

THE INTEGRATED SCIENCE TEACHER IN THE SUCCESSFUL IMPLEMENTATION OF INTEGRATED SCIENCE CURRICULUM IN NIGERIA

Rachel Ovuezirie Atomatofa and Stella E. Ewesor

Abstract

A look at the curriculum objectives of Integrated Science shows that it is a subject that demands well trained teachers who are task oriented and understand the subject's curriculum objectives to be able to properly and successfully achieve the objectives. Integrated Science is a subject that attempts to put aside the various single science subjects' boundaries and sees science as one. It is the subject that lays foundation for further study of science. At the secondary levels, it is taught at the junior secondary 1 - 3. Issues relating to the teacher in the successful implementation of the Integrated science curriculum were discussed in this paper. Since the teacher is seen as the key agent in the successful implementation of the Integrated science curriculum, it is important that he is well informed about the likely problem he may face in the implementation and what can do to overcome such.

Introduction

One feature of Global movement towards improving science education around 1960's and 70's was the development of new sets of science curriculum materials. Before this time Integrated Science was not one of the subjects in the school curriculum of Nigeria. What was being taught was the Elementary Science, General Science and Nature Science or Rural science.

When the need for a reform in science comes up, the United States and Britain took up the challenge after USSR launched the first space satellite in 1957. Their reform led to a development of new science curriculum. In Nigeria, Integrated Science came up when West African Examination Council (WAEC) requested Science Teacher Association of Nigeria (STAN) to make a review of the then science curriculum in Nigeria because of the massive failure in the WAEC examination at that time.

The Integrated Science subject in Nigeria has as its philosophy according to STAN (1984), to teach students what science really is and how scientist works. Likewise the Federal Government derived a philosophy for Integrated Science based on the National Policy on Education, which states that Integrated Science is a course that:

1. stresses the fundamental unity of science.
2. is relevant to the child's need.
3. lays a foundation for further learning of science
4. adds cultural dimension to science.

The structure of the 6-3-3-4 system of education is stated clearly in the National Policy of Education (1981). Based on this, the Federal Ministry of Education developed a core curriculum for Integrated Science which was published in 1984. Thus Integrated Science is to be taught and has since been taught at the first three years at the secondary levels.

The Integrated Science core curriculum therefore attempts to present topics, performance objectives, content, activities and evaluation in a well structured teaching manner. The topics are presented in themes. This core curriculum presents the Integrated Science subject as a fundamental science that makes students see science as real. Thus it is the duty of the classroom teacher to translate the curriculum goals from theory to practical. It is on this background that this paper was written as an attempt to stress the importance of the Integrated Science teacher in the successful implementation of the integrated science curriculum.

Implementing the Science Curriculum: An Overview

When learning opportunities are planned with the intention to bring about certain changes in

pupils and the extent to which changes have taken place in them are assessed, one can say that curriculum development is taking place. In other words curriculum development involves the actual implementation of the decisions reached during curriculum planning.

Curriculum is defined as a guide that gives purpose and direction to the specific activities of the class the teacher must complete for students to achieve measurable goals. The curriculum after being planned needs to be adopted for use in the school system. According to Ali (1998) Implementing the science curriculum is as difficult if not more difficult than developing it.

White (1994) positioned that the implementation stage of any educational program contends with practical obstacles which may make impossible the actualization of intended goals and objectives and one of such problems is the teacher factor. Today, science has become an essential part of the curriculum of most schools. All students at all educational levels see it as a systematic body of knowledge worthy of study. Thus a major goal of science instruction is the justification that science and technology recognizes the dependence of the society on science and emphasizes the understanding of the nature of scientific knowledge as well as development of problem solving skills.

The science curriculum of Nigeria is tailored towards achieving the objectives of science which are;

- o To provide for the child, basic training in scientific investigation,
- o To provide basic scientific literacy for everyday living,
- o To provide basic skills and attitudes for necessary technological take off.
- o To stimulate and enhance the child's creativity through practical activities.

The actual process of implementing the science curriculum involves the

1. Preparation of notes of lessons and lesson plan by the science teacher.
2. Usage of the lesson notes/plan by the science teacher.

