Lagos State University, Ojo, Lagos State, Nigeria

From the SelectedWorks of Bolanle Danmole

Fall November, 2009

SCIENCE TECHNOLOGY AND MATHEMATICS EDUCATIONAL POLICIES: STATUS, IMPEDIMENTS AND IMPLEMENTATION STRATEGIES

Bolanle T. Danmole, (Ph.D), Lagos State University, Ojo, Lagos State, Nigeria
Tunde Owolabi, (Ph.D), Lagos State University

This work is licensed under a Creative Commons CC_BY-NC-SA International License.

Available at: https://works.bepress.com/bolanle-danmole/
SCIENCE TECHNOLOGY AND MATHEMATICS EDUCATIONAL POLICIES: STATUS, IMPEDIMENTS AND IMPLEMENTATION STRATEGIES

By

TUNDE OWOLABI
Department of Science & Technology Education,
Lagos State University, Ojo

and

B.T. DANMOLE
Department of Science & Technology Education,
Lagos State University, Ojo

Abstract

This paper examined the policy provisions in science, technology and mathematics (STM) education. It noted that there were no clear cut policies in STM. However, policy provisions in the Ministry of Science and Technology have some bearings with STM education. It identified that lack of interaction among the three elements of implementation (policy makers, policy initiators and policy implementers) was responsible for slow pace of development in STM education. Five phases were discussed as strategies to ensure proper formulation and implementation of STM policies.

Introduction

Education has been well acknowledged as an instrument of positive change and development in Nigeria (FRN, 2004:5). In realization of this laudable aim, the Federal Government has since 1977 laid down various policies in education. Such educational policies spelled out government fundamental belief on pertinent issues in education. The educational policy document tagged National Policy on Education (NPE 1977, 1981, 1988 and 2004) stands as a reference point. The NPE has no clear-cut policy statements on Science, Technology and Mathematics (STM) education. However, there is sufficient clusters of statements of the policy that have direct bearing and implication for STM.

The National Policy on Science and Technology (NPST) however brought out indirectly, the philosophy and goals of STM. It sought a retreat into the traditional base to construct technological capacity building for the country (Akpan, 2006:11). NPST was prepared for a 25 year time frame with a provision for revision at 5 year interval. It is over
three decades, the impact of the policy has not been felt (Akpan, 2006:13). Shades of opinions of researchers expressed at seminar, conferences and meetings showed the deplorable state of affairs with respect to STM. This possibly was due to poor implementation of the policy that is located within the Ministry of Science and Technology and not Ministry of Education.

Implementation is a very crucial step of any development process. In Nigeria for instance, it can be argued that most programmes are poorly implemented. The fact remains that an articulate design of the educational policy on STM may not give the desired result without proper implementation of policy objectives. In this light, this paper examines the:

i) Policy provisions of STM
ii) Status of implementation of STM policy
iii) Implements to implementation
iv) Implementation strategies for STM policy
v) Implications of STM policy implementation to language development.

**Policy Provisions of STM**

The NPST provided the following as goals of STM:

i) Science and technology activities should be planned to achieve their acculturation and use, through science education, technology transfer and acquisition.

ii) Increase and strengthen theoretical and practical scientific base in the society.

iii) Increase and strengthen the technological base of the nation.

In order to achieve the stated goals, the following specific objectives derived from NPST and NPE policies are related to STM:

i) Science shall be taught to all children in primary and secondary schools.

ii) Provisions of adequate number of science and mathematics teachers to the schools.

iii) The teaching and learning of science shall be done in such a way as to develop the child in the three domains (cognitive, affective and psychomotor) of educational objectives.

iv) Local production of science equipment and the practice of improvisation.
Status of Implementation of STM Policy

The low pace of technology development in Nigeria has serious implication on the viability of the STM policy. It has not been worse as it is believed in many quarters. Analysis of research findings is here carried out to describe the implementation of STM policy.

