

**SCIENCE EDUCATION FOR VALUE RE-ORIENTATION, POVERTY  
ERADICATION AND NATIONAL DEVELOPMENT**

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**Abstract**

This study investigated how science education as a powerful instrument of social change could be effective in value re-orientation for poverty eradication and national development. It is a research based fact that education in our country is far behind that of many nations. Based on this, the study employed survey type of research design and three research questions were addressed. The sample consisted of 400 science teachers that were randomly selected from all the state owned colleges of education (polytechnic inclusive) in Kogi state by random sampling technique. Data was collected using two research instruments namely: Science Teachers Assessment Questionnaire (STAQ) and Public Assessment Interview (PAI). STAQ contained 30 items in Likert format and PAI contained check list of various facilities. To validate the instruments, the researcher presented the two instruments to three experts comprising senior lecturers from Biology department, Statistical section and English language department, all in Kogi State College of Education (Technical) Kabba; helped to validate the instrument. The data collected were analysed using mean scores to answer the research questions. Pilot test was carried out and a reliability coefficient index of 0.80 was obtained using Pearson Product Moment Correlation Coefficient. The study revealed that science teachers utilized their strategies to inspire value re-orientation for poverty eradication and development of the nation. It was observed that the laboratory equipments were inadequate but good for teaching and learning. Preventive maintenance is not taken seriously. It was therefore recommended that government should employ skilled personnel in laboratories and workshops for regular maintenance.

National Research Council (2007) stated that, the vitality of the nation is derived in large part from productivity of well-trained people and the steady stream of scientific and technical innovation they produce. Ezeaku (2007) said Education should be geared towards preparing people to undertake specific tasks and employment functions essential to the transformation of society. In order to achieve this, our science teachers should include programmes that must be geared towards engaging learners in the excitement of science, helping them discover the value of evidence-based reasoning and higher order cognitive skills; this will enable the citizens utilize learning experiences to induce and manage positive change that could improve the standard of living in the society (Ibraheem, 2016:431).

Based on this, Education is popularly known as a powerful instrument of social change and national development, this belief is held by all the societies, either developed or less developed nations to the extent that promoting and sustaining quality education are never left for chances (Robert, 2015:16). Importantly, for quite some decades, a good number of graduates from this education system failed to secure jobs and they are in dilemma. This is due to the fact that, they are not equipped with the pre-requisite skills for self or paid employment (Igwe, 2007). So, an individual needs pre-requisite background of science. Since science education is an instrument of

change and antidote to irrationalism (Chills, 1989:346)

The national policy on education (2004) stated that, the broad aims and objectives of secondary education in Nigerian educational system are (i) Preparation for useful living within the society (ii) Preparation for higher education. So, the area that concerns this study is the first objective which is – Preparation for useful living within the society (Obori, 2014). Adekoya (1999), claimed that for the Nigerian youth to be empowered economically they should be given the necessary skill acquisition and for this to be done the curriculum should be effectively implemented.

According to Davidson (2012) a modern and vibrant education system entails wide-ranging activities that would ensure functional and quantitative education of the highest possible standard at basic, post basic, and tertiary education at all levels, improving learning, teaching, infrastructure, technology, technical, vocational and training (NPC, 2010). This study however has tried to ascertain the challenges and exposed some strategies through which various forms of dilemma that consisted inhibition to the effective functional education in the country could be eliminated and thereby promote values, knowledge, skills and national development to progress. The main target of science education programmes aim at producing citizens who can apply their knowledge, skills and experiences to solve real life problems by harnessing the resources from the environment for the betterment of society. Kattari (2014) cited

in Obori (2016) opined that science education should be geared towards preparing people to undertake specific tasks and employment functions essential to the transformation of the society for value re-orientation to eradicate poverty.

