spelling and writing; also, mental health disorders such as mood, psychotic, eating or personality disorders.

There are a number of methods for teaching science at the basic education level. However, this chapter is centred on creative-teaching. This is discussed with focus on its model, behaviours, lesson plan and implications for special needs education.



Creative-Teaching

Creative-teaching of Basic Science refers to demonstrating how to think skilfully amidst tactics, resources in Basic Science content for inspiring learning and fostering students' creativity using Torrance incubation model and exhibiting creative-teaching behaviours. Ismail, Desa and Balakrisnan (2018) viewed it as involving teachers making learning more interesting and effective; using imaginative approaches or exhibiting the behaviours during lessons. Thus, giving room for effective teaching and learning to occur among learners in special needs education. As an aspect of creative education, McFinn (2015) stated that it is based on individuals' needs and abilities, which need freedom in learning and teaching as an active mode that influences innovative personality development, which creates something unique and turns it into an entrepreneurial activity. Creative education involves teaching creatively and teaching for creativity. Teaching creatively entails demonstrating how to think creatively and the ability to use diverse appropriate styles and resources. Whereas, teaching for creativity involves inspiring students to think creatively, exposing them to critical instances for generating ideas, encouraging creative learning and fostering learners' creative strengths. To Simplicio (2000), creative teachers are willing to change and welcome new experiences; they are not afraid to go off the main track or step into the unknown. Although there are other models of creative-teaching, Torrance Incubation Model is adapted here because of its suitability to basic school level in special needs education.

Torrance Incubation Model of Creative-Teaching

Torrance Incubation Model (TIM) is a 3-stage creative-teaching/learning model for delivering both subject content and creativity. According to Torrance and Safter (1990), the model was designed to make teaching more effective in any subject at any age. The TIM foundation was laid at the International Centre for Studies in Creativity, University of Buffalo, New York. TIM of creative-teaching and learning can be applied to a lesson, unit or project in any subject including Basic Science at the basic school level in special needs education. Torrance (1994) believed that people are inquisitive, exploring and searching kind of beings. Therefore, when given a choice, they would choose to learn creatively. They would continue to find problems and cannot keep from digging into things, turning ideas over in their minds, trying out new combinations, searching for new relationships and struggling for new insights.

It is suggestive that continued learning could only be aroused and sustained by students' interest in the learning activity, which could likely result in a corresponding performance. TIM delivers content knowledge, creativity skills; and sustains learners' engagement beyond the classroom. TIM of creative-teaching and learning has three stages; heightening anticipation, deepening expectations and extending learning as shown in Figure 1.

