BIOLOGY EDUCATION FOR NATIONAL ENVIRONMENTAL PROTECTION

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Abstract

The paper was intended to appraise the relative preparedness of recipients of instructions in NCE Biology courses for the enviable role of national environmental protection in the country. Using a questionnaire designed on a Likert scale of four response variables to generate information from some Biology students from three Colleges of Education in Kano State, the study noted that the course programme provided by the syllabus as well as the practical drills does not give learners the needed competences for national environmental protection endeavours. It was however observed that the teacher-trainees could develop the necessary skills for environmental matters if concrete environmental concepts are entrenched in their course programme and taught as a strategic curriculum course.

Introduction

The knowledge acquired from the study of Biology had been noted to be of immense national importance in diverse fields of human endeavours such as agriculture, health, industries as well as in crime detection (Makanjuola, 2002). Furthermore, Ukpene (1998) and Muhammad (2002) cited that the application of biotechnology has made it possible for scientists to develop plant cultivars that are resistant to crop pests. This scientific feat brought with it, a drastic reduction on the dependence and use of inorganic pesticides, which apart from leaving residual chemical components in the ecosystem to manifest later in increasing toxicity in ecological food chains, also have the attendant quality of depleting the ozone layer (Kola-Olusanya, 1997).

The history of Nigeria recorded in the distant past, a seemingly lukewarm posture of government in handling matters of grave environmental consequences, and this coupled with the ignorance of many citizens, culminated in the misuse or outright abuse of the Nigerian environment. Evident from this was the dumping of some 3,884 tonnes of toxic chemical wastes in 10,000 drums of five separate shiploads at the port of Koko near Warri, between August 1987 and May 1988, thanks to the vigilance of Nigerian students in Italy (Abdullahi, 1997). Following this was the promulgation of the Decree 42, the harmful waste (Criminal Provision) decree which bans the importation, transit, transportation, deposit and storage of harmful waste without the permission of the Federal Environmental Protection Agency (FEPA), (Abdullahi, 1997). Since then the Federal Government of Nigeria has been demonstrating serious commitment to the protection of the Nigerian environment for sustainable development, as can be observed from the following decrees, (Yanusa, 2002:59):

i.   Legislation such as Endangered Species Decree No. 11 of 1985.

ii.   Environmental Sanitation Decree.

iii.   Establishment of National Resource Conservation Council Decree.

iv.   Establishment of Federal and State Ministries of Environment (2000).

In addition, some non-governmental organizations were commissioned to create awareness among the Nigerian populace. At the school front elements of Environmental Education (EE) are scattered in cross- curricular subjects such as Biology, Physics, Chemistry, Geography, Social Studies and Agricultural Science. Entrenching these components of EE into the formal school system had been idealized by the Federal Government of Nigeria and the National Council on Education (Yanusa,

2002) as the veritable tool needed for generating and sustaining the consciousness of the people in formulating a positive code of behaviour about issues concerning environmental quality (Palmer and Neal, 1994). Through it human tendencies towards destructive exploitation and dominance would change to ones of protection, care and revitalization of the environment (Ukpene, 2002).

Conceptual Evaluation of Environmental Protection

The Nigerian environment is endowed with veritable aggregate of learning and commercially exploitable natural resources needed for the comfortable sustenance of life. The emission of energy (Ndu, Asun and Aina, 1991) in the form of green gases, liquid and solid wastes from industrial and domestic sources, run-offs from farmlands into water bodies and so on, introduce changes into the environment and destroy its natural ecological stability. Environmental protection is therefore conceptualized to embrace all aspects of human enterprises involved in harnessing the renewable and non-renewable resources of the environment without compromising its ability to sustain the needs of future generations.