#### **Statement of the Problem**

One of the major aims of science education based on Federal Government Policy (2004), stated that teaching science and technology must include science practical activities which will easily endow the learners with innovation in research work and training of appropriate skilled manpower by individuals to be self-reliant and as well contribute meaningfully to the development of the nation. These aims can only be achieved in a conducive environment where training facilities are adequately available. A careful look into most of the institutions in Nigeria and Kogi state in particular, reveals that education given to students are not adequate enough as to help acquire better skills due to lack of modern facilities, and consequently they acquire poor skills which reflect in their working in public offices. This sum up the core problem of this study; hence the quality of education given to the learners raise some doubt about the status of science practical activities such as:

#### **Purpose of the Study**

The main purpose of this study was to investigate the extent to which science teachers' strategies inspire value re-orientation with laboratory facilities for

poverty eradication. Specifically, the study was set to:

1. Find out the extent to which science teachers' strategies inspire value re-orientation for poverty eradication.
2. Find out the extent to which equipment in science teaching are adequate enough for teaching and learning.
3. Find out if the science equipment in the State Colleges of Education laboratories are regularly maintained.

#### **Research Questions:**

The following research questions were formulated to guide the study:

1. To what extent do science teachers' strategies inspire value re-orientation for poverty eradication?
2. Are the science equipment in the State Colleges of Education laboratories adequate for teaching and learning?
3. Are the science laboratories in the Colleges of Education regularly maintained?

#### **Science Teachers**

According to Ibraheem (2016), science teachers are the nerve centre for technology advancement in any society hence it is mandatory for any nation to rise above poverty and backwardness; and this rest heavily on the shoulders of science teachers. Onu (2007) discovered in his research work and also a well-known fact that no technologically advanced nation is poor and no poor nation is technologically advanced. This has a lot of implications for science education which is the centre for value re-orientation.

These implementers of national curriculum are very relevant in the development of skills among the learners. They equip the learners with attributes such as scientific enquiry, power of observation, mastery of manipulative skills, resourcefulness and mechanical comprehension (Therechery, 1998). These qualities enable science learners to meaningfully engage in research work and reason inventively towards poverty eradication for national development.

Science teachers possess the quality that leads the learners to think in a highly imaginative way that apply the knowledge by relating it to the existing knowledge to foster creative thinking in the learners. This could lead them to inventive reasoning that promotes the society technologically against poverty. Teachers are capable of this being that they are motivators, facilitators, role model, and friends to the learners and as one who is actively involved in achieving the laid down educational objectives (Omadiyi, 2011). They also impart knowledge through multiple ways of encouragement. They teach with concepts that are known to the learners to explain things that are abstract.

Uzoechi (2014) established in his work that a creative science teacher should be able to know when it will be most important or appropriate to use direct teaching, inquiry, discovery, project or group work. Teachers' field of adequate content knowledge and ability to create an appropriate learning environment also add to the creative way of imparting knowledge to the learners. More

importantly, the researcher also identified that the popular method of instruction in most institution particularly in secondary school science (biology inclusive) is mainly expository method (Okoli, 2006; Aniodo and Ebo, 2013). This expository method concerns mainly verbal presentation of subject matter which is mainly teacher centred. By this method, the teacher only presents lessons without any hand-on or practical activity to the students. Ezenduka C. U, Achufusi J.N. and S.I. Okoli(2014; 216) went further to add that, expository method lacks innovation and does not encourage learning conditions that foster creativity in science learning.

So, based on this, most science teachers adopted an innovative teaching approach that enable students participate in the lesson, acquire skills, generate ideas and develop critical thinking to enhance creativity that brings about innovation. In order to embark on total eradication of poverty in the society, there is need for the provision of functional education that brings about human capital development to the teeming Nigerian youths in various educational institutions in the country. To educate citizens in science, technical and vocational courses which will enable them become self-reliant, self-sustaining and self-employed instead of jostling for few white collar jobs (Kolawole&Arikpo, 2008 and Ahmed, 2011).

