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STRATEGIES FOR AROUSING STUDENTS' INTEREST IN MATHEMATICS

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Abstract

The research surveyed the strategies for arousing students' interest in mathematics. The topic is all about the learning process for awakening learners' feelings of intentness over mathematics. The strategies for arousing students' interest in mathematics include creating awareness, using assessment method, parents encouragement at home and use of teaching/motivational techniques like teaching personality, variety of learning materials, giving feedback and rewards and establishing mathematics club in the school. The researcher found out that; lack of instructional materials, motivation, good teacher/students relationship and caring for individual differences affect the effective ways of teaching mathematics. In view of these, the researcher recommended that: Mathematics teachers should be encouraged to adopt instructional materials in teaching mathematics topics/concepts. This will make mathematics gain popularity, capture the learners' interest, challenge their intellect and result in better performance. Mathematics teachers should take care of individual differences of students by offering different experiences for different learners varying contents, language, rate of learning, material of instruction and the goals of learning according to individual differences. Mathematics teachers should introduce motivation to encourage students' participation and to achieve social, academic, economic and political recognition. Professional development should provide opportunities for work shops or courses that would refresh our teachers' minds of the importance of building positive relationships with their students.

Introduction

Mathematics occupies an important place in the curriculum. Keeping in view its important, strategies for arousing students' interest in mathematics should be used in order to achieve the teaching aim. Mathematics is the science that deals with numbers, counting and numerical operations (Odili , 2006). It has several important branches dealing with actual or theoretical uses in the physical world. Mathematics is the study of abstractions. It allows us to isolate one or a few features such as the number, shape or direction of some kind of object (Onyia, 2007). Ogbu (2007) observed that mathematics is the study of pattern and relationship, which can express ideas. It embraces many important ideas about numbers and space which involves problem-solving activities and a very powerful way of communication.

In the words of Usman (2007), mathematics is the study of number and computations, sizes, shapes and spaces and the science of generalizations and measurements. Mathematics is the ingredient for the effective articulation of the abstract elements of science that give impetus to the development of technologies (Akin, 2006). Experts also agree that mathematics is the key engine of growth in any nation (Crop, 2005).

In other words, it is the level of mathematics that determines the level of the science and technological component of any nation. Today mathematics has become a veritable and indispensable tool in national development.

Unfortunately, many Nigerian students lack interest for the subject which is compulsory and applied in everyday life. Many students believes that competence in the subject is reserved for a selected few, while others are of the opinion that it is a nightmare that should be avoided (Proper, 2002). Despite the high positions and place given to mathematics, students do not like the subject. Majority of the students perceive mathematics as difficult, abstract, unattractive, boring, not captivating, un-motivating and not related to their daily living (Swarupa, 2008). To worsen issues, many students are not interested in mathematics and what it can offer. They are full of fear, phobia and hatred for this subject (Kulbir, 2006). This un-interestedness on the part of the students led to massive failure yearly in mathematics examination (WAEC, 2009).

Despite government's effort at both state and federal levels to promote achievement in mathematics, students are still not performing well in the subject (Salau, 2002). According to STAN (2002), acute shortage of qualified professional mathematics teachers, overcrowded mathematics classrooms, students' negative attitude towards mathematics, undue emphasis on the coverage of mathematics syllabi at the expense of meaningful learning of mathematical concept, inadequate facilities and mathematics laboratories in our schools and lack of students' interest in mathematics contribute to students' poor performance in mathematics.

It was discovered that students' lack of interest in mathematics was caused by the teachers' use of inadequate, monotonous way of exposing or impacting mathematical concepts to student using conventional strategy (Usman and Nwabueze, 2001). Interest could be achieved by explaining mathematics in a clear way and incorporating the enhanced strategies for this laudable goal.

Strategy

The word strategy has to do with psychology and study of learning process. Thus, the concept is seen as the orderly presentation of information or knowledge to the students. It can equally be defined as any means the teacher uses to organize and guide learning experiences (Ogbu, 2012).