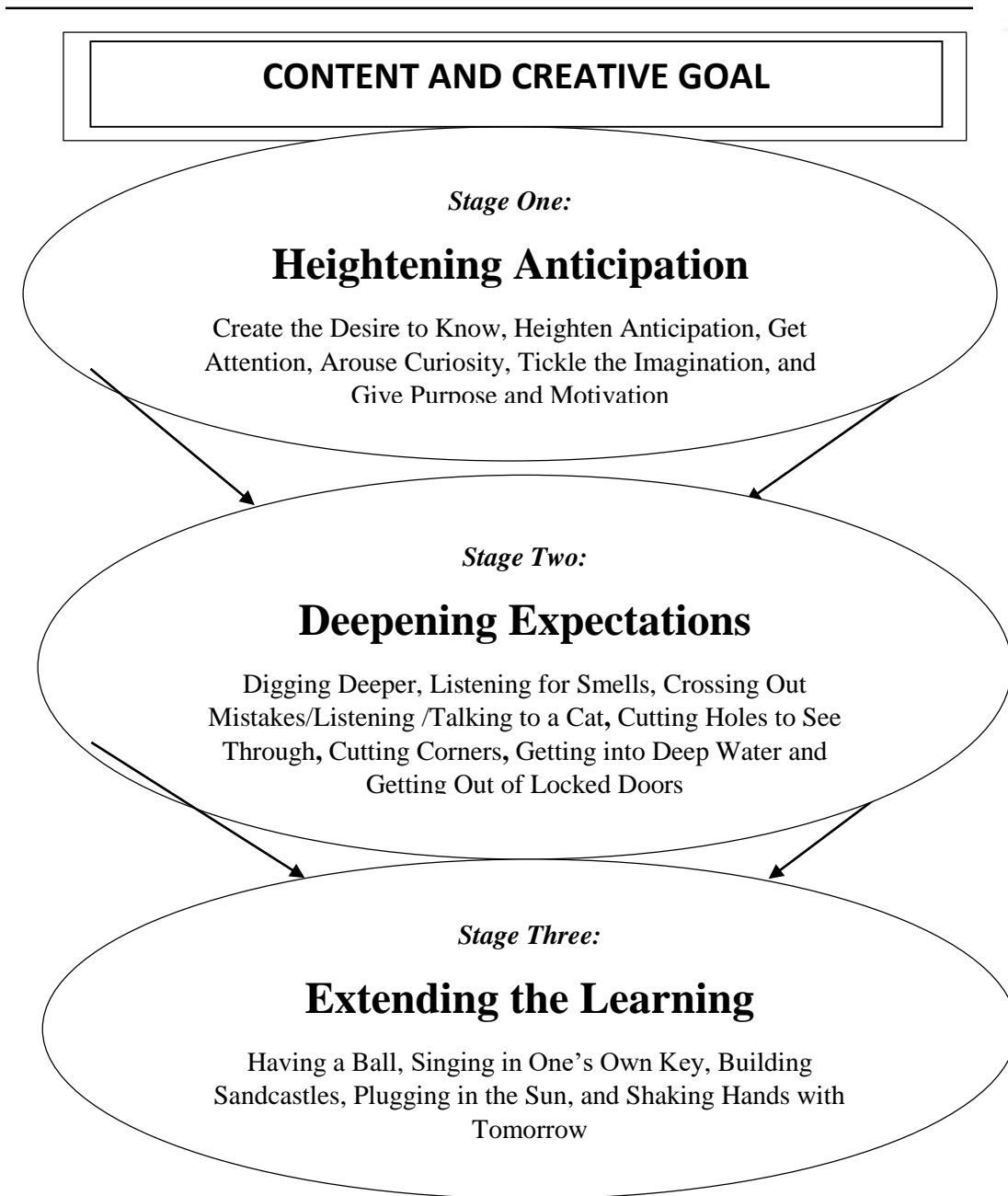


Figure 1: Three-Stage Torrance Incubation Model (Adopted from Torrance & Safter, 1990).

Heightening Anticipation: It is designed for preparing learners for the task ahead. This is referred to as the 'warming up period' or the 'hooking'. At this stage, the teacher gets the students excited about learning, creates the desire to know, gets attention, arouses curiosity, tickles the imagination, sets interesting objectives and ensures an encouraging environment suitable for creative-teaching and learning in special needs education class. Whereas learners make personal connections to the subject matter being presented.

Deepening Expectations: At this stage, the intrinsic motivation to learn that was developed in stage one is maintained by some cognitive and emotional



experiences to further engage the students with the content. Thus, allowing them to discover and explore the topic more intensively. At this stage, students take ownership of the topic and bring personal meaning to it by looking beyond the surface of the problem for solutions that can be applied (Worwood, 2011; Lesswing, 2014). Thus, diagnosing difficulties and integrating known and unknown information, elaborating and divergent thinking, evaluating and re-evaluating information, using all senses, modifying and making the good solutions better, discarding what is not useful and making mental leaps to new insights for extending the learning.

Extending the learning: Focuses on additional creative strategies to further engage the learner, so that their engagement and motivation carries through and they are encouraged to continue their study and application of creative knowledge in real life situations. Nitkowski (2004) stated that the bulk of the instruction is a means to spark incubation by setting up learning experiences that lay the foundation for intrinsically-inspired further exploration and utilization. Worwood (2011); and Lesswing (2014) maintained that this stage requires making links by using one's schema to relate to the content. It also entails identifying and using the available resources within one's reach to apply knowledge.

The creative-teaching lesson's flowchart based on TIM is presented in Figure 2.