### **Laboratory**

Laboratory is an important instrument that science teachers manipulate on the learners for value re-

orientation. Its activities have become the centre of attention at all levels of science teaching. The Nigerian Secondary School Project emphasized laboratory experience as a means by which meaningful learning in science can take place. The teaching processes which consequently affect their laboratory skills (Darrell, Allan and David, 2002). According to Ibraheem (2015), the roles played or areas by which laboratory activities have been employed are:

- as a means to verify science principles, law or theory known to the students
- as a means of practicing one or more of the listed process skills like observation, classification, measuring or interpretation of data.
- as a means of determining the relationship between cause and effect.
- as a means of obtaining and learning scientific information.

These teaching skill demonstrated stimulated thinking skills that consequently influence laboratory manipulative skills; which make the learners appreciate the scientific values.

Science practical lessons help the learners to understand science concepts and laboratory activities, make abstract concepts to become concrete and experience-based, because students are given the chance to explore (Marricar and Socokrote, 2000). This certainly leads them to be creative in thinking and research work. This means that they will start creating something new which markedly deviates from traditional practices that have been in existence for a

long time in order to impart education at different levels (Cauhau, 1979). So, this is a sound re-orientation that science education centred upon for total eradication of poverty in the society. If a nation like Nigeria boosts the science laboratories with adequate and modern equipments, it will serve as a positive role that necessarily engage the learners with series of researches that brings about innovation that promotes the image of our nation.

Gloria (2015) holds that any developing nation that wants to shake off its syndromes of poverty, insecurity, unemployment and other social ills, must prepare to equip science laboratories and workshops in all institutions to promote science and vocational education that serve as vehicle for such realization through which individuals and communities are educated and endowed with innovative research and training of skilled manpower for self-reliance. It is for this development that the Federal Government stressed much on the importance of science with practical activities and teaching of technology and other relevant vocational education as stipulated in the National Policy on Education (2004).

The study of science and technologies and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of our economic life, will eradicate poverty, which will surely enable our nation to compete favourably well in this era of globalization.

### **Methodology**

#### **Research Design**

The research was based on survey design meant to collect data from science teachers. A survey design according to Olaitan and Nwoke (1999) is one in which the entire population or representative sample are studied by collecting and analysing data from the group through the use of questionnaire; interview or field observation. The area of the study was the entire Kogi state.

#### **Sample and Sampling Technique**

The area for the study was the entire Kogi state. According to Verma and Beard (1981) describe population as the larger group from which a sample is selected for study. Also, Esan and Okafor (1995) describe population as the aggregate of all units in a target universe.

According to Esan and Okafor (1995), a sample is a sub-set of a population selected to meet specific objectives, and it must have essential characteristics of the target population. The purpose of selecting a sample is to gain information concerning the population of interest (and to draw inferences about the population).

#### **Instrumentation**

There were two different instruments used in this study for collection of data. They are (i) Science Teachers Assessment Questionnaire (STAQ) and (ii) Public Assessment Interview (PAI). The STAQ contained 30 items and they were in the likert scale format; each having five response options and numerical values assigned to them as follows: A – strongly

agree (5), B – agree (4), C – undecided (3), D – disagree (2) and E – strongly disagree (1). The second instrument known as Public Assessment Interview was a check list for various sciences, technological, vocational and ICT facilities. The PAI was used to identify some facts that science teachers may hesitate to release which are vital information for the research. The instruments were validated by three experts in the area of science education, measurement and evaluation for face validity, all from faculty of education, Ahmadu Bello University, Zaria. The corrections were effected before the copies of questionnaire were taken to the field for distribution to the respondents.

#### **Data Collection Procedure**

The instruments were administered on five groups of science teachers in the following fields, such as: Biology, Chemistry, Physics, Technical and ICT. With the help of research assistants, each one for a local government to cover the respondents for the study. 500 copies of STAQ questionnaire were served to the science teachers. PAI interview checklist was conducted with some sampled public.

#### **Data Analysis**

In analysing the data collected with the questionnaire, the three research questions were answered using mean scores. An acceptance criterion mean of 3.5 was used for the research questions. The questionnaire was designed to collect information that relates to the three research questions formulated for the

study using the five Likert points scale format.

