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# RE-ENGINEERING THE TEACHING OF MATHEMATICS FOR EMPLOYMENT AND SELF PRODUCTIVITY IN NIGERIA

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By

**O. T. Subeno**

*Department of Mathematics and Statistics,  
Delta State Polytechnic,  
Ogwashi-Uku.*

and

**C. C. Kerry**

*Department of Mathematics and Statistics,  
Delta State Polytechnic,  
Ogwashi-Uku.*

## **Abstract**

*This paper draws attention to the current state of teaching/learning of Mathematical Sciences in tertiary institutions. Official documents on curricula and examination which make explicit statements on how mathematical ideas and techniques are to be taught useful skills and capabilities that school graduates should acquire. It further emphasises as the application of these techniques to real life problems. Some: challenges on the teaching/learning of Mathematical Sciences in tertiary institutions such as: inadequate teaching force, shortage of teaching resources and the nature of the students are identified as some of the challenges of the teaching/Learning of Mathematical Sciences. Suggestions were equally made on the. Way forward.*

Presently, there is an increase in the awareness and Importance of Mathematical Science education in Nigeria. Mathematics has been known to play vital roles in the study of Sciences, technology and other spheres of human endeavor. Mathematics, which is described as the science of quantity and space contains sets of concepts, facts

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and operations, which every layman, student and scientists needs to know (Umeoduagu, 2001).

Mathematics is concerned with searching for patterns and relationships among different entities, developing and expressing generalizations in mathematical symbols. It involves making decision in an axiomatic system, which requires identifying and stating assumptions within which conclusions are made. Generally speaking, Mathematics is a creation of the human mind which is concerned with ideas, processes and reasoning.

Despite the obvious and numerous advantages of Mathematical Science, its teaching and Learning in Nigeria is associated with several challenges (Ibid, 2003), Due to the increasing demand for mathematical knowledge in nearly all spheres of life, the high level of deficiency in mathematical knowledge of secondary, pre-secondary school students and Lack of adequate training of teachers/lecturers, there is the need for a new method of teaching Mathematical Sciences at the tertiary Level. This method has to be based on a well rooted mathematical training and a teaching approach aimed at solving problems. There should also be policy adjustments and continuous professional development.

### **Theoretical Framework**

Education in most countries of the world faces a number of challenges. The current prominent ones include: innovative teaching strategies, various measures to improve the quality of teachers, 'greater attention to (constructivist) Inspired forms of teaching and learning, the advent and impact of new technologies on classroom practice (Iopkins, 1998).

Researches in schools have provided elements of practice that work and those that do not work. For example, "constructivism" leads to new beliefs about excellence in teaching, (earning and about the roles of both teachers and students in the process (Stein A. F, Bond G. L and Tinker (1994). Students learn Mathematics with meaning when they activate their existing knowledge through motivation and relate it to existing educational experiences to develop new concepts as new knowledge is constructed. Active participation is therefore imperative for learning.

### **Challenges of Mathematical Science Education**

The following are identified as some of the challenges of Mathematical Science Education in tertiary institution

- a. Confidence for Mathematics: When there is tuck of confidence on the part of the students, it becomes very difficult for teachers to impact the required knowledge. This has to do with the foundation of Mathematics on the students.

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If the students do not get insights into mathematical structure, they will find it difficult to do the required work and are likely to lose confidence in their ability to do so. This in turn will be destructive to the (earning of Mathematical Science. Therefore, teachers should endeavour to work out a strategy to restore confidence since it plays an important role in Mathematical Science.

- b. Failure to recognize the diversity in focus between what is quite appropriate
- c. For elementary Mathematics and What is vital for genuine higher Mathematics Education? Will lead to a chaotic situation. The distinction between those two is referred to as “Mathematics” for the higher Level and “Arithmetic” for the elementary level, hardly extends beyond the art of enumerating at Calculating. The great Mathematician Gauss was dealing with the properties of whole numbers mathematically, an area now called Number Theory. Ironically, whole numbers might seem to be only relevant in very elementary Arithmetic. Gauss therefore, made it clear that there is a distinction. He concludes: “it seems proper to call this subject Elementary Arithmetic and to distinguish it from Higher Arithmetic”
- d. Problem of Time: For confidence building, a slow initial pace may be needed. This is not readily available as students being afraid of failure complain most often of their fears of not covering the course. An alternative approach is often resorted to where by most topics are not well covered and few selected topics are concentrated on. This will now lead to the addition of extra marks to raw scores by teachers to save their faces
- e. Lack of Motivation: Motivation is vital when teaching Mathematics Sciences. It is the trigger of the learning process. It is more needed when teaching Mathematics in a non centered mathematics career. It is usual to Forget that each discipline has its particular Mathematics with a common root but with different aspect, which have to be borne in mind for the sake of students’ motivation and the planning of the students’ activities. Elena (1996) opines that it has been taken into account that a present - time graduate has to be trained in such a mathematical environment that it allows him to develop his intuition and creativity as well as use different mathematical patterns in different technological Processes and to develop their own solving strategies at the same time:

Other challenges that face the teaching of Mathematics in schools include the nature and shortage of Mathematics teachers, the attitude of students to Mathematical Sciences, shortage of teaching and learning materials and resource like suitable textbooks. There is an acute shortage of Mathematics teachers, even the few who are available move to better paid jobs outside education. The few who remain in service are

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usually over loaded and poorly remunerated and therefore have low morale and are disinterested. There is also lack of collaborative effort amongst Schools, Universities and Mathematicians. There is also lack of textbooks and other instructional materials relevant to the Local Government. To bridge the gap of differences among students of higher instruction, introductory courses should be designed to build on their background. Students' backgrounds are strongly related and contribute to the, students' development in Mathematical thinking. Unfortunately, teachers in schools Lack or have very little knowledge of Mathematics curriculum in higher institutions. They Lack knowledge of what their students are going to do and what preparation they need because there is a weak Link between the lecturers in the higher institutions and school teachers.

## **Conclusion**

Most students in the tertiary institutions have chosen careers apparently away from Mathematics thinking that it has to with their chosen courses but there comes reality. They enter into higher institutions and the first discipline they bump into is Mathematics. Such is the case of some Social Sciences and if we add Statistics, when speaking about Mathematics, the problem widens and there is practically no career without this subject.

In order to encourage these students, the approach of teaching Mathematics has to be improved so as to enable them embrace the importance of the subject. It is therefore necessary to explore the cognitive processes, which are triggered, and their relationships with problems of increasing complexity. It is also important to encourage research in Mathematics education at the tertiary level because of the importance it has in the different careers.

## **The Way Forward**

The teaching of Mathematics at the tertiary Level follows a usual pattern in which there are theoretical classes, and workshop where students have to solve exercises and problems. In order to change this pattern of teaching, the following can be adopted:

- i. **Translation of Difficult Topics to Practical Situations:** Students who are less capable struggle to understand Mathematics unless they can fit into a practical situation, then everything we do need to have a direct link to practical situation.
- ii. **Support from Colleagues:** It is true that tertiary lecturers have more time to prepare and work together at departmental levels. The issues of teaching difficult topics can be discussed by colleagues from time to time and possible ways of overcoming the problem can be considered. There is a perception that there are fewer teachers. – Student

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interaction at tertiary level. At the tertiary Level, lecturers do not need to take responsibility for students' result. If this notion can be changed, lecturers will tend to sit up and revisit the difficult areas students are always afraid of. As the difficult areas are being treated and repeated, the students will tend to gain better understanding of the topic. It is true that strict mathematical proofs, if unmotivated, can be quite difficult for learner mathematicians to follow. Overcoming this is the task of teachers. The logical presentation with all the details covered may well sensibly come after a psychological presentation. This may give highlights, perhaps the big picture and crucial sticking points, which need to be overcome in a complete proof. Many Mathematicians inexperienced at teaching find great difficulty at times in explaining to students' things that are obvious to them. Having proved the result by logical argument in there is nothing else available for explanation. Teachers, however, have an opportunity to point to this as small parts of a wider phenomenon whereby much more of Mathematics can become obvious though originally seeming to be a bizarre conglomeration of unrelated parts (Buthworth, 2001).

Difficult topics can better be handled by building the confidence of the students since lack of confidence leads to a very limited effort to solve the problem without assistance. Continuing effort is then readily identified with wasted effort. In Mathematics, confidence is the key to success. To count as a Mathematician here, the requirements expected of students need to include applying general results to particular situations or instances, as for such Mathematics, confidence in one's own ability is valuable. Confidence that one can solve a problem leads to persistent efforts if necessary before it is solved. Once it is solved, the satisfaction derived from that success reinforces both the willingness to again persist and indeed the confidence is felt.

The resolution of Mathematical problems supplies students with techniques which can be used in different areas, even to everyday problems. Mathematical thinking is logical and strict, intuitive creative, dynamic and changing. Students who are not studying to become Mathematician have to be taken into account and their interest motivated in the Mathematical Sciences.

Learning Mathematics is not only learning rules, statements, definitions to demonstrate theorems and using them in the resolution of problems, but practically using, it in solving challenging problems, trying different strategies and finding shorter and simpler ways of coming to an exact conclusion. Mathematics at the tertiary level is deeply rooted in the building up of knowledge. It is very necessary that the student understands he/she has to study it and learn how to do it. According to Chevatlard (1997) studying is the best link between teaching and learning

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