Problem of the Study

Despite the concerted effort of the Federal Government of Nigeria and the National Council on Education to ensure that environmental matters were entrenched into the formal school system, our social environment has continued to witness degradation in terms of cleanliness and serenity (Lawal, 1994; Olagunji, 1997, in Yunusa, 2002), as evident from the stench that emanates from heaps of garbage that litter some market places, gutters and street corners. Is it that Nigerians care very little about cleanliness in public places and structures like markets and gutters? The applause that greeted the cancellation of the then national monthly environmental sanitation exercise was thunderous. Today, however, the country is threatened by the ravages of desertification. It was reported that "currently more than 400,000 square kilometers or 45% of the total land area in the country is under this threat" (Abdulbaki, 2003). Also there is prevalence of soil erosion in the east and oil spillages occasioned by oil prospecting and bunkering activities in Southern Nigeria, thus making the country to face enormous environmental problems. Makanjuola (2002), asserted that Biology helps to solve problems of conservation, drought and pollution. Notable in this regard is the fact that in Biology as a course discipline, environmental matters such as health and diseases, ecological consequences of human activities as well as conservation of natural resources are studied in applied Biology, a 2 credit unit compulsory course. Other sources of environmentally-related topics are found in Ecology I and II respectively, and possibly in genetics. However the latter groups of courses have little or no emphasis for the acquisition of fundamental skills on environmental protection. This paper in therefore an endeavour to appraise the relevance of the knowledge acquired from the NCE Biology education programme to the quest for a sustainable national environmental protection.

Significance of the Study

The study was intended to:

i.   Generate information on the provisions of the Biology course programme in Colleges of Education (COE) for inculcating the right aptitudes into learners on matters of environmental protection.

ii. Re-orientate Biology students from COEs so that proper application could be made of instructional experiences from soil conservation, plant physiology and breeding for drought resistant, insect habit and life cycles to controlling soil erosion, desertification and improved biological control of pests.

Research Question

The following research questions were postulated for this study:

i. Is the scope of Biology education course in COEs adequate for subsistent entrepreneurial management of domestic wastes?

ii. How effectively utilized is the knowledge obtained from insect pest habit and life cycles for integrated pest management (IPM) to reduce farmers' dependence on inorganic pesticides?

iii. Does practical Biology lesson adequately expose students to the concrete paradigms needed for effective environmental protection?

Hypothesis

The investigation tested the following hypothesis:

i. *Ho* Capability for environmental protection is significantly independent of NCE Biology course content for students in COEs.

ii. *Ho* Generating awareness and aptitudes for national environmental protection is significantly independent of drills carried out in Biology practical.

iii. *Ho* Ability to protect the environment is significantly independent of exposing NCE Biology students to concepts on desertification, management of solid and liquid wastes, as well as integrated pest management.

Methodology
Sample

The sample used in the study consisted of seventy-three students of Biology education from the Federal College of Education (Tech.) Bichi (Twenty five), Federal College of Education, Kano (Thirty), and Kano State College of Education, Mumbotso (Eighteen). The students were randomly selected from the NCE II and NCE III students respectively.

Instrumentation

The research instrument was a questionnaire designed on a four-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (DA) and Strongly Disagree (SD). The test was trial-tested on a sample of twenty Biology students in Federal College of Education (Tech.) Bichi by administering the test twice on the subject within fourteen days. A resultant test-retest reliability index of 0.78 was recorded.

Result

Table 1: Capability for National Environmental Protection through Adequate Course Content

		SA	A	D	SD	Column Total
Bichi	O	8	5	9	3	
	E	7.19	7.53	7.53	2.73	25
Kano	O	6	12	10	2	
	E	8.63	9.04	9.04	3.29	30
Kumbotso	O	7	5	3	3	
	E	5.18	5.42	5.42	1.97	18
Row Total		21	22	22	08	73

$Df = 6$

$X2 = 8.48 \quad X2 = 12.592$

Since the test statistic $X2 = 8.48$ is less than $X2 = 12.592$, at the 0.05 level of significance, the null hypothesis that capability for environmental protection is significantly independent of NCE Biology course taken by students is accepted.

The 2: Drills Carried out on Biology Practical

		SA	A	D	SD	Column Total
Bichi	O	4	5	14	2	
	E	2.40	5.14	12.32	5.14	25
Kano	O	0	5	15	10	
	E	2.88	6.16	14.79	6.16	30
Kumbotso	O	3	5	7	3	
	E	1.73	3.70	8.88	3.70	18
Row Total		7	15	36	15	73

$Df = 6$

$X2 = 8.76$ $X2 = 12.592$

The test Statistics, $X2 = 8.76$ is less than the critical value $X2 = 12.592$, at the 0.05 level of significance, we therefore accept the null hypothesis that generating awareness and aptitudes for national environmental protection is independent of drills carried out in NCE Biology practical.

