GENERATING AND SUSTAINING INTEREST OF STUDENTS IN MATHEMATICS IN   SECONDARY SCHOOL

Ojo S. G.

National Mathematical Centre, Abuja- Nigeria

ojosog1@yahoo.com

Abstract

Mathematics is one of the most important subjects in Nigeria secondary schools; hence it is made compulsory for all students to offer it both at junior and senior secondary school levels. The importance placed on the subject is derived from the fact that it could help the nation meet its quest for science and technological advancement. Despite the importance of mathematics to overall development of a nation, it appears that there has been a dwindling interest of learners in mathematics. This should generate a lot of concern for both parents, teachers and other stakeholders in education. This topic is all about reawakening and sustaining students' interest in mathematics with a view to getting better performance. The methods suggested, in this paper, include introducing practical activities, use of mathematical games/puzzles, use of instructional materials, setting up mathematical laboratory, formation of mathematical club, and recognition of good students, among others. This will make mathematics gain popularity, capture the students' interest, challenge their intellect and result in good performance. Mathematics teachers can use some of these or all of these methods to rekindle the interest of their students in the subject. Teachers, parents, authorities of schools and the government should note that the child's interest is of primary importance, they should therefore advise, inform, encourage and motivate the students to study mathematics as an important subject.

Keywords: Generating, Sustaining, Interest, Mathematics, School

INTRODUCTION

Hornby (2010) defined interest as an activity or subject that you enjoy and that you spend your free time doing or studying. Harbor-Peters (2002) defined interest as a zeal or willingness to participate in an activity from which you derive some pleasure. Interest is a surjective feeling of intentness or curiosity over something, the interest in a particular thing is a feeling manifested in an activity (Usman & Nwabueze, 2011). Interest is a motivation drive or force that propels an individual in a particular direction (Egara , 2010; Owora &

Chika, 2019). It, therefore, means that for a person to be interested in a particular task or subject, there is element of willingness involved. A student is said to be interested when he/she is willingly engaging in mathematical activities. A basic subject like mathematics which is taught at all levels of the school system, from the primary school to the tertiary level and to most students, had suffered most in teaching and in the hand of students. Ale (1981), Iweka (2006) identified students' problems as major for the mathematics teacher as they come to the mathematics class with some psychological barriers. These barriers, according to Ale (1981) and Iweka (2006) include: the notion that mathematics is difficult, the attitude that mathematics is only for the gifted, and a fear of the subject. Ale (1981) went further to summarize the students' problems as:

a. Poor background: Due to either lack of competent teachers in their previous schools or non-mastery of basic concepts.
b. Fear of the subject and teacher: This constitutes a main problem for 69% of the students.
c. Poor teaching: This is a serious problem in the secondary school where teachers are unqualified. Individual attention is not given to the students. Some schools even lack mathematics teachers for many months of a particular year.
d. Lack of concentration and motivation: Most students do not know why they study mathematics, and 82% of those who even major in it in the university think that the only career opportunity for mathematics student is teaching.
e. Constant discouragement: Some students complained that they never succeeded in solving mathematical problems on their own, except those already solved by the teacher, which they often memorize. So they are always discouraged about mathematical issues.
f. Lack of interest: About 60% of students in the secondary school level lack the much needed interest in the subject. This accounts for the reason why they want to avoid mathematics (as much as possible).

In the same vein, Blake (1994) summarized some of the reasons given by students, why they have no interest in mathematics. They include:

1. No subject presents students with the stark alternatives of success and failure in quite the same way as mathematics. An answer can be quite simply wrong. If it is, the answers that follow it may all be wrong as well. It is easy to spend hours on work which receives no credit whatsoever. This is naturally demoralizing for the student and contrasts with experience in arts subjects where more essays will receive some credit.
2. Mathematics students can spend hours getting virtually nowhere, with nothing on paper to show for all the effort. This hard for them, particularly since it is an experience they tend not to have in other areas of their lives. In adult life it will be

a different matter, and arguably the study of mathematics helps to prepare them for the sort of frustrations they will meet too often later on. But at the age they are, it is uniquely frustrating experience.

