
FACILITATING CLASSROOM TEACHERS' SKILLS ON MATHEMATICS ANXIETY THROUGH EDUCATIONAL TECHNOLOGIES

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Abstract

Several problems have evolved in teaching and learning of mathematics which had led to poor performances in various examinations at all levels, coupled with lack of interest in making it a career choice. A neglect of such critical reasoning subject and problem solving skills might be a threat to the youth of the society. Scholars had attributed the cause of the problems to mathematics anxiety and conditions in which mathematics is learnt in the classroom. The research paper tried to sensitise parents, teachers, curriculum planners as well as the government in combating this menace from the society. Attempts were also made by the paper to proffer solution to the problem of mathematics anxiety through the use of educational technologies. Recommendations were given as to the necessity of teaching and learning mathematics for the growth of the society in general.

Nowadays, society desperately needs highly able citizens who can bring innovative solutions to its current challenges and at the same time produce new ideas for on-going socio-economic and political advancement. For a paradigm shift to the logic of economic effectiveness and efficiency, discourse about learning practise needs to move away from the kind of surface learning to deep learning. Surface learning also known as bookish learning involves memorization, drill and practise and conceiving

material as unrelated bit of information. Deep learning or real learning on the other hand questions the material critically and conceive it as essential to their daily life activities (Subhkan, 2012).

Development in its simplest reductionism can be referred to as growth, change in a state of thing, etc. Development can be described as a multi-dimensional process involving the re-organization and re-orientation of the entire economic and social system. Economic development does not only involve physical and financial progress but also improvements in the political and social aspect of the society (Marcellus, 2009).

As explained above, modern companies need employees that are proactive, self-reliant professionals which therefore call for a need to replace the traditional pedagogical practises of teaching and learning which underpin the educational system. Teachers need to rise up to the challenging fact that their practises are questioned by all and sundry. They need to take a bold step by exploring knowledge and expanding their tentacles beyond the four walls of the classroom. Teachers should stand up and take their honourable place in the society.

It saddens to find out that mathematics which stimulates critical reasoning which can out rightly lead to discovery has been neglected. Difficulties in mathematics as a subject or a course of study, has been frequently reported as well as low scores which students obtain in the field (WAEC,2009). This has been attributed to several a factor amongst which is mathematics anxiety. Mathematics anxiety not only affects students and parents only, it does affect teachers also. It can occur at any level of education from primary to tertiary and can persist in life activities affecting further learning of mathematics.

The rest of the paper will be organised into five sections. The first focuses on Professional status of teachers and professional developers. This is followed by a brief explanation of the concept of mathematics and societal/economic development. The next is the role of technology as an instrument for economic development. This is followed by probing if mathematics anxiety really exists. The next explores mathematics anxiety and educational technologies and a general conclusion of the work is given.

Professional Status of Teachers and Pedagogy Change Model

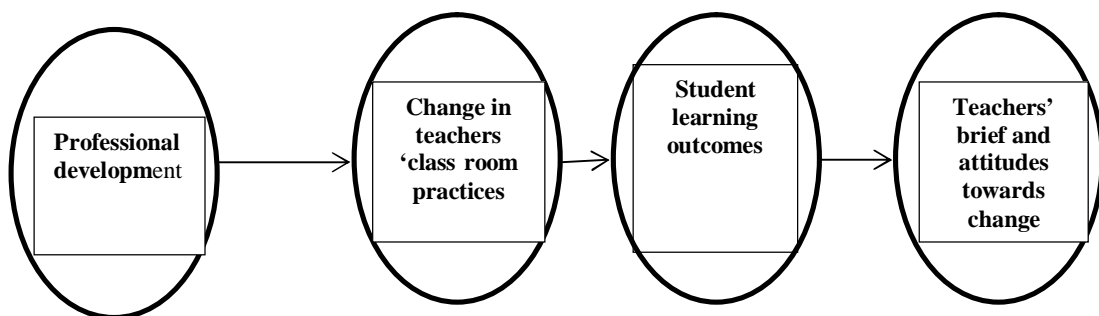
It is amazing that despite lack of encouragement and inadequate inceptives, many scholars still devote their lives to seeking and to extend the frontiers of knowledge. A significant number has emanated outside the cabinet where labour is appreciated and causing brain drain.