The various policy statements on STM are crystallized for ease of discussion into the following:

i) Students’ participation in STM.

ii) Demand and supply of personnel

iii) Provision of materials resources

iv) Curriculum development

v) Science and technology continuum

vi) Delivery of STM instruction.

Students’ Participation in STM

There is one hundred percent success in terms of students participation in STM, all students at primary and secondary school level offer at least one science subject. Science is a core subject in the curriculum of primary and secondary schools. Little success has been achieved in terms of students’ enrolment into sciences. The enrolment pattern below shows a shortfall from policy recommendation.

Enrolment Into Tertiary Institution As At 2006

<table>
<thead>
<tr>
<th>SCHOOL TYPE</th>
<th>RECOMMENDATIONS</th>
<th>ENROLMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Science</td>
<td>Art</td>
</tr>
<tr>
<td></td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>University</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Polytechnic</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>Secondary</td>
<td>60</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Akpan (2006)
The bar chart below depicts the enrolment pattern.

Demand and Supply of Personnels

Literature is replete with growing demand of teachers as a result of improved enrolment of students into STM, that teachers supply is grossly inadequate (Ogunleye, 1999 and Ajejalemi, 2002). There is also dearth of laboratory assistants (Owolabi, 1999).

Provision of Materials Resources

Plethora of studies (Edem, 1988:135; Agusiobo, 1994:181 and Nneji, 1995:169) have noted that material resources for science teaching are either not available, non-use or mis-use. Akpan (1992:45) found that a lot of money is spent yearly in purchasing laboratory materials. In most cases however, wrong types of equipment and materials are purchased and remained unused. Studies (Nneji, 1995:56 and Owolabi, 2005:71) also revealed that most equipment bought for implementation of technical education in the 6-3-3-4 system of education are abandoned in the school stores. Reasons adduced for this negligence are non-availability of workshops, lack of technical experts and finance.

In order to boost local production, federal government established a centre in the Federal Ministry of Education (Science Equipment Centre). The activities of this centre are seriously dwindling for political and economic reasons (Owolabi, 2005:71).

STM Continuum: From School to University

There is a general feeling that most secondary school students favour academic university qualification instead of polytechnic (Akpan, 2006:13). It is common knowledge
that most universities of technology offer courses that are irrelevant to their mission. It is worrisome to note that most universities of technology in Nigeria have no education faculty, hence technical and technology units/departments. Consequently, there is no smooth transition of STM students from secondary, technical, colleges of education and polytechnics into university.

Curriculum Development

Curriculum development at present is centrally controlled either at the federal or state levels. The curriculum development agencies such as CESAC, NERDC, STAN and WAEC have supported government through symposia, workshops and conferences to update teachers’ knowledge. Owolabi (2005:71) found that such efforts are insufficient because appreciable impact has not been recorded. Nwosu (1998:43) noted that science teachers do not implement the cardinal objectives of the curriculum because they lack the knowledge of the curriculum objectives. Ivowi (1988:38) also found that science teachers lacked the needed training to implement the curriculum as desired. There are no known books at present developed in Nigeria languages for the first three years of primary education.

Delivery of STM Instruction

At the lower primary school level (Primary I-III), there is no strict adherence to delivery of STM instruction using the immediate language of the environment in complaint with (FRN 2004:10). The method advocated by the curriculum is the guided discovery. Guided discovery ensures that science is taught through a series of well tailored learning experiences typified with experimentation, questioning and discussions.

Several studies (Ajeyalemi, 1981:28; Odubunmi, 2001:22 and Owolabi and Olatunde, 2005:111) have shown that science teaching is dominated by factual statements by the teachers. Students are reduced to passive listeners. It is worrisome to also note that most of the science teachers in schools are incompetent and rated low in content knowledge, pedagogical knowledge and content pedagogical knowledge (Odubunmi, 2001:24, Ajeyalemi, 2002:33 and Okebukola, 2002:38).