3. Mathematics is a sequential subject, where each topic builds on what has been taught before. For the student, this means that mathematics gets progressively harder. At each successive stage many of the participants will have already reached their personal limits of ability. Only a minority will be confident enough, and sufficiently able, to go to the next stage.

4. Added emotional pressure is provided by society's expectations and requirements. Many higher education courses and many jobs with promotion prospects in commerce and industry require credit pass and above in Ordinary Level Mathematics. Many university courses specify a grade in Mathematics as a condition of entry.

5. On the other hand, when you do come to understand a particular topic, so that it is possible to rattle through questions, getting them right one after the other, then you feel good. The sense of elation that comes from finally understanding what was incomprehensible before can be intense.

To many students at the secondary school, mathematics is a boring imposition from outside (Ohuche, 1989). Yet, if there is anything we know about learning, it is that people are not likely to learn what they are not pre-disposed to learn. We may say that in general the indifference and often-times lack of interest of a large proportion of secondary school students to mathematics have confounded the situation in relation to the learning of the subject.

Uninspiring mathematics teachers often believe that students cannot learn, are undisciplined, disrespectful, and unwilling to work. An inspiring mathematics teacher recognizes difficulties encountered in teaching and learning of mathematics but strives to make his teaching vigorous, planned, purposeful, friendly and interesting (Ezekute & Ihezue, 2006). He uses a variety of teaching materials and methods in enhancing his students' interest in their study of mathematics.

METHODS OF GENERATING AND SUSTAINING INTREST OF STUDENTS IN MATHEMATICS

For generating and sustaining the interest of students in mathematics, a teacher should consider some of the following strategies:

1. PRACTICAL ACTIVITIES

Activities and practical experiences are vehicles through which the teacher leads his students in pursuant of the achievement of a given objective in mathematics (Usman & Nwabueze, 2011). The teacher has to be effective and the beginning point of this

effectiveness is mastery of the mathematics to the extent that he can teach it with confidence at the secondary school level. The teacher's personality is also important. In Nigerian context, he has to show warm affection necessary from time to time. The teacher must teach the subject practically (Ohuche,1989; Adetula, 2001). This is not intended to detract from the presumed fact that mathematics is an abstract subject. Rather, it is to stress that although this is the case, the subject can still be taught through illustrations, practical examples and models. The result is that abstraction can be made intelligible to most learners of mathematics at secondary school level. For example, in a topic like elevation and depression, two students of different heights- short and tall could be asked to come out to drive home the point. To teach closure law , for example, in a class consisting of Nigerians only (boys and girls) if a law is made that they should intermarry among themselves only, the children born can only resemble Nigerians (not mulatto).

Practical work should involve all the students in the class. If there is not sufficient apparatus for all of them to use at the same time the difficulty can sometimes be overcome by dividing the class into groups. If this is done, each group should know exactly what is should be doing. So often teachers are afraid to do this kind of thing – perhaps because having tried it once they found themselves with a disorganized class of youngsters. This can be avoided to a large extent if the whole class is told what each group will be doing before the students are told to which group they belong. Once a group has been selected and knows what it is to do the students concerned are not particularly interested to listen to instructions for another group.

Any teacher who has used practical methods will know what a difference it makes to the interest of the students and this alone should him to persevere with this approach (Usman & Nwabueze, 2011). Until our students are allowed to do things for themselves, rather than sitting in tidy rows while the teacher "tells" them how to solve their equations, this will not be easy. Each teacher can get his class over the initial difficult stage quite quickly if he is interested enough to make the effort.

