ASSESSING MECHANISM FOR WASTE REDUCTION IN SCIENCE EDUCATION

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Abstract

Science Education in Nigeria has attracted improved funding in recent times. Government and non-governmental agencies now provide financial assistance to science education. Major problems emanating in the science education programmes now are inadequate maintenance of facilities provided in schools for training students needed to serve the various agencies, industries and government so as to turn out yearly profits. This paper however, examines the concept of assessing mechanism for waste reduction in science Education, and it identifies wastage as when the output of a system is comparatively low to justify the input. Sources of wastage are highlighted in this paper. These are admission of students into educational programmes, structures of the educational system, inadequate guidance and counseling of students, resources input waste and graduate outcomes, human resources among other things. This paper however proffers solutions in which wastes produced by the system could be reduced in terms of teachers' preparation, resources allocation and rightful employment of graduates of Science Education.

Introduction

The effectiveness of any educational system or programme is largely dependent on its effective management and the availability of competent material and human resources. In science education, the material resources include school buildings such as classrooms, laboratories, equipments, chemicals and furniture. Human resources include staff (both academic and non-academic) and other members of the community where the programme is located. Both the material and human resources are important elements in determining the quality of an educational programme and its products.

Science education programme needs competent personnel and the appropriate material resources for the effective training of its students. The United Nations Educational Scientific and Cultural Organization (UNESCO)(2003) reports that the provision of basic resources as well as the effective utilization are the important issues in science education programmes. The reason is based on the fact that resources for science education programmes are costly and needed for its successful implementation. The fact that these resources are costly calls for judicious utilization and waste prevention. This paper is assessing the mechanism for waste management in order to reduce it in terms of:

1. Concept of waste in science Education
2. Sources of waste in Science Education
3. Waste reduction techniques for effective resources utilization.

Concept of waste in Science Education Brimor and Paul (2001), defined waste as the degree to which actual educational out put fails to correspond with stated educational goals within a given period of time. Inadequate resource allocation which in turn, leads to failure in the attainment of a nations educational goals and objectives may be classified as waste in education. Therefore, the concept of waste in education refers to those constraints which make it impossible for the nation's educational goals to be achieved in relations to the resources invested. Waste in education affects all

levels of educational institutions such as Pre-primary, primary, secondary and tertiary institutions. According to Olaitan (2002), waste is defined as the degree to which human and material resources developed and made available are grossly under-utilized or neglected. This means that the output of an educational programme will be incongruent with the nation's educational goals.

The issue of educational waste has generated a lot of concerns the world over. This prompted the meeting of UNESCO in July 2002 in Geneva to examine the issue of Waste at all levels of our educational system so as to identify and reduce its effect on our educational system (UNESCO, 2003).

The Organization for Economic Co-operation and Development (OECD) (1986) through a survey of educational human resources and development in Argentina laid emphasis on methodological aspect of educational and manpower analysis and planning. Their study included the internal efficiency of educational system and problems of dropout in and repeaters. Most important factors associated with dropout in their finding include: age of entry into school, place of residence, economic background and the location of schools studied. The study concluded that a large proportion of dropouts and repeaters could be avoided if teacher had a better knowledge of their subject, and pays more attention to the pupils and maintain individual contacts with them.

Adeyemi (2001) in a study classified waste in education in three dimensions. They are:

(i) Failure or inability to obtain the terminal certificate at the end of the school course.
(ii) Repetition or staying in one grade more than a year
(iii) Drop-outs or non-completion of a scheduled course of study

In his findings, Adeyemi discovered that 9.4 percent of primary school children in Lagos State were affected by repetition of classes in addition to other problems.

Sources of Waste in Science Education

Waste in science education can result through the following sources.

i. The structure of the educational system
ii. Recruitment of students into the educational system.
iii. Guidance of students admitted into the system.
iv. Resources injected into the system.
v. Graduate outcomes and other material resource committed into the educational programmes (Olaitan 2002).

Consider a situation where equipments and laboratory apparatus meant for the teaching and learning of science lie waste or unused in various institutions This can be termed a waste factor to the society since this can lead to stagnation of human learning.

