IMPROVING THE QUALITY OF MATHEMATICS INSTRUCTION FOR ECONOMIC REHABILITATION AND RELIANCE

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Abstract

It is quite obvious that the nation is witnessing and economic crisis which results in dramatic reductions in the quality of life of the individuals and in investment and expenditure. On the welfare scale, Nigeria has gradually moved to a position in which we are now found at the lower cadre of less developed countries. There can however be no economic rehabilitation without prior scientific and technological advancement and modern technology hinges to a large extent on proper knowledge of mathematical concepts and principles. Thus the need to ensure that there is improvement in the quality of mathematic teaching and learning.

Introduction

Though Nigeria is a nation richly blessed with both human and natural resources, a great number of its citizenry suffer from abject poverty and lack. In fact since the drastic austerity of the 1980s, the economic growth in the country has been relatively slow with resultant reductions in investment and quality of life. According to Benson in Adesina (2002:131), the problems of Nigeria at present are multidimensional. These include: how to feed its teeming populace, provide gainful employment, provide good roads, potable water, regular electric supply as well as affordable means of transportation and communication. Again Adesina stated that on the welfare scale, Nigeria has gradually moved from a position in which it's citizens enjoyed higher standard of living during (he oil boom, to a position in which we are now at the lower rung of the ladder of less developed countries.

The fact that Nigeria is rated as the $13^{1,1}$ poorest nation in the world with regard to the per capita income calls for urgent attention from all its citizens especially from the education sector. This is because, there can be no lasting economic rehabilitation without a well prepared or equipped citizenry capable of discharging its responsibilities to bring about such development. According to Haggis (1991), education brings about individual creativity, increased productivity, improved participation in the social, economic, cultural and political life of the society and hence to a more effective contribution towards economic development.

Furthermore, for us to rehabilitate the economy, a lot depends on our ability to develop technologically and to put it's principles into adequate use. Modern technology dictates the pace for global economic growth and modern technological advancements rely greatly on the knowledge and application of mathematical concepts and principles.

Contributions of Mathematics Education Towards Rehabilitating the Economy

The usefulness of mathematics education in inculcating basic principles of modern knowledge in the individual as well as the ability to apply such in solving his own problems and those of the larger society cannot be over-emphasized. Mathematical principles and ideas are indispensable for lasting scientific and technological advancement and this determines the survival of any nation. In the manufacturing environment for instance, knowledge of basic mathematical skills and operations such as division, multiplication, addition and subtraction is highly necessary for achieving very high productivity.

Mathematics plays important roles in many vocational Ik-ids and any student with a good mathematical background has a valuable asset which will enable such individual contribute to the overall well being of the society. For instance, studies in physical sciences, medicine and advanced biological sciences like in the area of genetics, heredity, nutrition, growth and maturation etc, depend largely on the application of mathematical procedures. Social sciences draw heavily upon statistical and graphical methods, stochastic processes, linear programming etc. Engineering relies on mathematics and physical sciences for its very foundation. Again we are in the computer age and the impact of electronic computers on world economy has been quite tremendous. It

has transformed the business sector and created new employment opportunities, which to some extent require mathematical preparations.

Mathematics education contributes in many ways towards enriching the life of the individuals and the society. According to Butler, Wren and Banks (1970), it enables the students to:

1. Acquire competence in some basic skills and knowledge necessary for dealing with numbers and shapes.
2. Form habits of effective thinking which include both analytical, critical, imaginative as well as development of intellectual curiosity.
3. Develop abilities to differentiate between relevant and irrelevant data and achieve intellectual independence.
4. Discriminate values and hence make relevant judgments.
5. Acquire competence in communication of thoughts through symbolic expression and graphs.
6. Attain cultural advancement through a realization of the significance of mathematics in its own right and in its relation to the society.

From the above it can be observed that adequate knowledge of mathematical skills, ideas, concepts etc, goes a long way in transforming the intellectual, social, cultural and economic life of the people and communities. However several factors are envisaged as possible hindrances to the impact of mathematics education towards economic rehabilitation. These include:

1. The use of a rigid curriculum, which is confined by rigid syllabuses and examinations.
2. Lack of trained teachers who are both computer literate and ready for change.
3. Lack of funds
4. Inadequate infrastructure like mathematics laboratory and instructional aids.
5. Large teacher/student ratio.