2. MATHEMATICAL GAMES/PUZZLES

Again, mathematical games could be played to enrich the teaching of mathematics and thereby stimulate students' interest. This is the type of game that could well be played by choice to occupy moments of leisure. The question that readily comes to mind is this: Is there any need to actually play games if the object is merely to provide a setting for doing some mathematics?

Tapson (1997) gave three good reasons why this is necessary. First of all there is the intrinsic mathematics which is always present. Second, there is high level of interest and motivation which games-playing generates. Third and most important, is the deeper

understanding of the situation to be worked on which can be gained only by playing through several games. Far too often students are expected to try and analyse a situation of which they usually have little or previous experience. Here at least there is a chance to remedy that defect. However, it is good to bear in mind that not all students like playing games – especially if they are full-time losers. Apart from that obvious reason, there are some people who just do not like games at all, at least not of the variety we are considering here; fortunately, they are a minority. Games in which chance plays a part, perhaps where a die or some other randomizing devise is used, can be helpful in giving weaker players a better chance. Such games also serve to introduce the topic of probability. Some games involve arithmetic so in order to retain the game-like feel it is essential that the arithmetic is kept simple. It may be tempting to insert large numbers into the game or set higher target totals, but it should be resisted. The arithmetic should be easy enough to be done without any major effort after all, playing games is usually meant to be a social activity, a hobby, and a relaxation. National Mathematical Centre, (NMC) (2002) identified the role of mathematical games as follows:

1. Generation of interest and excitement about learning mathematics.
2. Activities which develop sense of competitiveness, bring satisfaction and pleasure to the students by improving creative use of mathematical and meaningful learning related to social needs.
3. Developing positive attitude toward mathematics.
4. Improvement of study habits.
5. Making practice period more pleasant and successful.
6. Enriching the mathematics vocabulary.
7. Introduction of new ideas.
8. Allowing for individual differences.
9. Revision of variety of mathematics skills.

For example, a practical way of teaching isomorphism can be done as follows:

   a. Draw out a strip of cells and write in the number 1 to 9

1	2	3	4	5	6	7	8	9

   b. Players take turns claiming a number- perhaps by putting their initial(s) in that cell – but it must allow the number to be seen which add up to 15. The player may actually "possess" more than three numbers, but only three of them can be counted.

Difficult to analyse? How many ways are there of making 15 with three numbers chosen from the above selection? This should reveal that some numbers are 'better' than others.

Try setting the nine numbers out as a magic square and have players select their numbers from that by crossing them out with their own distinctive signs (like, may be, a O and a X).

8	1	6
3	5	7
4	9	2

This is very practical example of an isomorphism.

Another puzzle goes thus: How old is the king, how many children has he, and long is his boat? Given that the product of three positive integers gives 32118 which answers these questions. The length of his boat is in metres, the king has sons and daughters, he has more years than his children, but he is less than one hundred years old.

Solution

Let a represent the number of children, b, his age, and c, the length of the boat.

Then $abc = 32118$ $such\ that\ 4 \leq a\ < b < 100$

$$= 2 \text{ x}3 \text{ x } 5353$$

$$= 2 \text{ x } 53 \text{ x } 303$$

$$= 2 \text{ x } 101 \text{ x } 159$$

$$= 3 \text{ x } 53 \text{ x } 202$$

$$= 3 \text{ x } 101 \text{ x } 106$$

$$= 6 \text{ x } 53 \text{ x } 101$$

Of these six possibilities, we reject all except the last one, and so we obtain

$$a = 6\,, b = 53, \qquad c = 101$$

The king has 6 children, he is 53 years old and the length of his boat is 101 metres.

Let us consider another puzzle.

A, B, C and D were riding bicycle together at night when they arrived at a suspended bridge which they have to cross. They only had one torchlight between the four of them and torch is essential in crossing the bridge. At most two of them can cross the bridge at the same time. A can cross in two minutes, B in three minutes, C in six minutes and D, in nine minutes. When two of them cross together they cross at the pace of the slower person. How should they arrange to cross the bridge in the least possible time?