Pilot test was carried out to ascertain the reliability of these research instruments i.e. STAQ and PAI, they were administered twice on the respondents at an interval of two weeks. The two schools, one public and the other private were used for test and re-test reliability of the instrument. The results of the separate exercise were correlated by applying the Pearson's Product Moment Correlation

Statistics. The reliability yielded  $r = 0.80$  coefficient and this was considered to be adequate enough in ascertaining interval consistency of the items in the instrument.

### **Result**

Research Question 1: To what extent do science teachers' strategies inspire value re-orientation for poverty eradication?

**Table 1: Mean Responses of Biology Teachers on the Strategies to Inspire Creativity in Senior Secondary School Biology Students**

S/N	Items	Responses						Mean	Remark
		SA	A	U	D	SD			
1.	Science practical activities are geared towards preparing people to undertake tasks	12	24	2	4	8	3.56	Accepted	
2.	It encourages them to develop employment functions essential to the transformation of society.	15	28	1	2	4	3.95	Accepted	
3.	Gives room for research experiment for inventiveness.	14	29	1	2	4	3.50	Accepted	
4.	It makes hard working learners to be recognized and be regularly rewarded.	15	24	1	4	6	3.76	Accepted	
5.	Science practicals make the learners to further their thinking.	15	25	1	4	5	3.85	Accepted	
6.	It supports learners led discovery.	12	28	1	6	3	3.88	Accepted	
7.	Practical activities lead learners' ability to apply their knowledge in further research.	12	23	2	4	9	3.50	Accepted	
8.	Promotes research activities for inventive performances.	12	24	2	4	8	3.56	Accepted	
9.	It prepares learners to acquire scientific facts and theories.	15	24	1	4	6	3.76	Accepted	
10.	It helps learners to build their self-efficacy.	18	21	1	4	6	3.82	Accepted	
11.	It inspires creative skills for poverty eradication.	14	22	6	3	5	3.74	Accepted	
12.	It enables the learners to apply skills in solving problem in real life situation for value re-orientation.	10	26	5	4	5	3.52	Accepted	
13.	It provides skills for healthy life style.	10	26	5	4	5	3.64	Accepted	
14.	Helps to ensure learners acquire knowledge necessary for self-reliance.	22	20	3	3	2	4.14	Accepted	
15.	Provide a stimulating environment for creative learning	14	29	1	2	4	3.94	Accepted	

Mean of 3.5 is accepted criterion.

All the items in table1 were accepted by the science teachers as the strategies that teachers use to inspire value re-orientation for poverty eradication.

Research Question 2: To what extent do science equipment in the laboratories of State Colleges of Education, adequate enough for teaching and learning biology?

**Table 2: Mean Responses of Biology Teachers on the Extent to which Science Equipment in the Laboratories of State Colleges of Education Adequate Enough for Teaching and Learning**

S/N	Items	Responses					Mean	Remark
		SA	A	U	D	SD		
16.	There are enough tools/equipment in your college laboratories.	12	22	130	140	94	3.35	Not Accepted
17.	Laboratory equipment in your college are obsolete.	12	22	32	150	184	3.21	Not Accepted
18.	All the equipment in your college laboratories are good for teaching and learning.	160	160	32	32	16	4.04	Accepted
19.	Laboratory equipment in your college are inadequate for the number of students.	122	150	13	86	30	3.88	Accepted
20.	Equipment in your college are the types needed for the teaching and learning.	110	126	45	54	65	3.64	Accepted
21.	Laboratory equipment in your college should be replaced completely.	28	21	94	120	137	3.20	Not Accepted
22.	Equipment in your college laboratories are bad for sequence of operations in the laboratories.	20	23	120	95	142	3.27	Not Accepted

State Colleges of Education regularly maintained?

Acceptance criterion mean = 3.5 and above.

Science teachers were at variance in their opinions about the nature of equipment found in their various science laboratories.