Thus not much can be achieved despite the benefits and \contributions derivable from mathematics education, if there is no improvement in the process of mathematics teaching and learning in Nigeria. Emphasizing this point, Ibraheem and Ogunnusi (2001), stated that the condition of mathematics education in Nigeria has been in a terrible situation and this will definitely hinder our technological advancement. This therefore calls for more efforts towards improving the quality of mathematics teaching in Nigeria.

Improving The Quality of Mathematics Teaching and Learning

For the purpose of effective teaching and learning of mathematics there should be exposure to experiences, which sensitize the thinking, imagination creativity and interest of the learners as well as a guide towards an understanding of the major concepts. It should be noted therefore that the quality and relevance of mathematics learning greatly depends on the teacher's planning and experience. To this effect, a mathematics teacher should have a strong background in the subject, be prepared to adopt appropriate and effective teaching techniques and be well versed with the demands of individual differences among the students. He should have sufficient interest in the subject, believe in its value and be willing to offer adequate guidance to the students.

Several steps could be adopted for the purpose of making mathematics learning more relevant. These include:

1. Stimulating and Sustaining Interest in Mathematics

Several authors (Butter, Wren and Banks, 1970; and Obodo, 1997) are of the opinion that students are most likely to work diligently and effectively at tasks in which they are genuinely interested in. Interest is the attribute, which arouses the students' concern and curiosity required for lasting attention on an object. In Nigeria however, it has been observed that students generally exhibit poor interest in the study of mathematics. This poor interest could be attributed to some factors such as students negative attitude, students' view about the nature of mathematics, poor method of teaching, students poor background in mathematics etc. In order to generate this interest, the teacher should bear in mind that students' interest could be easily aroused if they are presented with new and exciting activities or ideas. Such ideas must be the type for which the students can visualize its practical values or applications to situations they have already experienced. Having generated the interest, it is important to sustain it by making sure that the students are exposed to activities,

which pose a continual challenge.

One way of generating students interest in mathematics is by teaching it in such a way as to make students see its relationship or application to other fields of study and real life situations. Mathematical principles have several impacts on the foundation of many school subjects. It is indispensable and has instrumental value in the study of science subjects. The languages and fine arts are equally enriched by such concepts like the knowledge of numbers, shapes, symmetry, patterns etc. Thus by consistently x-raying the applications of mathematical concepts to many disciplines and everyday life, the teacher can stimulate the students' interest, give them better understanding of the nature of the other subjects and as such make them effective in any field of endeavour. It is also necessary that to improve students interest in mathematics, they should be made to see the variety of career opportunities open to them in business and industry.

Again in other to enhance and maintain interest in mathematics, the teacher should realize that students' intellectual curiosity plays a vital role. Mathematical discoveries depend to a great extent on the students' intellectual curiosity and without discoveries there can neither be technological advancement nor rehabilitation of our ailing economy. To this effect the lesson should be planned and presented in such a way as to stimulate the interest by challenging the students' intellectual curiosity.

2. Improving Quality through Proper Use of lnstructional Aids

Another way of improving the quality of mathematics teaching and learning is through effective use of instructional materials. The use of these aids reduces the level of abstraction of mathematical concepts, thereby making them meaningful. They also stimulate the students' imagination, provide an avenue for clarifying mathematical concepts and give them the opportunity to see the application of these concepts. These aids to instruction include good textual materials, models of geometric shapes, measuring instruments, graph boards, calculators, projection equipment etc.

Despite the relevance of these instructional aids, it is observed that apart from the very simple and improvisable materials which atimes are not consistently used, most of these equipment are not readily available in Nigerian classrooms. Again Laboratory work, which has gained much ground in industrialized countries due to its relevance, is yet to receive- serious consideration in mathematics teaching in Nigeria. The Laboratory technique in mathematics according to Butler, Wren and Banks, (1970) is a situation whereby the students develop new concepts and gain better understanding through experimental activities with physical equipment. Since the students are fully involved in these activities, the knowledge acquired is meaningful, lasting and functional. This may account to a large extent for the explosive growth of mathematical knowledge and its application to problems in many fields in the developed countries. Thus leading to technological advancement and resultant revitalization in their economy.