Solution

First, we show that it is possible to cross the bridge in 20 minutes.

First, A and B cross, this takes 3 minutes

Then A returns with the torch, this takes 2 minutes.

Then C and D cross, this takes 9 minutes.

Then B returns with the torch, which takes 3 minutes.

Then A and B cross the bridge, taking a final 3 minutes.

Thus the least time = 3 +2 +9 + 3 + 3 = 20 minutes.

Now, we can show that it is not possible to cross the bridge in less than 20 minutes. There must be at least five (5) crossings to get everybody across the bridge.

If C and D don't cross the bridge together then there is one crossing that takes nine (9) minutes, one that takes six (6) minutes and another three (3) each taking at least two (2) minutes. This takes a total of 23 minutes. So C and D must cross the bridge at the same time. C and D can't make the first the first one or the last crossing because this would require one of them to make a return trip carrying the torch. This means that A and B must make the first trip, one of them then returns with the torch, C and D then cross. Whoever didn't return from A and B now returns with the torch and the two of them travel across the bridge.

Another puzzle goes thus:

An Army General was commanding a troop of soldiers in preparation to go to war front. He discovered that one soldier was left out when he tried to arrange them in 2s. He tried to arrange the soldiers in 3s, there was one left. He tried the troop in 4s, 5s, 6s , 7s with one soldier left at each attempt. He gave up the attempt since it is difficult to ordinarily arrange a troop like this in a parade how much more of controlling at the war front. How many soldiers were General trying to arrange?

Solution

We observe that at each stage the General was one soldier short. That is, if there had been one more soldier, the number would have been exactly divisible by 2,3,4,5,6, and 7. Therefore, the LCM of 2, 3,4,5,6,and 7 is 420. This is the smallest number with this property. Hence the General was arranging 419 soldiers.

3. USE OF INSTRUCTIONAL MATERIALS

The use of concrete/ instructional materials cannot be over-stressed. Instructional materials help to generate and sustain interest of students in mathematics in the classroom. Instructional materials help to concretize the abstract concepts in mathematics making them meaningful to students, capture students' interest, stimulate imagination, keep students busy and active, give room for effective retention of mathematical concepts, save teacher's time and lot of words to conserve the energy (Azuka, 2018). The good thing about this is that the students can take part in the production of some of these materials. The materials need not be expensive to procure. Expensive equipment is not essential and a great deal can be done with seeds, empty cartons, matchsticks, bottle-tops, sand, water, tins, paper, cardboard, etc. With the use of instructional materials, the teacher's energy will be saved a great deal. Most instructional materials appeal to senses: students can see, touch, measure, count these materials and this enables them to internalize the concept being taught and retention can be enhanced. According to Azuka (2018), Owora & Chika (2019), the use of instructional materials can stimulate both visual and auditory stimuli, especially in large classrooms or auditoria where modern technology can be used to control the size of the visual image and the amplitude of the sound so that all the students can hear/see.

4. SETTING UP OF MATHEMATICAL LABORATORY

Another way of generating and sustaining the interest of students in mathematics is by setting up a mathematics laboratory where students could weigh, measure and manipulate equipment. The case for laboratory approach to mathematics teaching is that since we have put a premium on active and relevance of what is learnt, the student should be a willing partner in his learning. Observation is a useful assessment technique in the mathematics laboratory. Cognitive, affective and psychomotor performance can be observed in that setting. Also, class assignments, projects and other practical activities can be observed and used as components of our determination of the students' progress. Iweka (2006) summarize the use of mathematics laboratory as a medium of instruction as follows:

1. Learning in students is related to past experiences and provides new experiences when needed.
2. Investigation of interesting problems are made available to students.
3. The teacher provides a non-threatening atmosphere conducive for learning.
4. Students progress at their own rate and take responsibility for their learning.

