

**THE NEED FOR BIOLOGY TEACHERS'
EDUCATION AND DEVELOPMENT IN NIGERIA BEYOND YEAR 2020**

BY

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Abstract

The importance of biology teacher education and development in Nigeria beyond year 2020 cannot be over emphasized. This is because when in-service biology teachers are properly educated on basic principles of teaching, characteristics of good teaching, desirable teachers behaviors, how to utilize various new biology teaching methods, teaching skills and biology resources, application of principles of motivation as well as utilization of ICT (information and communication technology) especially application of CAI (computer-assisted instruction), CMI (computer-managed instruction), e-teaching methods for teaching their students, these biology students will achieve very high in their examination especially in senior secondary school certificate examinations (SSCE) being organized by WAEC (West African Examination Council) and NECO (National Examination Council).

Introduction

Teaching is a noble profession and those involved in imparting knowledge to young people (students in secondary schools) are known as teachers. According to national policy on education (FRN,2004), no nation will rise above the level of her teacher's education hence the need of continuous education of biology teachers in order to enable them teach their students very well and proffer solutions to their students daily challenges. A teacher affects eternity; he/she can never tell where his/her

influence stops; hence teachers are seen as role models. According to Nwachukwu (2000), Biology which is the study of living organisms(plants and animals as well as human beings is the basis of such professions as medicine, pharmacy, agriculture (plants and animal breeding),nursing among others, therefore, there is a serious need for continuous and adequate education of the Biology teachers for effective and efficient academic service delivery to students in Nigeria before 2020.

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The significant roles of biology teachers cannot be over-emphasized. This is because Mbakwem (2000a) pointed out that a biology teacher is an interpreter of the biology curriculum, a service-deliverer of knowledge to students during his/her classroom teaching, manager of her classroom, a guidance-counselor to his/her students especially when they want to make carrier choice. A Biology teacher is also a loco-parentis as well as a community relation's officers. Biology teachers are involved in effective implementation of biology curriculum so that students after

learning biology topics will exhibit changes in their behaviors that will enable them contribute effectively and efficiently to national and international development. Furthermore, biology teachers' helps students to develop very well in the three educational domains namely: cognitive, psychomotor and affective domains. These teachers impart adequate biological knowledge to students in order to enable them perform various roles in national development are seen in industries, agriculture, diseases' control, environmental pollution control, population control/family planning, crime detection through application of forensic science/use of fingers/toe prints, conduction of academic researchers, teaching and application of genetic engineering to solve genetic problems and settle cases of disputed paternity.

The scenario as it concerns the present status of effective teaching and learning biology in Nigerian secondary schools is that there are a lot of challenges or problems militating against it namely:

- a) Inadequate financial allocation to educational sector in Nigeria as well as in mismanagement of allocated fund (Ali,2010),
- b) Insufficient time allocation to biology teachers as well as conduction of practical biology,
- c) Pour incentive/motivation of biology teachers by the government,
- d) Non-payment of biology practical conduction allowance by the government,
- e) Inadequate remuneration of

Important Aspects for Biology Teachers' Adequate Education and Development In Nigeria Beyond 2020

The various aspects of teaching in which the in-service biology teachers should be properly educated through conferences, seminars and workshops for them to remain relevant in the discharge of their duties in Nigeria beyond 2020 are as follows:

1. Desirable teacher behaviors for effective teaching of biology,
2. Four-phases' activities of teaching biology,
3. Basic principles of teaching,
4. Characteristics of good teaching,
5. Biology teachers' continuous utilization of various teaching skills during their classroom lessons,
6. Biology teachers' application of principles of motivation to students during lessons,
7. Importance of utilizing biology resources for teaching his/her students and for biology practical conduction
8. Biology teachers should annually attend conferences and seminars on utilization of ICT (Information and communication technology) in order to enable them enhance their students achievement during their examination
9. Biology teachers should attend STAN (science teachers association of Nigeria) conferences and work shops in order to enable them update their biological knowledge for their

professional growth (Mbakwem, 2000).

10. Paradigm shift in science (eg; Biology) teaching and learning
11. Biology teachers should try/endeavor to match theories with continuous conductions of biology practical for students.

1. Desirable teachers' behaviors for effective teaching of biology

Anyone who wants to be a teacher must possess personal trait or behaviors. The following behaviors are desirable for effective classroom teaching namely;

- a) A biology teachers must be alert enthusiastic
- b) He/she must be cheerful and optimistic
- c) Self-controlled and not easily upset
- d) Likes fun and has a sense of humor
- e) Recognizes and admits his/her mistakes
- f) Patience, friendly and courteous
- g) Accept all students (does not discriminate)
- h) Gives help willingly
- i) Punctual and seldom absent in his/her work
- j) Corporate with staff willingly
- k) To communicate appropriately with parents
- l) Shows a professional commitment of self-improvement

2. Four-phases' activity of teaching

The Four-phases of teaching identify by Hough and Duncan (2003) areas follows:

- biology teachers and sometimes delay in the payment of monthly salaries
- f) Non-payment of biology teacher's salaries as well as that of other teachers in Nigerian secondary schools sometimes leads to industrial action/strike,
 - g) Lack of interest by some biology students,
 - h) The training of some teachers is far beyond the level of demands of the new biology curriculum which states that secondary school graduates must be able to:
 - i) Acquire at least one functional trade and be functionally useful to the Nigerian society,
 - j) Become job creators/employees of labour and not job-seekers,
 - k) Be better prepared for higher education,
 - l) Become computer ICT literate (Ezeano, 2013).