3. Improving Quality Through the Application of Computer Technology

A vital issue, which needs more serious consideration in an attempt to improve the quality of mathematics learning, is the application of computers in teaching. According to Harbor-Peters (2001), human life and activities have been greatly improved through computer revolution. As a result, education and economy are now technologically based. The computer among other things can store, sort, and retrieve a large amount of information, respond to the input from different learners, do calculations at a relatively high speed, allow the learner to update or correct existing information etc.

Among the computer programmes being applied in teaching are the computer assisted instruction (CAI), computer managed instruction (CMI), computer supported learning (CSL), computer augmented teaching (CAI) (Nwosu, 1998). The most common of al! these is the computer assisted instruction (CAT), in which a whole programmed course is stored in the memory of a computer and presented to the learner in an interactive process.

It is obvious that the computer is the main pivot on which modern technological advancement is based. Without technology according to Omeiza (1997:66), there is no modernization and modernization in turn brings about economic rehabilitation and improvement in the quality of life. It is therefore quite unfortunate that up till now, much effort has not been made to fully integrate computer technology into the education system and the teaching of mathematics in particular. Emphasizing this point, Harbor-Peters (2001), stated that about 99.9% of mathematics teachers in Nigeria are computer illiterate and as such cannot apply it for the purpose of improved instruction.

4. Improved Quality through Adequate Planning

The success of mathematics instruction depends to a large extent on adequate planning. Planning in this context deals with the planning of the curriculum and the learning environment. In the developed countries, mathematics has undergone several changes in terms of curricular innovations, methods of teaching as well as in the substance of mathematics itself According to Ali (1996), there exists now in American high schools, a wide variety of curricular materials for different needs, interests and abilities so that all the students in the same school system, do not need to study the same mathematics with the same curricula. In the same way, efforts should be made in Nigeria to introduce through careful planning, effective and teachable mathematics curricula which are responsive to the particular needs of the nation, the intellectual abilities of the students and the professional aspirations of students.

Again it is also necessary to make adequate plan to have a conducive environment for learning. This includes the physical environment such as the seat arrangements, wall displays, arrangement of instructional materials; the personal environment, which deals with the teacher-pupil relationship and the learners relationship with each other; and the intellectual environment which entails the teachers' attitudes and perceptions about mathematical activities (Backhouse, Haggarty, and Stratton, 1999). The teacher needs to convince his students through his attitudes, personality, novelty and readiness to teach that mathematics is both relevant and enjoyable. The teacher should adopt appropriate and inspiring teaching methods. This will go a long way in sensitizing the students and creating a conducive atmosphere for effective learning.

Recommendations

It is recommended from the outcome of the above discussions that:

1. The mathematics curriculum should be reviewed and new areas like computer applications in mathematic should be incorporated into the curriculum at all levels.

2. Computer literacy should be a compulsory requirement for entrance into the teaching field and in-service training should be given to those already in practice.

3. Supervisors of education should ensure that mathematics laboratories are not just established, but that they are well equipped and put into adequate use.

4. Government should provide more fund for the procurement of non-impro vis able learning materials e.g. projectors.

5. Seminars and workshops should be organized for teachers to expose them to current developments in the fields.

Conclusion

In conclusion, it can be deduced from the fore going that the Nigerian economy is in urgent need of rehabilitation. For this to be possible a lot depends on our ability to advance technologically and modem technological advancement cannot be attained without much reliance on the application of mathematical principles and ideas. However, it is observed that mathematics education in Nigeria is in a deplorable state and this calls for more effort towards improving the quality of mathematics teaching and learning. Several issues were therefore suggested such as improving the quality through adequate planning, application of computer technology, proper use of instructional aids and stimulating and sustaining students' interest in mathematics.

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