5. FORMATION OF MATHEMATICAL CLUB

Students can be encouraged to have interest in mathematics by the teacher through recreational and mathematics club which can be formed in the school. The mathematics club plays important role in creating interest in mathematics in school. This helps the

students in having an idea of the practical utility of mathematics in addition to creating their interest in mathematics. Mathematics club is useful in arousing and maintaining interest in mathematics (Owora & Chika, 2019). This can be an avenue for rubbing minds together on problems of common interest. Projects could be cooperatively executed in this group. 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 discussions, and debates and mathematical innovations. It provides an opportunity for leadership, cooperation, joint responsibility, active participation and organizing programmes (Iweka, 2006; Owora & Chika, 2019).

6. RECOGNITION OF GOOD STUDENTS

  It is not enough for the teacher to know the subject-matter, the teacher must know the students he is trying to impart the knowledge and must know how to impart the knowledge artistically (Azuka, 2018). Good students (in mathematics) could be decorated with badges or emblems during the assembly for others to see and emulate. This could be done weekly or termly to allow for healthy rivalry among the students. Fast improving students should be recognized and encouraged. Recognition of students enables teacher to know how to tackle students' misconceptions and errors, present approaches to overcome the misconceptions, predict students' thoughts and possible solutions, and encourage them to produce different solutions (Adoke, 2018). Knowing good students will enable the teacher to inspire the students to mathematics success, energize the student for achievement, liberate the student from career limitations, free the student from mathematical fear and enable the student's dream to come true (Adetula, 2001).

7. ADOPTION OF READER FRIENDLY MATHEMATICS TEXTBOOK

A textbook should not be judged by its cover but by its content. A good mathematics textbook should be the one written in simple and understandable language (Adetula, 2001; Azuka, 2018). It should be free from mistakes. It should be written within the grasp of the students. It should provide sufficient materials to motivate students to solve problems. The textbook should be such that contains many examples and illustrations. At the same time, it should have enough exercises for students to practise both at home and in the school. The exercises should be graduated to cater for average and highly gifted students. In a situation where the exercises are above average, the interest of students could be dampened if they can hardly solve one or few problems. One or two problems could be included for highly gifted ones so as to challenge them for further studies. Odili (2006) gave the following as qualities of a reader- friendly textbook:

1. A mathematics textbook should be written in accordance with the aims and objectives of teaching the subject in that particular class.

2. It should be well illustrated.
3. There should be diagrams and figures wherever needed.
4. It should be free from mistakes.
5. It should be written within the grasp of the children.
6. It should provide sufficient materials to motivate the students to solve the problems.
7. It should provide for individual differences. It should meet the needs of students of varying abilities, interest and attitudes.
8. There should be sufficient provision for revision, practice and review.
9. The textbook should relate the classroom learning to real life needs and the physical and social environments of the learners.
10. It terms and symbols used must be those which are popular and internationally accepted. All the terms, concepts and principles used in the text should be clearly and accurately stated and defined.
11. The textbook should contain difficult problems or exercises to challenge the mathematically gifted students.

8. COUNSELLING

Words of encouragement should be used lavishly by the teacher instead of flogging, scolding or abusing. Some discouraging words like; "you, big for nothing", "you big head", " do you think mathematics is for people like you?" should be avoided in a mathematics lesson. Obodo (2004) remarked that counselling helps students to build confidence, encourages questioning and makes space for curiosity, emphasizes conceptual understanding over procedural, provides authentic problems that increase students' drive to engage with mathematics and encourages positive attitude about mathematics. A mathematics teacher needs to take the role of counselor to address the mathematics anxious students he/she has in his/her class. As a society, we must work together to extinguish the discomfort our children are having toward mathematics in an age of Science, Technology, Engineering and Mathematics (STEM). It is important that all students feel confident in their ability to do mathematics in an age that relies heavily on problem solving, technology, science and mathematics.