Research Question 3: To what extent does science equipment in the laboratories of

**Table 3: Mean Responses of Biology Teachers on Science Equipment in the Laboratories of State Colleges of Education Regularly Maintained**

S/N	Items	Responses						
		SA	A	U	D	SD	Mean	Remark
23.	Equipment in your college laboratories are normally cleaned regularly at the end of each practical.	12	24	2	4	8	3.56	A
24.	Washing, drying and lubrication of laboratory equipment from time to time in your college laboratories is regular.	28	12	3	6	1	3.85	A
25.	Broken glassware and other damaged equipment in your college laboratories are regularly replaced when it happens.	12	13	1	4	6	3.12	D
26.	Preventive maintenance of equipment is regularly observed in your college laboratories.	11	13	1	2	4	3.18	D
27.	Cleaning of microscopes in your college laboratories is regular.	10	26	5	4	5	3.65	A
28.	Equipment in your college laboratories are normally tested for efficacy before use.	10	14	3	4	1	2.97	D
29.	The equipment in your college laboratories are properly kept in the store room after use.	12	23	2	4	9	3.49	A
30.	Skilled personnel are used to maintain equipment in your college laboratories.	10	11	3	3	2	2.18	D

The acceptance mean criterion is 3.50 and above.

From table 3 above it was revealed that, damaged equipment are not urgently replaced and results to inadequacy of instruments and reagents. Also, analysis revealed that skilled personnel are not employed to man the laboratories and they are not available to maintain the equipment.

### **Discussion**

The result of the study is that the science teachers used in this study agreed with all the items in table 1 as the strategies teacher use to inspire value re-orientation

for poverty eradication for national development. This is due to encouragement given to science students to become independent in their thinking skills, which promotes active learning and curiosity in learners. Science practical activities are geared towards preparing people to undertake tasks that develop employment functions essential to the transformation of the society. This finding is in agreement with the statement of Nonye and Clementina (2014; 204) that teachers can promote value re-orientation for poverty eradication during practical activities, hence students are given the opportunity to explore and to come out with creatively innovative product or

results by using brain storming and problem solving techniques, encouraging idea generation, making questions as part of the daily classroom exchange among others. Supporting this, Loveness (2009; 204) stated that science teachers should allow learners to reflect upon ideas and concepts from different points of view and cross-fertilize ideas from different subject areas. Also in compliance with the result is the findings of Robert (2009) that practical activities lead learners' ability to apply their knowledge in further research that promotes inventive performance.

The result from table 2 revealed that science teachers were at variance in their opinions about the nature of equipment found in their various science laboratories. That equipments are not obsolete and they are good for teaching and learning; but some needs to be replaced. They are found to be inadequate for students' practical activities.

Table 3 revealed fact on maintenance of equipment. The science teachers agreed that equipments are regularly cleaned at the end of each practical and damaged equipments are not urgently replaced, preventive maintenance is not taken serious but care of microscope is taken very highly and kept in the safe; and skilled personnel are not available to maintain the equipments.

### **Conclusion**

A science teacher is expected to teach and inspire in learners towards value re-orientation for poverty eradication which involves high level of intelligence. It demands the teacher to nurture, grow and

develop in the learners to acquire skilful ideas to become self-reliant. One of the ways is to inspire creativity in the learners so that poverty could be eradicated in the community. It is important to embark on functional education where classroom environment is more motivational, interesting and educational for teachers and students; that promotes the production of skilled and competent workforce for economic, industrial and social development that eradicates poverty completely.

### **Recommendations**

Based on the findings of the study the following recommendations were made:

1. Federal government should try to buy science equipment like the mass science consignment of 1981 to all the government secondary schools in the country so as to make the nation technologically advanced.
2. Government should provide infrastructural facilities in public schools and commence the process of renovation so as to enable the science teachers to promote creative teaching for research and inventive thinking of the students.
3. Class size should be stream lined to correspond with the provision in the National Policy on Education (2004) for effective teaching.
4. In-service training should be given to science teachers on educational technology particularly on the production and use of computerized instructional materials.
5. Federal government should make the condition of service-teachers to be

reasonably comparable with those teachers in advanced nations.

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