Several arguments has been debated as to if teaching as a profession should be seen as a specialist occupation or from a pragmatic perspective as explained by Okunloye, 2009. The body responsible for this in Nigeria – Nigeria Union Teacher (NUT) has identified several factors amongst which are:

1. that it is crucial to the society
2. it is a learnt skill
3. requires educational institution
4. it has a code of conduct
5. ability to identify professionally qualified teachers by authority
6. clients (learner) centeredness; as characteristics which make them qualify to be a profession

Despite this call, teaching is yet to be recognised as a profession in Nigeria, but as a trade union. Thereby, it is yet to be accorded its rightful place in the society. This has affected several practices and activities of the teacher among which is pedagogical change.

According to Guskey (2002), teachers need to be considered when carrying out activities that affect their practises. They opined that, when professional development of pedagogy is being carried out, teachers are sometimes not considered during this process. They therefore stressed the importance of the teacher change model sequence which consists of three major outcomes of professional development. The sequence includes changes in teacher classroom practises, student learning outcomes and teachers' belief and attitudes towards change. They finally concluded that for a successful implementation, the sequence should follow the stated order:



Is Mathematics Anxiety a Problem

Mathematics has been an area of study, has proven difficult in the minds of many people and also in the hands of many teachers when it comes to appropriate pedagogical approaches for various aspect of the field. Generally, anxiety can be classified as having two distinct components;

- a. Trait anxiety (relatively stable in human) and

b. State anxiety (transitory emotional condition).

In academics, state anxiety which could either be text or mathematics. Text anxiety is the inability to think or remember a feeling of tension and difficulty in reading and comprehending simple sentences or directives on an examination. Text anxiety consists of two components; “worry and emotionality”. Worry was defined as any cognitive expression of concern about one’s performance while emotionality was defined as autonomic reactions to the test situation” (McAnallen, 2010).

According to Berg (2013), mathematics anxiety is the feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations.

Sian (2010) as quoted by Dolin (2010), to have said that “People are very happy to say that they don’t like math, but no one walks around bragging that they can’t read. Ann K. Dolin categorized the causes of mathematics anxiety into learned and biological behavior. The emotional feeling caused by this factor affect the learners’ ability to understand and do mathematics and thereby making them to forget and lose self-confidence towards mathematics. Researches in the past had confirmed some practices which are part and parcel of teaching processes in the traditional mathematics classroom. These practises include rote learning, memorization, teacher centeredness, imposed authority, public exposure, time deadlines, etc. All of these cause great anxiety in many students.

According to Curtain-Phillips (2001) in an article titled “The Causes and Prevention of Math Anxiety”, he opined that these are a regular part of the traditional mathematics classroom which causes great deal of anxiety and consequently, there should be more emphasis on teaching methods which include less lecture, more students directed classes and more discussion.

Past studies have shown students learn best when they are active rather than passive learners (Ajelabi, 2005). Therefore, it is crucial to recognize that the problem of anxiety cannot be overcome by just encouraging the learners to put more effort but instead teaching methods needs to be re-examined; teachers should design or adopt a practical (experimental) approach during teaching and learning processes in order to help learners in exploring, manipulating and conjecturing the whole concepts of mathematics in their everyday lives. This will go a long way in dispelling various erroneous impressions towards mathematics in the world at large.

The Position of Mathematics and Societal/Economic Development

Mathematics as an area of specialization is referred to as the bedrock of science and technology. Galileo, the great scientist was quoted to have expressed his thought on

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mathematics to be a language in which the great books of nature are read and written by mathematicians. To buttress the role mathematics play in the development of the society, Roohi (2009), grouped its importance into two as follows:

- a. at personal level
- b. at societal level

The table below explains the further ways with which each of the aforementioned levels contributes to the development of the society as follows;

At Personal Level	At Societal Level
Social Development	Education system
Intellectual Development	Economics
Vocational Development	Infrastructure
Moral Development	Science and development
Spiritual Development	Medical science
Cultural Development	Agriculture field
	Cultural and Morality
	Living standard

It will be worthy to stress at this point that mathematics is not just a science of numbers but a science that has its effects on every aspect of the society. A testament to this is the findings of Keldermann, Nash and Panfilov (2009). They reported equations which describe cardiac mechanics including blood, muscle and valves mechanics and electrophysiology differently. In both cases, a realistic treatment demands the use of methods that account for anisotropy in homogeneity and complex geometrics.