9. MAKING THE EVALUATION PROCEDURE KNOWN TO STUDENTS;;

Let the students know that the process of solving a problem is much more important than the answer itself. Emphasis should be laid on the process rather than the answer. If a teacher marks a set of work and most students have several mistakes, it is likely that the work has not been understood well. The teacher should endeavour to make the students know their pitfalls (West African Examinations Council, (WAEC), 2006). WAEC has these to say about candidates' weaknesses:

1. Lack of full grasp of the meaning, properties and application of logarithm of numbers;
2. Failure to follow instructions in some questions;
3. Wrongly interpreting segment as a sector hence calculated arc length instead of the chord;
4. Most candidates unable to handle questions on mixture;
5. Many candidates did not know how to derive the slope at the given point;
6. Many candidates did not know how to derive the slope of a graph at a given point;
7. Most candidates did not know that locus l_2 consists of both the external and the internal bisector of the angle in question. Many candidates normally construct only the internal bisector.

As a means of overcoming these weaknesses, WAEC (2006) opined that candidates should be exposed to frequent practice, teachers too are advised, while teaching, to have a good coverage of the syllabus.

10. USE OF HISTORY OF MATHEMATICS

The recognition of the pedagogical importance of the history of mathematics is certainly not new (Ojo, 2018; Barwell, 1913; Fishman, 1965; Thomaidis, 187; Toumasis, 1993). Especially in recent years the importance of the history of mathematics has been widely recognized and promoted (Jones,1957; Jones, 1980; Grantan,1978). Many excellent works can also be used as sources to introduce historical material in the teaching of high school mathematics (NCTM, 1969; Walter, 1975; Read, 1970). History can substantially add to students' value of mathematics learned from the past and in the present.

This article encourages using history in teaching. By including it, we can rescue students from the island of mathematics and relocate them on the mainland of life that contains mathematics that is open, alive, full of emotion and always interesting. Consider exploring enough history to improve mathematics learning by students at all levels.

What can the history of mathematics do for our students? First, it can substantially humanize it. Mathematics heroes and heroines need to be regarded in the same way as such great men and women of history as Alexander the Great, Abraham Lincoln, Marie Curie, or Mother Teresa. Do our students know history's mathematicians as well? What do they know about of Archimedes, Hypatia, Newton, Ramanujan, or Noether? Do they know about Sophie Germain, among other women, was forced to unite under a man's name to have her work recognized or that George Cantor had mental breakdowns because his work was not accepted by his peers. We need to bring biographies into the mathematics classroom. Students should read books and report on stories about mathematicians. Famous

stories can be told and discussed about Cardan – Tartaglia, Newton – Liebniz, Kronecker – cantor, or the difficulties of women and minorities.

What else can history do in the classroom? It can explain a great deal of 'whys' in mathematics. Why do we use such words as numerator, average, radius and hypotenuse? Why do we have sixty minutes in an hour or seven days in a week? Why do we use symbols in mathematics? Why do we use the equals sign? All conventions arose through various reasons which can be discovered by reading history and researching etymology.

This natural way of incorporating history into the everyday teaching helps both teacher and students to discover the beauty of the history of mathematics, providing at the same time awareness that it was not always the way it is today, and hence it might have been otherwise as well as that mathematics might be taught in some different way.

11. TEACHER'S METHODOLOGY

It is a well-known fact mathematics curriculum we are operating is vocabulary intensive. Students must learn the terminology of mathematical concepts – addition, quotient, reciprocal, coordinates as well as operational language – "One fifth of twenty", "what is the difference between …?" They should learn quantitative prefixes like mono - , bi, tri – and multi – and should compile individual glossaries of the terms they learn (Bidwell,1993). Whenever mathematics is taught, teachers can, stimulate students' interest thereby increase their chances of success by employing some of or all these techniques (Sobel, 1975):