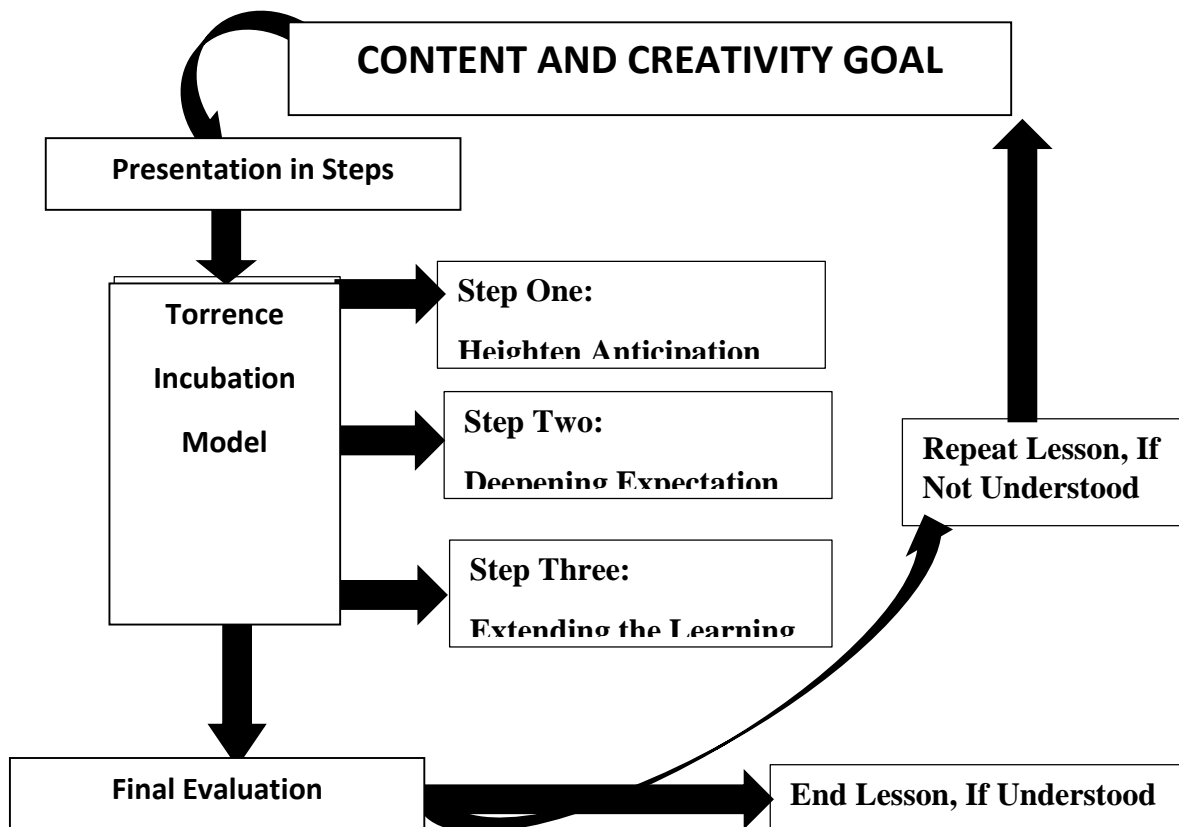




Figure 2: Creative-Teaching Lesson Flowchart (Ayua, 2021)

The flowchart in Figure 2 shows that both subject content and creativity are presented in three steps based on TIM. Thereafter, the lesson is evaluated by the teacher to determine its success or otherwise. Based on the evaluation result, the lesson is expected to be ended if successful or to be repeated if not successful. In adapting creative-teaching in special needs education based on TIM, teachers need to display a high level of creative-teaching behaviours appropriately.

Creative-Teaching Behaviours

Creative-Teaching Behaviours (CTB) refer to teachers' useful education conduct exhibited during lessons to aid students' acquisition of knowledge and skills. CTBs are based on teachers' creativity and expertise, which create an atmosphere where learners could exercise and improve their knowledge and creativity. CTB as outlined by Ibe (2011) and Ayua (2021) include: accepting students' unusual ideas and questions, showing that their ideas and questions have value, providing materials for enhancing creativity, reducing pupils' anxiety for safe scientific experimentation, involving pupils in improvisation and problem solving, giving them leadership responsibility during science activities, guiding them to explore their environment, and creating opportunities for them to exhibit their products. Other CTBs according to Choe, Lee and Kim (2016) are: independence, integration, motivation, judgement, flexibility, evaluation, questioning, utilizing opportunities, managing frustration, openness, originality, critical and divergent thoughts. Besides, improvising ability, methods of teaching, style of leadership, entrepreneurial spirit/skills, practical/technical skills, supervisory role, and use of reward as reinforcement form part of CTB. When appropriate CTBs are exhibited, the classroom atmosphere becomes free of fear, intimidation, anxiety, insecurity, defencelessness and lack of confidence resulting in effective teaching for knowledge and creativity skill acquisition in special needs education (Foster, 2017). CTB blends TIM of creative-teaching in lesson planning and delivery.

Creative-Teaching Lesson Plan

Class/Class Size: Upper Basic Three/35

Gender/Ability Level: Varied

Subject: Basic Science

Topic: Electrical Energy

Subtopic: Electron Flow (Electricity)

Creativity Skills: Wiring/Maintenance

Time: 80 minutes

Instructional Materials: Charts showing: direction of electron flow in a circuit, close and open circuits, torch, switches, battery, electric bulb, copper and iron wires.



Performance Objectives: By the end of the lesson, students should be able to:

1. Define an electric circuit and list its components
2. Show direction of electron flow (positive to negative) using circuit diagram.
3. Differentiate between open and closed circuits
4. Demonstrate by simply wiring the wire (copper or iron) with higher resistance.