Technology as an Instrument for Economic Development

The fast development of modern technology in the world today has left no doubt that its use is very essential for our day- to- day activities. As it is evident world over, the developed nations have harnessed the potential of technology to transform their economics from resource based ones to knowledge based economies. For Nigeria to be able to cope with this big wave of change there is need for her to re-strategize and expand its vision on technological issues (Onasanya, 2009).

Educational technology, in its wide sense as understood today, includes the development, application and evaluation of systems, techniques and aids in the field of learning. These educational technology tools can be used to communicate the needed factual information to the learners which in turn will reinforce and strengthen the progress of the learners in mathematics. According to Chitrasen (2006), the growing use of educational technology will help the teacher to be released from the routine role

in the class to the more important tasks of planning, arranging, guiding, encouraging, evaluating learning experiences and counselling the learners.

Adopting an integrated vision where technologies are considered together with the educational strategies, contents and activities might be the long awaited breakthrough. International studies as revealed by UNESCO, (2011), have shown that education earns a high return on investment on technology. It stressed that microeconomics focus on the benefit on educational investments to individual while macroeconomics studies focus on returns to the economy at large. It could be argued that several problems ranging from corruption, inexpediency, opposition, intransigence and god-fatherism has affected most aspect of sectorial development such that projects or investments are not properly executed or not executed at all.

Therefore, there is need for a functioning economy which considers investment and development as essential in every sector. Nigeria no doubt has taken a giant stride in expanding the telecom access in recent years, but the successes are largely confined to the mobile telephony (World Bank, 2010). The Federal Government should also try to support other sectors of the economy by increasing spending, subsidizing and promoting IT literacy in Nigerian Schools.

Application of Educational Technologies to Mathematics Anxiety

Mathematics anxiety has been defined by several researches based on their view of the concept. It is a form of disability which can be experienced by teachers, students, parents, curriculum planners and the society at large. This often leads to utterances of statements such as I am not good at mathematics, I won't take courses in mathematics, Mathematics is the confusing course that causes my headaches, etc.

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources. This stresses that teachers' role in class is no longer to control the learning practices anymore but to facilitate it appropriately (Subkhan, 2012).

Researches in cognitive science and mathematics education have shown the importance of making reference to students' experience in their everyday world. Technologies can play a crucial role in approaching a mathematical domain of knowledge, which is abstract and formal through the exploration and the manipulation of concrete representations that help them to deal with such knowledge from a visual and motor perspective.

In their work, Bettino (2004) described the ARI –LAB project which experimented new approaches and methodologies for mathematics teaching and

learning with technological tools. The principles which inspired the study are as follows:

1. **Mathematics Rich Activities:** Learners are made active not passive and concept taught should be concrete and not passive. Age-appropriate tools and representations in which they can contribute and make reference with their own experience
2. **Construction:** Learners are to construct, manipulate and validate artifact which should not be foreign in their community.
3. **Collaboration:** Learning environment should be structured in such a way that will allow for teacher-learner interaction, learner-learner interaction as well as tools for developing pedagogical activities based on comparison and negotiation of mathematical meanings involved.
4. **Context:** An Educational Technology tool or environment which considers the whole educational situation through which effective and valuable changes can be brought about in the classroom.

Based on previous works by scholars, technology can serve as a tool to combat mathematics anxiety in classroom. Sun and Pyzdrowski, (2009) suggest that mathematics anxiety can be combated through students' familiarity with computer (i.e. to reduce teaching anxiety) and a good sense of control to utilize the internet to learn mathematics. They further suggested some software and internet sources which will be of help as follows:

Software	Internet
BasketMath	http://www.mathgoodies.com/articles/math_anxiety.shtm
MathTV	http://www.nctm.org/tcm/2000/04/p516.htm
Interactive Math type	http://www.mathpower.com (has a good Math Anxiety section)
Geometer's sketchpad	http://www.cut-the-knot.com/manifesto/index.html

Conclusion

In order to drastically bring about reduction or changes in the pain and frustration caused by mathematics anxiety, maximum effort is required from teachers, parents and even the government for its success. The use of technological tools and mathematical games should be introduced during teaching/learning mathematics. The basic vocabularies involve in mathematics should be taught. The learners should be motivated towards having positive self-talk during classes. The teachers as well as the society at large should shun utterances that can in a way create mathematics anxiety or

phobia (statement such as boys are better than girls in mathematics, mathematicians are mad people, should be avoided). Government agencies should also try support where necessary.

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