In the words of Tonna (2008), strategy is the method or procedure by which the teacher meets the learner at his level starting with his interest, problems and then establishes conditions that enable him to proceed to reach set goal in effective possible manner. Strategy generally involves setting goals, determining actions to achieve the goals and mobilizing resources to execute the action. Max. (2011) argues that strategy is about shaping the future and is the human attempt to get to desirable end with available means. Professor Richard P. (2011) described strategy as a type of problem solving. He wrote that good strategy has an underlying structure he called Kernel. The kernel has three parts. The first part is a diagnosis that defines or explains the nature of the challenge. The second part is a guiding policy for dealing with the challenge and the last part is coherent action designed to carry out the guiding policy.

Strategy typically involves two major processes; formulation and implementation. Formulation involves analyzing the environment or situation making the diagnosis and developing the guiding policy. Implementation refers to the action plans taken to achieve the

goals established by the guiding policy. All a teacher requires when selecting a strategy of teaching is to look for a method that will best help the learner to understand the desired objectives.

A teaching strategy refers simply to an approach, method or a combination of carefully designed classroom interactions that could be followed meticulously to teach a topic, concept or an idea (Olayemi, 2002). There are many teaching strategies or method that a mathematics teacher could use.

According to Daso (2012), a teaching strategy is conceived of as being series of goal directed purposeful, activities or procedure to be carried out by a teacher with respect to a learner and in the context of a syllabus on a body of subject matter. It is clear from their definition that teaching strategy involved the teacher's intellectual emotional and behavioral development of the student, his personality, motivation, his social and emotional standard or condition of being.

Teaching strategies also refer to a board range of processes, from the way in which classrooms are organized and resources are used to the daily activities engaged in by teachers and students to facilitate learning. Student learning strategies refer to cognitive and meta-cognitive processes employed by students as they attempt to learn something new.

Teaching and learning strategies are complex processes that interact with another suggesting that in-depth, context-specific analysis are necessary to fully understand each strategy's role in enhancing student performance.

Interest

On the other hand, interest is a subjective feeling of intentness or curiosity over something, the interest in a particular thing is a feeling manifested in an activity (Usman, 2010). Interest is a tendency to become absorbed in an experience and to continue it. It is the zeal or willingness to participate in any activity from which one derives some pleasure, continuing (Usman, 2007). Edward (2000) referred interest as motivation. Motivation is a drive or force that propels an individual in a particular direction.

Interest is the feeling of wanting to know or learn about something or somebody. Researchers have identified two types of interest. Situational interest and personal interest. Situational interest is spontaneous, transitory and environmental activated, whereas personal interest, also referred to as individual interest, which is less spontaneous of ending personal value and activated internally. Situational interest appears to be especially, important in catching student's attention, whereas personal interest may be more important in holding it (Hidi & Harackwicz, 2006)

Personal interest appears to be especially important for sustaining engagement and long-term learning (Hidi & Renninger, 2006). Situational interest increases learning when the task or to-be-learned information is model or when information is relevant to a task or learning goal.

Personal interest increases learning due to increased engagement, the acquisition of expert knowledge and making mundane tasks more challenging. Personal interest is also important because it appears to mediate the relationship between short-term situational interest and long-term mastery and learning within a domain (Hidi & Rnninger, 2006).

Definitive evidence indicates that situational and personal interests are related to learning in three important ways. One way is that interest increases motivation, engagement, and persistence. Situational interest has a positive effect on extrinsic motivation, whereas personal interest has a positive long-term effect on intrinsic motivation. Presumably, external factors such as teachers and interesting textbooks provide external motivation to learn more about a domain. Once situational interest develops into well-developed individual interest, external factors likely play a smaller role in motivation, whereas intrinsic motivation and enjoyment play larger roles. A second way that interest is related to learning is through strategy use (Alexander & Jetton, 1996). Students who are interested in a topic report using more strategies are more likely to monitor their performance and shift strategies when necessary and are better able to self-regulate their learning. Increased strategy use, mat-cognitive monitoring and self-regulation improve the efficiency of skill and knowledge acquisition as well as the amount of information learned.