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1. Desirable teachers' behaviors for effective teaching of biology

Anyone who wants to be a teacher must possess personal trait or behaviors. The following

variety of learning experiences and activities in order to meet the individual needs of the learner (Mbakwem, 2000b).

4. Characteristics of good Teaching

According to Johnson and Barry (2011), an effective teacher does the following:

- i. Plans instruction to achieve selected objectives.
- ii. Organizes instruction to take into account individual differences among learners.
- iii. Obtains and uses information about the needs and progress of individual learners.
- iv. Refers learners with special problems to specialists.
- v. Obtains and uses information about the effectiveness or instruction to reverse it when necessary.
- vi. Uses instructional techniques, methods, and media related to objectives.
- vii. Demonstrates a repertoire of teaching methods.
- viii. Reinforces and encourages learners' involvement/ participation during his/her teaching.
- ix. Demonstrates an understanding of the school subject being taught.
- x. Organizes time, space, materials and equipment for instruction.
- xi. Demonstrates enthusiasm for teaching his/her students.
- xii. Helps learners develop positive self-concepts.

- xiii. Manages classroom interactions.
- xiv. Meets professional responsibilities.
- xv. Engages in professional self-development (Johnson and Barry, 2011).

5. Biology Teachers' continuous of practical Biology After Teaching Each Topic

Practical work may be described as any learning experience which demands activity rather than receptivity which is characteristic of a theoretical work. Viewed in its widest sense, it may be regarded as any learning experience which involves students in activities such as observing, counting, measuring, experimenting, recording observation and carrying out field work as opposed to theoretical work which involves listening to the teachers and taking note (Ndu, 1980)

Practical work needs to be dovetailed into the theoretical development so that the entire course is a unified whole and presented in a manner conducive to thinking. An undesirable method which still prevails in some secondary schools is the practice of setting aside the practical in biology or any other subject till the a few weeks just before the Senior School Certificate Examination. It is unfortunate as (Ndu, 1988), pointed out "that many teachers treat organizing of practical work as an incidental adjunct to the giving of lectures which they recognize as their main function". If the teaching of biology to make its maximum contribution to education and well-being the students and the society, the teachers

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2. **Four-phases' activity of teaching**

The Four-phases of teaching identify by Hough and Duncan (2003) are as follows:

- a) Curriculum planning phase: at this stage the teacher formulates goals of education, state general and specific behavioral objectives, select contents and learning experiences, methods and materials to be used.
- b) Instruction phase: Here actual instruction takes place involving creating, using and modifying instructional strategies and tactics, instructing, interpreting and acting on situational feedback about instruction

- c) Measurement phase: This involves selecting or creating a measurement devices, measuring learning, organizing and analyzing measurement data

- d) Evaluation phase: This phase involves the appropriateness of objectives, the effectiveness of instruction, the validity and reliability of the devices used to measure learning. The prime intention of teaching is to facilitate learning (Duncan, 2003).

3. **Basic principles of Teaching**

- a) According to Mbakwem (2000), the teacher should provide enough activities and learning experiences necessary for the students. This could be done through demonstration, experiment, question construction and the use of instructional materials. A student learns by doing, as he actively interacts with instructional materials, the teacher and the external condition of his environment. He is an active participant in the teaching-learning process. Thus teaching should stimulate and encourage active participation of the learner.
- b) Teaching should proceed from known to unknown. That is, starting from what the learner already know to the materials already introduced
- c) Similarly, the lesson should start from the simple aspect of the subject matter to the more complex

according to their plans. Real learning results when individual constructs meaning of objects and events they encounter on their own. Teachers are required to place students in a more central position in the whole instructional programme. The students should question more and their questions should form the basis for classroom/laboratory discussions and investigations. Furthermore, students should proffer solutions and offer explanations. However, teaching for construction rather than transmission suggests that teaching changes to facilitating, negotiation and interpretations which should be based on the learners' prior knowledge. Alternative conceptions are ways events are interpreted and constructed as a product of human mind.

According to Mbarjiogu (2003), learning was greatly influenced by the philosopher John Locke, who was proposed the theory of tabular rasa. This theory presents human mind slate devoid of any prior impression at birth. It directed teaching lent legitimacy to drill as a method of teaching.