Impediments to STM Educational Policies Implementation

Three elements are identified in STM educational policies implementation, these are; policy makers, policy initiators and policy implementers. Policy makers are those in government (president, governors, ministers and directors) and are responsible for taking
final decision on a proposal brought before them. Policy initiators are those (advisers, ministry staff, and academics) invited to generate appropriate policy for government. Policy implementers are those (inspectors, ministry staff and teachers) on the field that are to translate the policy into action. Relationship among the three elements is represented diagrammatically thus:

Fig. 1

![Diagram showing relationship between Policy Initiators and Policy Implementers]

The relationship among these three elements appears to be linear. Consequently, there is no room for interaction among these elements and such have plunged several holes into the educational system. These holes have several facets (impediments) and are identified as follows: publicity, quality control, political will and finance.

**Publicity**

Awareness on STM policy is very low. It is much in doubt whether teachers who are the implementers of the policy statements have copies of the policy documents. This situation will rather make it difficult for teachers to translate the objectives relating to them into action. It is pertinent to ask whether head of schools are all familiar with policy provisions relating to technical and technology education. The situation is as bad as their responses would suggest.

**Quality Control**

Monitoring of policy implementers is a way of ensuring quality control. Oshodi (1997:45) noted that the structure and functional orientation of the inspectorate divisions of the ministry of education in Nigeria has become obsolete and ineffective. The lack of adequate supervision from the inspectorate divisions has led to the noticeable weaknesses and ineffectiveness.

**Political Will**

Policy formulation and implementation in education is hinged on politics among other factors. Educational legislation, ordinances and policies were made to serve the political
interest of the day. As noted by Abari (1997:15), the existence of providing finance, deciding and managing educational institution are political actions. Cases abound of laxity in policy implementations due to political reasons. The following examples are so recent, upgrading of polytechnics into university status, which has met a brick wall. Federal Universities of Technology offering virtually same course as conventional universities instead of technical/technology oriented courses.

Finance

Financial implication of STM policies is huge. Olaniyonu (1997:31) noted that government alone cannot bear the cost. As the economy worsens, the impact of funds becomes more apparent. Consequently, educational services tend to be.

Information, Communication and Technology

A website should be opened on STM policies for easy access by the public. The website should contain information on policy statements, modus-operandi and implementation manual. An interactive session should be created at the website to respond to possible grey areas raised by the public.

Assessment and Promotion

Era of automatic promotion of civil servants is in the dark. Today’s reality is that civil servants are exposed to both written and oral examinations. STM policy issues and practices should be integrated into promotional examination of civil servants. This will encourage teachers and other partakers to study the existing policy statements. It will also stimulate their interest and curiosity about the policy.

Implication of STM Educational Policy Implementation to Language Development

The recognition given to language of the immediate environment of a child by NPE has not been realized in the teaching of science at primary school level. The lack of appropriate textual materials written in mother tongue (language of the immediate environment) at lower primary has hindered effective teaching of science.

Consequently, there occurs a crippling effect on the child’s language formation. Children learn faster and develop language within the age bracket of one and nine years (Piaget,1957:182). It is in recognition of this that government places high premium on language as a means of promoting social interaction and national cohesion, and preserving cultures (FRN,2004:13).
Recommendations

To ensure smooth delivery of STM policies, the following are recommended:

i) Provision of adequate human and materials resources.

ii) Establishment of more institutions (technical colleges and university of technology).

iii) Boost local production of resources materials by ensuring that science equipment centre of the Federal Ministry of Education function effectively.

iv) Promoting productive skills between industries, schools and Ministry of Education.

v) Reforming the curriculum to be competency-based, interactive and problem-based.

vi) Substantial investment should be channeled to Science Technology and Mathematics Education.

vii) Expedite action on development of science textbooks in indigenous languages for lower primary.

Conclusion

This paper has revealed that not much has been achieved in respect of implementation of educational policies in Nigeria. Science, Technology and Mathematics (STM) education is still in a precarious situation. If Science, Technology and Mathematics education hold the key to sustainable development, then government should take a bold step towards redressing the poor state of implementation of the policy as advocated in this paper.
References