A third way that interest affects learning is through deeper information processing. Dewey explains four types of educative interest. The first one is interest in physical activity. A baby learns to use the organs of sense. The second one is interest in the constructive work, a higher from of activity when children, youth and adults use means of tools for reaching his end. For example, when a child is engaged in making boat with tools, the thought of the finished product and of the use may come to his mind. Self is identified with some objects or ideas through action. The third one is intellectual interest which intelligence is an integral part of the constructive activity. The last one is interest is in a person, social interest. Social interest is not a social inquisitiveness, but an intellectual concern about others activities and aims (Osbrone, 2003). The social interest is a natural resources for making activities broad and enlightened in scope and interior with former three interest.

Therefore, there is a need for research about how to bring good attitude toward science in school as well as how to create students' interest in a classroom. This helps to awaken students' interest in science, particularly in mathematics.

Arousal

Arousal can be defined as a state of alertness, wakefulness or readiness caused by nervous system activity. The concept of arousal has been a major aspect of many learning theories and is closely related to other important concepts such as anxiety, attention and motivation. According to Berlyne, there is an optimal level of arousal for an individual at a given time. If the level of arousal drops below the optimal level, the organism will seek stimulation i.e. exploratory behaviors.

Eysenck (2006), examines the relationship between attention and arousal. He concludes that there are two types of arousal; a passive and general system that can raise or lower the overall level of attention, and a specific compensatory system that allows attention to be focused on certain task or environmental stimuli. Mandler (2003) argues that arousal is the key element in triggering emotional behavior.

When we are aroused, we are energized and "feel alive". There are three ways that arousal can be achieved: mentally, emotionally and physically, as described below.

a) **Cognitive Arousal**; cognitive or intellectual (mental) arousal is about thinking and mental stimulation. This is the state where we are exploring, learning and discovering interesting things. We are driven into this cognitively aroused state by curiosity, novelty and general interest. Some people are more easily stimulated by cognitive arousal than others. When arouse, some are more focused on whilst others (often 'experts') are more likely to act to display and defend their pre-existing ideas and knowledge.

b) **Affective Arousal**: Affective or emotional arousal happens when we are emotionally charged up and feel passionate about something. We may be angry, excited, scared, joyful or feeling the stimulation of any other emotion. Some people fall easily into affective arousal and may be considered to have a volatile temperament. Affective aw is, in some ways, most central to awakener is that cognitive and physical arousal are more likely to be accompanied with some degree of emotional sensation.

c) **Physical Arousal**: Physical arousal occurs where our bodies are in a heightened sense of arousal, typically with adrenaline coursing through our muscles. Physical arousal is managed in the brain by the brainstem, the oldest "reptilian" part of the brain that manages wakefulness and basic bodily action. People have preference for being aroused in different ways and seed these ways in life, for example in the way the intellectual enjoys reading and why others play football. So play to these in your persuasion, offering them different types of arousal as rewards is invoking the language of different awakeners in your conversation.

Strategies for Arousing Students' Interest in Mathematics

For the learning of mathematics to be effective by students and quality performance achieved, their interests in the subject have to be aroused or awakened. The following strategies among other could be adopted.

1) CREATE AWARENESS:-

Conscious effort should be made by the government to popularize mathematics having known the poor performance of students in mathematics in schools. The establishment of the National Mathematical Centre, Abuja by the federal government is a welcome idea, but that is not enough. Efforts should be made to constantly use radio and television programmes be it NTA or various state television stations for weekly or monthly mathematics quiz, competition, debate etc. Non-Governmental Organizations (NGOs) should be encouraged to participate in promoting mathematics like it is done by COWBELL, Bournvita.