Over the years the lecture method has been used with minimal opposition to it as a good method of teaching. Its basic assumption is that the lecturer is a novice in the learning process while the teacher is the expert who needs to pass across the truth about the world or the conception in question. Thus learning was seen as the process of adding new concepts to the repertoire of concepts held by the learner in order to arrive at ever increasingly perfect conception of the phenomenon. The

students' task was to assimilate, with minimal interference to the teaching process, the idea being passed on by the teacher. He can by of course ask questions but only to clarify hazy aspect of the idea. Learning was, therefore, seen as accretive rather than an evolutionary or revolutionary process.

It is now clear that science learning is a cultural and social phenomenon. As a cultural phenomenon, it is recognized that the function of the science teacher is to convey the social conventions regarding particular ideas and conceptions whereas the cognizing individual is to negotiate his position in the face of such conventions. Thus, the learner is involved in the acceptance or rejection of the conventions based on his current central commitments. This is seen as multidimensional process involving social, rational, affective or ontological perspectives.

Conceptual Change Phenomenon

The research literature is replete with terms to describe the conceptual change phenomenon. Constructivism recognizes the context of an individual; therefore, learning involves a process of negotiation: a constructive process involving the generation and the test of different alternative conceptions. The theory is much influenced by Piaget's process of cognitive development that involves an individual's schema and/or schemata interacting with his environment. His two processes of assimilation and accommodation are crucial to this theory.

- ones. In any event, the easiest and most striking aspect of a lesson should be presented first before the more difficult ones.
- d) Teaching should encourage and promote creativity in the learners. The learner must be enabled to think, investigate, explore and discover things for himself. A variety of audio-visual material should be utilized when teaching as well as other appropriate teaching methods that can be employed.
- e) The uniqueness of the individual child must be considered. No one class is homogenous. Individual differences exist in a class in terms of the age of the students, their family background, their needs and interests, emotions, physical and mental development levels, intellectual ability levels and their cognitive styles amongst others. They are fast, low and average learners. The teachers need to vary his/her teaching methods, provide a variety of learning experiences and activities in order to meet the individual needs of the learner (Mbakwem, 2000b).
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for judgment are those given above and must be fulfilled Mbajiorgu, (2003).

7. **Continuous Training of in-service biology teachers during STAN conferences, seminar and workshops on effective utilization of information and communication technology (ICT):** especially the use of CMI (computer-managed instruction), CAI (computer-assisted instruction) among others for proper presentation of their biology lessons in order to enhance their students' high achievement during examinations.

Microsoft PowerPoint is software for presentation of lessons/lectures. The programme is very much dependent on windows. It is the best application to use when putting a presentation together, even if you are not using a projector or a computer to display along with its black and white specific features. PowerPoint has graphic design and output muscles that help create great look printed handout for your audience.

Presentation is a collection of data and information that is to be delivered to a specific audience. A PowerPoint presentation is a collection of electronic slides that can have text, pictures, graphics, tables, sounds and video. This collection can run automatically or can be controlled by a presenter.

Recommendations

The following recommendations are highlighted as ways of ensuring effective and efficient biology teachers' education and development in Nigeria beyond year 2020 namely:

1. There is need to train Nigerian biology teachers on information and communication technology (ICT) so that they will become computer literate. This will enable them to present their biology lessons to students using PowerPoint as well as animation. Animation which is an agent of computer multimedia will help biology teachers to teach molecular cell biology very well to students. Furthermore, the utilization of computer-managed instruction (CMI) and computer Aided instruction will assist these teachers to carry out distant teaching to their students.
2. Annual biology workshops should be organized for these teachers in Nigerian secondary schools in order to enable them learn how to make improvised materials for teaching and conduction of practical biology.
3. There is need for yearly organization of STAN (Science Teachers' Association Of Nigeria) seminars and conferences for biology teachers' professional growth as well as up-dating their knowledge on current issues in biology.

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Importance of Biology Practical Work

Practical work in biology provides opportunity to promote the scientific methods of thought. The scientific method entails inculcating into the learner, the habit of drawing conclusions on the basis of observation and experimentation. In other words, students will regard scientific conclusion as being based on verifiable truth. During practical work in biology by the student's scientific attitudes such as curiosity, thoroughness, open-mindedness, objectivity, scepticism, honesty in reporting their findings, persistence among others are developed in them. Practical work arouses and maintains students' interest in the study of biology. The joy of discovering something or arriving at scientific conclusion through one's own experiments can be highly motivating. Practical works helps students to develop manipulative skills through handling of equipment and apparatus. It serves to elucidate the theoretical work so as to be done in school satisfies the requirements of practical examination regulations. It provides training in problem solving through opportunity offered in inquiring and practical investigation. Students-to-students talk during practical in biology generates discussion that is likely to facilitate understanding. Practical work thus serves as a classroom technique that promotes students' co-operation and interchange of ideas. Practical works make phenomena being investigated more real through actual experience. Through practical work, biology students acquire science process skills of observation, classification, measurement,

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