This should be done after a thorough study of the relevant sections of the science curriculum. For instance, one of the objectives of the Biology syllabus is to provide a logical and psychological follow up for the Junior Secondary (JSS) curriculum for Integrated Science. Thus the JSS Integrated Science curriculum was considered in the structuring of the biology curriculum. Also, the Chemistry and Physics Curriculum have bearing reflecting the JSS Integrated Science Curriculum. This is why it is recommended for science teachers to start by finding out how well the students understand basic scientific principles and concepts from their study of Integrated Science before building on them at the Physics, Chemistry and Biology (Senior Secondary Schools) Levels.

Thus in implementing the science curriculum, one would be right to ask that are there professionally qualified teachers? Are they sufficient? Do they understand the core and depth of the curriculum? Are they devoted and ready to work hard to ensure that success is achieved? Are they duely motivated and encouraged? The answer to these questions will affect the extent to which the objectives of the science curriculum are met.

Implementing the Integrated Science Curriculum in Nigeria.

The Nigeria Integrated Science Project (NISP) was born out of the argument to begin an Integrated-Science programme that will cover the first two forms of secondary school work. This was later referred to as the core curriculum for Integrated Science when the 6-3-3-4 system of education began.

The philosophy for the subject includes a course relevant to the child's need and experience; a course which stresses the fundamental unity. Unity of science and lays a foundation for further study, as well as a course that adds cultural dimension to science education. (Bajah, 1993)

According to Bajah (1993) the skills desired for student includes ability of students to:

- a) Observe carefully and thoroughly
- b) Report carefully and completely what is observed
- c) Organize information acquired through observation
- d) Generalize on the basis of information acquired.
- e) Predict as a result of generalization
- f) Design experiments
- g) Using models to explain phenomena
- h) Continuing the process of inquiry when new data do not conform to prediction.

For the teaching of the Integrated Science curriculum, teaching strategies recommended are the *problem solving, child-centred and activity based methods*. The use of the guided discovery method has thus being stressed as the best method for the teaching of the Integrated Science. This has been supported by various researches as carried out by researchers in the field of Integrated Science.

(Ajewole 1987, Ovri 2007, Uneuro 2005).

The Integrated Science curriculum includes topics which are stated in themes because of the nature of the subjects. There are six themes. These are

1. You are a living thing
2. You and your home
3. Living components of the environment
4. Non- living components of the environment
5. Saving your energy
6. Controlling the environment.

These themes are found in all the three levels of the Junior Secondary School.

The content of the Integrated Science curriculum which provides for the cognitive, affective and psychomotor domains intends that the learner be able to achieve holistically.

There exist a gap between the theory and the actual implementation of the integrated science curriculum, and several reasons are responsible for this gap. Among them are; The lack of understanding of the Integrated Science philosophy, goal or objectives; The lack of understanding of the Integrated Science content and materials; The Non usage of instructional materials/appropriate teaching methods; The Non availability of qualified/professional Integrated Science teachers Financial problems and so on.

Ogunniyi (1978) in his paper on determinant of successful implementation of the Integrated Science programme in Nigeria asked the following questions.

- 1) Is the content of the programme of desirable quality?
- 2) Is there a positive relation between actual learning outcome and intended learning? Are the intended learning outcome achieved?
- 3) Are unintended learning outcomes identified and corrected for?
- 4) Is the content of the subject relevant to the needs of the students
- 5) Does the implementation programme continue to be effective?
- 6) Are the materials available locally or obtainable from other areas with relative ease and convenience at a reasonable list?
- 7) Are necessary supportive or maintenance services provided?

Ogunniyi's works revealed that problems identified with implementation programme includes too much activities in the curriculum, poor teaching preparation, overemphasis of processes of science, overdependence on the service training for teachers and the difficulty level of materials. This, according to him, if solved, the implementation of the programme would become successful.

The Teacher Factor in the Implementation of the Integrated Science Curriculum

The Integrated Science teacher is the key agent in the actual implementation process. He prepares notes of lesson for the teaching of the subject. He assesses the Integrated Science students

It is the teacher that bears the responsibility of ensuring the curriculum is implemented in the teaching learning situation. They are not all involved in the planning process this makes them to be ignorant of the consequences of alternatives at each point of the curriculum. According to Okoye (1991), it should be the role of school administrators to establish a network of curriculum planning in which teachers are centrally involved. This can be made possible by school policy makers and administrators organizing seminars, workshops, conferences etc, where crucial issued are discussed.