Previous Knowledge: Students are familiar with electric conductors/insulators, switching on/off torches and electric bulbs.

Presentation in Steps:



Content & Time	Teacher's Activities	Students' Activities
Step I: Heightening Anticipation (9 minutes)	1. Gets students learning ready by tickling their imagination and verifying their previous knowledge with questions like: a. Differentiate between electric conductors and insulators with examples. b. What happens when torches and electric bulbs are switched on/off? c. Moderates' students' responses, where necessary.	1. Become curious. 2. Listen and give responses 3. Make personal links to the subject matter
Step II: Deepening Expectations 1. Electric circuit: meaning and components 2. Electron flow: conductive materials and flow direction 3. Electron flow: open and closed circuits. (30 minutes)	2. Sustains students' interest and occupies them with content by displaying learning aids and activity guide sheet (Charts showing: direction of electron flow in a circuit, close and open circuits, torch and switches, battery, electric bulb, rope, copper and iron wires) and supervising learning based on: a. Definition of electric circuit (path that allows electricity to flow from one point to another) b. Identification of electric circuit components (conductive path, resistor and voltage source). c. Identification of conductors (materials that allow electricity flow), insulators (do not allow current flow) and resistors (electricity flows with some difficulty). d. Direction of electron flow (positive to negative) e. Open or broken circuit (no current flow). f. Close or complete circuit (no current flow)	4. Take ownership of the topic, via the learning aids and activity guide sheet to learn and practice science. 5. Observed/study the chart showing direction of electron flow in a circuit to define electric circuit/its components and state direction of electron flow 6. Use wire, rope, battery and bulb to define and differentiate conductors and insulators. 7. Use charts of close and open circuits, and torch with switch to show current flow and no current flow in close and open circuit respectively. 8. Make notes and ask questions where necessary. 9. Complete the activity sheet.
Step III: Extending Learning (23 minutes)	Asks students to use a close circuit diagram as a guide, and the materials (battery, bulb, copper and iron wires) to do a simple wiring experiment (for each wire and observe the glow) to determine the wire with higher resistance. Note: less glowing = higher resistance.	10. Follow the teacher's guide and use the prescribed resources to do the wiring experiment to determine the wire (copper or iron) with higher resistance. 11. Note and relate what has been learnt to future vision. 12. Complete the activity sheet.