Human Resources Recruitment Wastage

The United Nations (1980), concept of general education is that basic education is a right of every child which was expressed by this International Declaration of Human Right. This means that any nation that fails to provide university education to all her citizens is not only failing in its responsibility but also wasting part of its human resources. Nigeria in order to justify this assertion, implemented the Universal Primary Education (UBE) scheme in 1976, where it made its primary education free and universal. In the year 1999 the Universal Primary Education was modified to Universal Basic Education where every Nigerian child has the right to free education up to junior secondary school level. However recruitment of children into these primary schools does not emphasize any specific scientific skill development.

Guidance of Human Resources Recruitment into the Educational System

Absence of guidance services to pupils in our educational institutions may give rise to waste of human learning. This results when pupils are not guided (when they finish primary school education) in choosing the right career that suits their specific abilities at the post primary school level.

Resources Injected into the System

If the resources injected into a system in terms of quality, quantity of skilled personnel produced within a given time do not equate with the human and material resources invested into the system, waste in said to occur. These human and materials resources include, science teachers, Equipment and Infrastructures. Waste may result due to shortfall in allocation of resources or un-utilization of the allocated resources. Major sources of waste on resources injected into the system are the failure to employ adequate qualified science teachers and laboratory staff into the system. Even when there are enough teachers, the learning environment may constitute a problem. Also failure to provide relevant textbooks, enough classrooms, equipment could hinder teaching and learning process that this type of situation leads to waste.

Graduate Outcome Waste

School leavers are known as graduates' of an educational process that leaves schools after the completion of their studies. These includes: - graduates of Technical Colleges, Colleges of Education, Polytechnics and Universities. The failure of the society to provide gainful employment for these graduates, so that they can contribute to the economic development of the society results into loss of human learning and graduate outcome waste. According to Olaitan (1986), there should be a close relationship between school leavers and manpower needs of the economy. Where this does not occur then graduate outcome waste results.

Type of Graduate Employment

The type of employment given to graduates of science education is another matter that may result to waste in science education. For example, there are lots of trained s scientist and Engineer who have turned out to be contractors, suppliers of goods and services. This is a form of waste since their scientific and engineering skills are not being utilized. A Nigerian Certificate in Education (NCE) holder in chemistry who opts for a degree in Educational Management and Planning either for one reason or the other amounts to waste.

Strategies for Waste Reduction

According to Olaitan (1986), strategies for waste reduction include:

- Resource allocation and utilization
- Teachers' preparation.

Resources Allocation and Utilization

The consistent growth in the demand of science education as exemplified by increase in enrolment as the only quantitative indicator. There is the need for an increase in the corresponding resource allocation in terms of science teachers, facilities such as laboratory equipment and all other considerations.

Coombs and Jacques (2006) expressed that performance in educational system, depends on the resources allocated to that educational system.

Teacher Preparation

Teachers play important roles towards the preparation and utilization of material resources and therefore must be properly prepared for his task. FRN (2004), stated that teachers will be required to actively participate in the production and assessment of educational materials and teaching aids and evaluation of scientific innovations and techniques. This means that the production of those resources that can be improvised at little or no cost, should be undertaken by classroom teachers.

Recommendations

From the discussions above, the following recommendations are made in order to reduce waste in science education:

1. Funds allocated for science education programmes must be prudently managed.
2. Qualified personnel should be employed to the positions of Heads of Institutions, Departments, administrators and teachers.
3. Science teachers must be encouraged to attend, conferences, seminars and workshops to keep abreast with innovations in the science sectors.
4. Guidance counselors should be employed to arouse students interest at all levels of education.
5. Graduates of science education should be employed and posted to places that will allow them practice what they actually studied.
6. There should be regular maintenance and repair of science equipments and facilities in educational institutions.
7. The private sectors who are the end users of science graduates should be part of the financiers of science education programmes in Nigeria.

Conclusion

From this paper, it should be noted that the provision of basic science facilities and the effective utilization of resources are important elements in waste reduction in science education. There is the necessity for all educational sectors to discourage wastage since it cannot be totally eliminated. Therefore, the effective planning towards resource allocation and effective preparation of science education teachers will be necessary steps towards waste reduction.

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