Furthermore, awareness of career opportunities of mathematically empowered individuals and its usefulness in science and technology and development of skills should be made known to the learners. The teachers should provide a background that will lead to public awareness of the importance of mathematics by using approaches that actively involves students, both boys and girls in participatory learning and place greater emphasis for learning for transference rather than memorization. The emphasis, according to ICASE (2003) needs to be on what students acquire rather than what is presented

2) THE TEACHING / MOTIVATIONAL TECHNIQUES;

Motivation is a drive or force that propels an individual in a particular direction. This innate propensity can be derived in two ways. One of the ways is through an external environment; the motivation got through an external environment is usually referred to as extrinsic motivation while the one got through an internal environment is referred to as an intrinsic motivation. The power of intrinsic motivation has been observed to be very effective in mathematics learning (Edward 2000). Extrinsic motivation also propels interest in mathematics learning. Many students dodge mathematics in schools not just because of its abstract nature, but because of the teacher's failure to present the subject in an interesting and clear manner. To guide and control children's behaviour, the teacher has to understand their needs, interest and aspiration and should channel his teaching towards that. . Also, the teacher should keep students informed of the objective of his lessons. The teacher should use variety of students-centred, approaches like use of smaller' groupings or sharing students into collaborative groups they like, because novelty in teaching creates interest. In the class, examples of mathematical problems to be given should involve real life problems. The understanding and proper use of motivational techniques brings interest, good morale, effective learning and sense of achievement in classroom. Students can be motivated through several ways some of which are as follows:

i. ***Teacher's Personality****:* When a student identifies the learning with a person he/she admires, this creates interest in what is being done. Therefore, teachers in mathematics should make themselves role model. Their personality in no small way facilitates students' interest in the learning of mathematics. There is a common erroneous belief that mathematics teachers are always confused, rough, and dress carelessly. Until the teachers discourage these beliefs and create hope in the minds of the learners by their attitudes or personality, this will continue to contribute in discouraging students' interest in mathematics as a subject. They should also be friendly to the students and have interest in what they teach.

ii. ***Variety of Learning Materials****:-* Olayede, (2007) regarded instructional materials as things which are intended to help the teacher to teach more effectively or better still which enable the pupils to learn more readily. Obodo (1997) opines that instructional materials are resources or materials used by mathematics teacher in the classroom for the purpose of ensuring effective teaching and learning that is stimulating and maintaining interest in teaching and learning of mathematics. Onyia N.C (2007): also defined instructional materials as audio-visual materials employed in the teaching learning process to make teaching and learning easier, more interesting and vivid and more effective in outcome. The employment of instructional materials makes teaching more practical and more original. Instructional materials supply the sense with the raw materials with which ideas are formed and thus make comprehension easier and faster, the teaching is simplified and the learning as a whole made exact and realistic.

National policy on Education (2004) de-emphasize the memorization and regurgitation of fact but instead emphasized practical exploratory and experimental methods of teaching which will thus lead to development of manual skills in the children. Learning could be improved when a rich environment is provided. It is of significant important to note that

students learn better when they interact with person, objects and the environment. The use of the instructional materials gives the students a direct contact with the realities of the social and physical environment. Instructional materials bring the learner face to face with the world which education intends to introduce to him. It is using real things in real life situation. A lot of mathematics topics can be easily taught by the help of visual, audio, and audio-visual materials depending on the topic. These could be computer based resources. When varieties of instructional materials or learning materials are used, it removes boredom and monotony. These varieties of materials bring life into a lesson and helps in retention and recall and by that too interest will arise or reawaken.

iii. Feedback: This is a way of reporting progress of performance of students. Making students know about their progress of performance gives them hope in the subject and it creates interest in what they do in mathematics class. Work done, be it class-work or tests should be marked and be returned to the students without delay by the teacher. This will help the learners know their areas of weakness for adjustment. Feedback of performance includes verbal reactions to answers. Of questions like "you are correct", "that is wrong", "good", "very good", "and excellent". These phrases can also be written on the students' scripts. Grading of papers and marking of specific errors are other means of feedback which the teacher should use from time to time.'