Table 3: Need for Strategic Course Components on Environmental Biology

		SA	A	D	SD	Column Total
Bichi	O	4	9	8	4	
	E	4.11	10.96	5.82	4.11	25
Kano	O	1	18	5	6	
	E	4.93	13.15	6.99	4.93	30
Kumbotso	O	7	5	4	2	
	E	2.96	7.89	4.19	2.96	18
Row Total		12	32	17	12	73

$Df = 6$

$X2 = 13.77 < X2 = 12.592$

Since 13.77 is greater than $X2 = 12.592$ we reject the null hypothesis at the 0.05 level of significance. We conclude that ability of NCE Biology students to protect the environment after graduation depends on having them exposed to environmentally-related concepts while at school.

Discussion

The investigation noted that despite the entrenchment of some course units that are environmentally-related into the Biology syllabus in COEs, the NCE programme does not provide learners with adequate instructional experiences to make them proficient in matters of environmental protection. This is supported by the fact that out of the minimum credit units of 38 that were required for graduation in Biology, only a 2-credit unit course actually provides learning experiences for

generating awareness on the need for environmental protection. Even the practical lessons carried out in Biology presently are tailored towards preparing the teacher-trainees for the task of teaching. It is observed however, that if an appropriate learning experience focused on effective environmental protection is packaged and delivered to the teacher-trainees, they might imbibe and transmit same to subsequent generations of learners and the country would stand to benefit from it. This belief is supported by Table III, which revealed that exposing NCE students of Biology to instructional concepts on desertification, domestic waste management, erosion control, as well as pest control strategies could predispose them towards developing the right code of behaviour in handling matters concerning environmental quality.

Recommendations

The study advances the following recommendations to ensure active participation of Biology education graduates in environmental protection:

i. A course programme to be called "environmental Biology" should be evolved from the present array of course where environmental concepts are scattered. The suggested environmental Biology should be structured to provide basic entrepreneurial skills for Biology students, so that they could engage in subsistence activities aimed at protecting the environment after leaving school.

ii. Environmental education should be made a strategic curriculum course for students of diverse academic disciplines so as to generate and sustain environmental consciousness among them and also inculcate in them the right code of behaviour that would guide their actions in the society when disposing.

iii. As suggested (Ukpene, 2002), the country's environmental laws should be periodically reviewed so that incidence of environmental abuse, misuse and destructive exploitation of its resources are drastically reduced, and in the process ensure that individual and communal rights are protected. However, the numerous decrees/measures so far put in place in this regard are noted and commended.

Conclusion

The strategic role played by a serene environment in the course of the nation's development cannot be over-emphasized. Developing a culture of love for the environment through the provision of adequately structured learning experience in Biology education would go a long way in sensitizing several generations of Nigerians to care for and protect the environment from man-made as well as some natural sources of degradations which would hitherto make it difficult or very expensive for a meaningful national development to take place.

References

Abdullah, S. D. (1997) Industrial Pollution and the Nigerian Environment. Policy Requirement and Practical Realities. In M. A. Wasagu and M. L. Buga Uzuegbu (Eds.), *Proceedings of STAN STS National Workshop*, Birnin-Kebbi.

Abdullbaki, N. (2003) Expert Alert on Desert Encroachment. *New Nigerian*, Wednesday, July 30, page 25.

Kola – Olusanya, A. (1997) Using Concept Mapping to Teach Global Warming Greenhouse Effect and Ozone Layer Depletion. In P.A. Okebukola and Akpan B. (Eds.), *Strategies for Environmental Education. Environmental Education Series,* No. 1 STAN.

Makanjuola, O. R. (2002) The Role of Biology in National Development. Tambari: *Kano Journal of Education* Vol. 6(3) 144-161.

Mohammed, I. B. (2002) Using Biotechnology in Enhancing Crop Productivity. Tambari: *Kano Journal of Education,* Vol. 6(3) 144-161.

Ndu, F. O. C., et al (1991) *Senior Secondary Biology 1.* Nigeria: Longman.

Palmer, J. and Neal, P. (1994) *A Handbook on Environmental Education.* London: Routledge.

Ukpene, A. O. (1998) Sustaining Food Production in Nigeria Using Environmental Friendly Pest and Disease Control Measures. *Bichi Journal of Education* Vol. 2(1) 84-90.

Ukpene, A. O. (2002) Evolving a Sustainable Environmental Education Programme in Nigeria: Some Issues for Consideration. *African Journal of Material and Natural Science.* Vol. 2(1) 84-90.

Yunusa, K. (2002) An Analysis of the Junior Secondary School Social Studies Curriculum for Acquisition of Environmental Education Attitude and Skills. Tambari: *Kano Journal of Education* Vol. 6(3) 56 – 66.