Ughanadu (1998) opined that feedback coming from teachers who have used a particular curriculum will be essential for meaningful revision or renewal of that curriculum. Since the demands of the Integrated Science programme are closely tied to the new national policy of education, it is seen that a lot is required from the Integrated Science teachers to implement the curriculum. He is seen as a facilitator of the learning and he is expected to study and understand the content of the curriculum so that in practice he/she can play his role to ensure that the objectives are being achieved.

In the course of implementing the Integrated Science subject curriculum, the Integrated Science teacher can fall into any of the classes below.

Category one Teachers: -These are the teachers who are not aware of what the curriculum entails. They do not even have the interest to find out what should be done. All they know and do is to teach. They just teach without considering or taking cognizance of the curriculum goals and objectives.

Category two Teachers those that are fully aware of what the curriculum entails, but have little or no interest to pursue its course. Their awareness may, just be by chance not by their effort to find out what the curriculum entails or what should be done.

Category three Teachers are those that are aware and contribute only a little to its attainment. For various reasons, mostly financial and lack of motivation and incentives from the government or school heads, they are not ready to go extra mile to ensure the curriculum objectives are meant,

Category four Teachers are those that are fully aware and involved in the curriculum development process. They are ready to go extra mile like taking up tutorial classes, extra mural classes, extension classes or even enrichment exercises.

Category five Teachers are those that provide opportunities for students to be involved actively in the implementation process. They give students opportunities to identify and solve authentic problems. Thus their students are able to understand and apply simple scientific concepts.

Category six Teachers are those whose teaching goes beyond the classroom. These teachers actively ensure that students experience are expanded and directed at solving problems by getting information from government agencies, internet, excursions or fieldworks.

Category seven Teachers are those whose interaction with students leads them to have ready access to a complete understanding of scientific concepts. Their students are able to solve problems related to real life situations. Their lessons are mostly student centred and actively based.

From category 1-7, one can say that Integrated Science teachers in the implementation process falls into any of the seven categories. However it is expected that a good Integrated Science teacher be thorough in the implementation of the curriculum and ensure that the objectives are met.

Between categories 1 - 7, teaching methods shifts from being teacher centred to being activity based/student centred. Integrated Science is a subject that welcomes inquiry teaching method, problem solving approach. Presently teacher centred methods are now being replaced with more inquiry approaches.

Teachers somewhere between categories 1 - 3 are those with low attitude while in those category 4 and 5 find themselves having mid attitude. Those in categories 6 and 7 have high attitude towards the implementation of the Integrated Science curriculum objectives.

Problems Faced by the Teacher in Implementing the Integrated Science Curriculum

Several problems confront the Integrated Science teaching while implementing the curriculum.

- 1. Lack of involvement in the curriculum planning process:** - Most of the Integrated Science teachers are not involved in the planning process. They do not understand the principles underlying each section the curriculum objectives. Their attitude in the teaching learning process is wrong and the method employed in teaching the subjects are not in line with the stipulated ones.
- 2. Communication Problems:** When a curriculum is designed, those involved needs to be communicated and any change made must be communicated promptly and effectively. The teacher of Integrated Science especially in the secondary school levels are hardly informed of current changes or innovations made in the subject content and curriculum. This can affect their effort in the implementation process. Sometimes there is ineffective communication (of ideas, plan, decisions or problem encountered) between the teachers and principals. The principals are not ready to listen to the teachers or try to encourage them thus communication gap can lead to frustration on the part of the teacher.
- 3. Financial Problem:** Implementing the curriculum effectively demands finances. The problem of finances have affected the Integrated Science teacher because they need the funds to make their class more practical oriented, and to buy equipment, tools, etc for the teaching of the subject contents. Most times, little or no money is available for the teacher to use to acquire the materials needed. This therefore is a serious problem to the teacher.

4. **Lack of Motivation and Incentives:** The teachers are hardly motivated or given incentives to encourage them. Their salaries are sometimes not promptly paid. Where then does the motivation come from to stir, up the teachers to teach and give all efforts to successfully implement the program?
5. **Overpopulation/Class size problem:** An ideal integrated science class ought to be a teacher: pupil ratio of 1:24 or at most 1:40 in a normal classroom. Presently in our public schools, some of the classrooms have population up to 150 students in their classes. This explosion can reduce effective teaching.
6. **Poor libraries/Information centres:** Most secondary schools do not have well stocked libraries. The Integrated Science teacher needs lots of good science texts to develop him and to prepare to teach the students.
Other problems include: Unequal distribution of secondary school lab facilities which includes Integrated Science, material, equipment, etc, lack of in-service training and government sponsorship to attend conferences, seminars, weak data base, and so on.