VI. Rewards (Award): Rewards create learning interest in students. Rewards of various kinds should be used in such a way that students can be motivated. The use of positive reinforcement of various kind which can be in form of material reward, symbolic and/or psychological should be employed because they help in creating self concept in the learning of mathematics. The teacher must however be cautious such that the reward does not become an end in itself but means to create learning desire in the learner (Chuhan, 2007). Therefore, award or praise the child for a work done and the teacher should note that praise should not only be by clapping hands of classmates but also by teacher's handshake. Praise can also be used following students' responses in such ways as: a nod by the teacher, smile, a good look, verbal, praise friendly movement towards the child, writing students' response on the board by the teacher etc. however, blame should be used where necessary but sparingly because it creates personality maladjustment.

Vii. Mathematics Club: Students can be encouraged to have interest in mathematics by the teacher through recreational and mathematics Clubs which can be formed in the school. The mathematics club plays an important role in creating interest in mathematics in schools. This helps the students in having an idea of the practical utility of mathematics in addition to creating their interest in mathematics. It can serve a number of purposes;

Mathematics club is useful in arousing and maintaining interest in mathematics. Gifted students get an opportunity to satisfy their needs and interest by actively participating in the activities of mathematics club. The student gets an opportunity of mathematical hobbies, recreational mathematics, mathematical projects, mathematics games, mathematical discussions, and debates and mathematical innovations. It provides an opportunity of leadership, cooperation, joint responsibility active participation and organizing programmes.

3) ASSESSMENT METHOD:-

Assessment method is one of the ways of arousing students' interest in mathematics. Students feel happy when their work is been assessed properly and guided along areas of weakness.

4) THE HOME:-

The child's first teacher is the home. The parents especially the mother influence the child's learning from the initial stage. Therefore, the role parents play in the child's interest in mathematics at home is very significant. If the mother is equipped with the knowledge of mathematics she can help in training and encouraging the child in mathematics. There is therefore the need for every man and woman to be mathematically literate. In addition, parent should have time to ask their children what have been done in their class daily and demand to see it even if they may not be mathematics oriented. Also; they should supervise how their children spend their spare time at home even on holidays.

Conclusion

The research sought to evaluate the strategies for arousing students' interest in mathematics. Interest is a very strong factor in teaching and learning mathematics. The degree and direction of attitude towards mathematics are largely determined by the kind of interest developed by the students for mathematics. In most schools, students are seen to have poor interest in mathematics lessons. Appropriate instructional materials, good teacher/students relationship, parent's effort and motivation are strategies that will help to arouse their interest in mathematics.

Recommendations

The review of this research gave rise to the following recommendations.

1. Mathematics teachers should be encouraged to adopt instructional materials in teaching mathematics topics/concepts. This will make mathematics gain popularity, capture the learners' interest, challenge their intellect and result in better performance.
2. Mathematics teachers should take care of individual differences of students by offering different experiences for different learners varying contents, language, rate of learning, material of instruction and the goals of learning according to individual differences.
3. Mathematics teachers should introduce motivation to encourage students' participation and to achieve social, academic, economic and political recognition.
4. Professional development should provide opportunities for work shops or courses that would refresh our teachers' minds of the importance of building positive relationships with their students. The workshops or courses should be designed to encourage self-reflection, peer coaching or action research.

Part of the teacher training should address the realities of everyday interaction in any given classroom. A heightened awareness of and the understanding that in the school setting situations arises where the teacher must diffuse conflict, empathize with individual needs, provide emotional security and more importantly, a sincere desire to interact with students' must be imparted in teacher training.

On the other hand, government should help to arouse students' interest in mathematics by creating conducive classroom environment, higher salaries for mathematics

teachers. The educational administrations should also work on providing the mathematics teachers with the educational materials and tools needed in teaching mathematics.

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