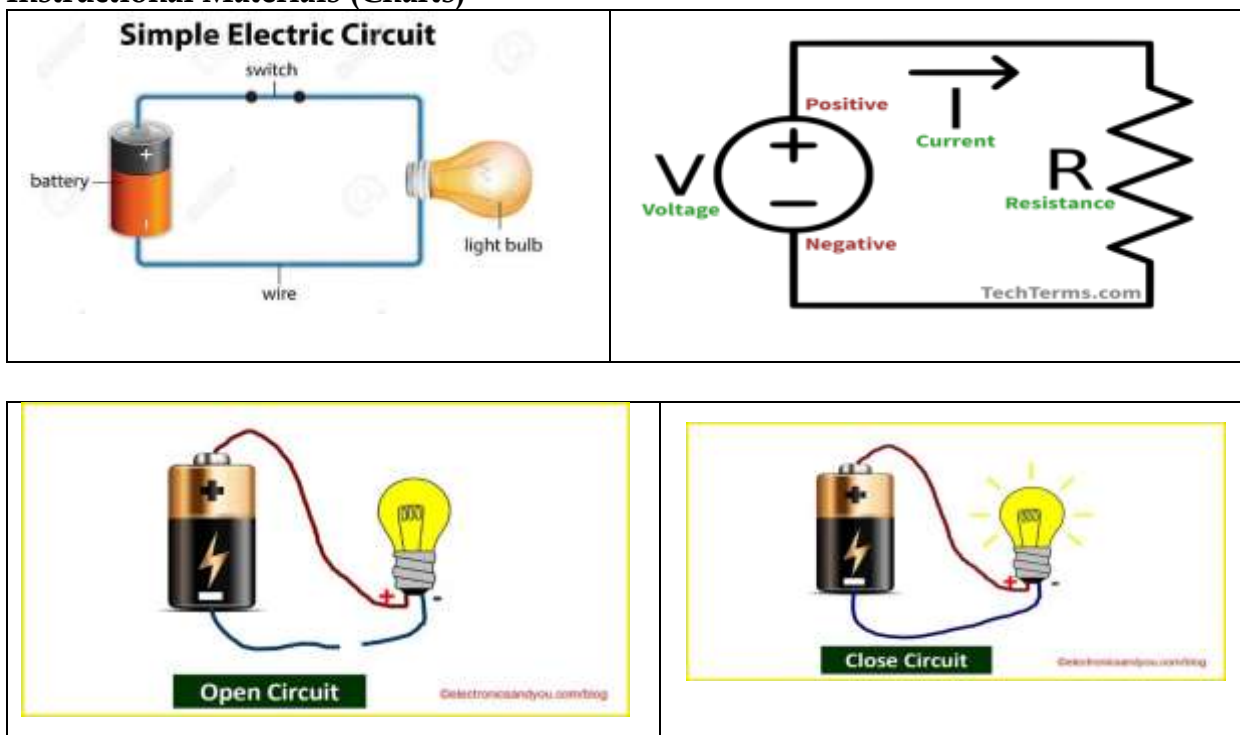


Final Evaluation (14 minutes): Teacher asks students to:

1. Define an electric circuit.
2. Show direction of electron flow (positive to negative) using circuit diagram.
3. Differentiate between open and closed circuits.
4. Demonstrate by simply wiring the wire (copper or iron) with higher resistance.

Closure (3 minutes): The teacher pinpoints the key points and encourages further reading and practice.

Instructional Materials (Charts)



Activity Sheet for Creative-Teaching Lesson

1. Name the materials before you
(a) _____ (b) _____ (c) _____ (d) _____ (e) _____ (f) _____
2. Identify charts 1.1 _____ 1.2 _____ 1.3 _____ 1.4 _____
3. Using chart 1.1, identify the components of a simple electric circuit in the torch
(a) _____ (b) _____ (c) _____ (d) _____
4. What terminals do 1 and 2 in chart 1.1 stand for? (a) _____ (b) _____
5. Name parts (1) _____ (2) _____ (3) _____ of chart 1.2



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6. Observe chart 1.2 and state the direction of current flow

 7. Using the materials before you, make an open circuit wiring as guided in chart 1.3 and write your observation on 3_____
 8. Join 4a & 4b of the wiring in chart 1.3 and record your observation

Summary/Conclusion

The chapter presents Basic Science as a core subject offered at the basic education level in regular and special needs education systems in Nigeria for laying the foundation on which the rest of science education at the post-basic and tertiary school levels would be built. However, this goal is threatened by the use of inappropriate teaching methods. Special needs education is intended to ease the learning of those who for some reasons, need some support and adaptive teaching methods in order to actively participate and meet the learning goals. Programmes in special needs education are similar to those in the regular education system but take individuals' peculiar needs into consideration by using suitable personnel, equipment and environment besides modified content and learning objectives. Therefore, Special Education methods are those modified to accommodate students with special needs or persons with learning disabilities like the blind, deaf and dumb, physically challenged or the deformed among others. This is why creative-teaching is discussed to be adapted in special needs education.

Creative-Teaching of Basic Science refers to demonstrating how to think skilfully amidst tactics, resources in Basic Science content for inspiring learning and fostering students' creativity using Torrance Incubation Model (TIM) and exhibiting Creative-Teaching Behaviours (CTB). TIM is a 3-stage (Heightening Anticipation, Deepening Expectations and Extending the learning) creative-teaching model for delivering both subject content and creativity. TIM is adapted here because of its suitability to basic school level in special needs education. Meanwhile CTBs are teachers' useful education conducts exhibited during lessons to aid students in acquiring knowledge and creativity skills. Thus, creative-teaching as shown in its organized integration of TIM and CTB lesson plan with ample teaching aids and activities for effective learning can be adapted for teaching Basic Science in special needs education.

Implications of creative-teaching for Special Needs Education

The implication of this discourse is that; students with varied disabilities in special needs education may acquire creativity or entrepreneurial skills, become more interested and perform better in electrical energy and related topics if taught using the Creative-Teaching method. This is because basic school children who are in their formative years can hardly understand science in abstraction. Merely talking about science without the relevant materials for children to see, handle, manipulate, think critically/creatively and learn by doing science could be



frustrating. Thus, without experimentation, science to them tends to be mysterious, strange, vague or meaningless, uninteresting and difficult enough to be dreaded. This connotes that students in special needs education like those in the regular education system need creative or child-centred teaching approaches for meaningful learning. When students focus on a creative goal, they become absorbed in their learning and more driven to acquire the skills they need to accomplish it. This may also boost students' academic performance, since creativity motivates learning. Thus, to boost students' creativity, entrepreneurial skill acquisition, interest and performance in Basic Science for self-reliance/survival in the harsh economy of the 21st century, creative-teaching should be adapted in special needs education.

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