What the Integrated Science Teacher can do in Implementing the Programme Successfully

A close look at the Nigeria secondary school science curriculum reveals that the objectives are not being achieved. Although much of the blame is on the government and school administrators, the teachers' even students but much can be done by the teacher to restore hope and ensure proper implementation of the curriculum. Below are some of the steps the Integrated Science teacher can take in implementing the curriculum.

1. Explore the environment and make use of every opportunity you can to teach the students and let them see science as real not abstract.
2. As much as you can improvise and use locally made materials to experiment and do practical. Integrated science does not need very expensive tools or materials. The students and their parents can help get some of the simple materials needed.
3. Be in constant communication with the principal, other science teachers within and outside the school and communicate your ideas with them. Let them suggest and assist you.
4. Make good use of the little funds you have access to. Plan excursions and visits outside the school environment.
5. Ensure that your lesson notes and plans are well prepared and the objectives clearly spelt out and related to the curriculum goals.
6. Try to attend science conferences, seminars, workshops and get informed about current information in the sciences.
7. Add to your qualification, go for in-service training programmes and work hard.
8. Use inquiry based teaching methods and get the students fully involved in times of practical. Let the teaching be more student centred. Make the students feel free to ask questions and discuss with them freely.
9. Study and understand the content of the Integrated Science curriculum, the philosophy and history. This will help you when preparing for your lessons.
10. Do not teach because you want to teach but teach because you want your students to become literate scientifically.
11. Manage your time properly. When there is the need to organize extra classes to make up for time loss or insufficient time. Start science clubs in the school and be actively involved in them.
12. If the class size is large, you can do your practical and demonstration in groups. You need the cooperation of your Head of Department as well as the principal to achieve this.

Conclusion

The successful implementation of the Integrated Science curriculum depends largely on the teachers. This is because they are the key agents in the fore front of implementing the curriculum. They are the brains that transmit the theory into practice. This is why discussion on the teacher as key agent in implementing the integrated science curriculum cannot be overemphasized, if the objectives of the curriculum must be achieved.

Rahor (1988) in a study on implementing the National Policy on Education in Lagos State found that Integrated Science was one of the subjects that need urgent attention in terms of teaching staff, facilities and laboratory. This means that qualified and task - oriented teaching staff are lacking in the teaching of Integrated Science. Some of the teachers do not understand the philosophy of the subject; others are single science subject specialist who may not be able to teach other aspects of the subject not related to their fields of study.

References

- Ajewole G. (1987). *The effect of discovery and lecture methods of teaching O level Biology*. Unpublished PhD thesis University of Ibadan.
- Ali, A (1998). *Strategic issues and trends in science education*. Owerri CAPE publishers international Ltd.
- Ani A. E. (1988): *The level of importance of continuous assessment in some selected secondary schools in badary LGA of Lagos*, Unpublished B.A.Ed Project LASU.
- Bajah ST. (1993). *Teaching science creatively*. Ibadan. Ibadan University Press.
- Federal Government of Nigeria (1981): *National policy on education Lagos*
- Federal Government of Nigeria (1984): *Core curriculum for JSS integrated science*. Heinemann Educational Books (Nigeria Ltd).
- Ogunniyi, M (1978): Determinants of successful implementation of the integrated science in Nigeria. *STAN Journal Vol. 16 No 2 April 1978*.
- Okoye N.S. (1991): *Curriculum theory and development*. Enugu. New Age Publishers.
- Ovri Rachel (2007): *Relative effect of inquiry, discussion lecture methods of teaching integrated science on students achievement*. Unpublished M.Ed Thesis. Delta State University Abraka.
- STAN (1984J: *Nigeria integrated science project (Texts)*. Heinemann educational books (Nigeria Ltd)
- Ughamadu .C. (1998): *Curriculum concept, development and implementation*. Agbor Kmensuo Educational Publishers.
- Ureuro, J.(2005): *Comparative study of guided discovery, lecture and concept mapping methods of teaching geometty* Unpublished PhD thesis. Delta State University Abraka
- White D (1994): Implementation of educational programme philosophical approach. *International Journal of Education (I) 4-26*