1. Never assume learners already understand mathematical terms. Allow students to work cooperatively with flash cards showing the term on one side and the symbol on the other; for example, Side A, "is greater than" Side B. ">".
2. Check constantly for comprehension of both mathematical concepts and English meaning. Use charts and diagrams to convey concepts, and then identify and teach related linguistic terms.
3. Occasionally elicit rapid "yes – no" or multiple choice responses rather than time-consuming English – intensive answers in which students must generate their own sentences. Ask, for example, "Is one-fifth greater than or less than twenty-five percent?" rather than "What is the relationship between one-fifth and twenty-five percent?"
4. Encourage accuracy not speed. In oral question-answer sessions, for example, insist on silent period to allow undisturbed processing time for decoding English meaning and computing answer.
5. Stress process, not answers, and limit word problems to an essential few. To emphasize process and facilitate reading of word problems, use group activities

and such instructions as "underline the mathematics – operation words", " circle the data needed", and " List or diagram the steps called for".

6. In mixed classes, have students with regular and limited English skills participate in small groups to help decipher word problems. Have one student read the problem aloud, another paraphrase it and explain its meaning, still another select the essential data, and one or two participants describe the process needed to solve the problem.

7. Start with familiar object since learning is easier when progress is from known to unknown.

8. Variation kills monotony; vary your method

9. Relate operations with numbers to real life situation where possible. It sparks off curiosity and interest of students when they see the usefulness of the operations they perform.

10. Teacher must show humour in the class so as to keep the students alive and attentive.

11. Present a challenge that can lead to the lesson. When students are challenged intellectually, they tend to react with enthusiasm. The challenge must be within reach of the ability of the students.

12. Teach the students to discover a pattern. Setting up a contrived situation that leads students to discover a pattern can often be quite motivating, as they take pleasure in finding and owning an idea. Rather than adding numbers in sequence, students can add the first and last (1 +100 =101), and then the second and next-to-last (2 + 99 = 101), and so on. They all have to get the required sum which is 50 x 101 = 5,050. The exercise will give students an enlightening experience with a lasting effect.

CONLUSION

If mathematics is to be interesting rather a dull experience for the students, the first step must be to make it a positive rather than a negative emotional experience for the teachers. They must be supported in public, adequately resourced, freed up to get on with the job of teaching, and given enough professional responsibility to develop their own teaching styles. You need satisfied, confident teachers to produce satisfied, confident students. The teacher is a major learning resource in mathematics at any level. If he is effective, he is a catalyst, a stimulator, an inspirer and a facilitator (Adetula, 2001). He has to be able to facilitate learning by creating opportunities which enable learner to investigate situations. He has to have internalized techniques which enable him to go beyond ordinary routine questions ending at the knowledge level (Ohuche, 1989). Comprehension, application, analysis, synthesis and evaluation which may together be called higher intellectual skills and abilities have to be viewed by the mathematics teachers as important attributes to be acquired by his students.

SUGGESTIONS

Mathematics teachers should be encouraged to adopt instructional materials in teaching mathematics topic/concepts. This will make mathematics gain popularity, capture the interest of students, 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.

REFERENCES

Adoke, I. (2018). Mathematics Club: A panacea of students' Interest and Performance in Mathematics in Yenagoa Education Zone of Bayelsa., Nigeria.

DOI: 10.30845/jesp.v5n3p23.

Adetula, L.O. (2001). *Mathematics Classroom Strategies.* Paper presented during an NMC workshop for Mathematics educators of Tertiary Institutions. Abuja. May.

Ale, S.O. (1981). Difficulties facing Mathematics teachers in developing countries. A case study of Nigeria *Educational Studies in Mathematics* 12(1) January, 483.

Azuka, B. F. (2018). Strategies for the Development of Students' Interest in the Study of Mathematics in Schools. *National Mathematical Centre's Mathematical Sciences Education Journal* 5(1), 782.

Barwell, M.(1913).The advisability of including some instruction in the school course on the
history of Mathematics. *The Mathematical Gazette*, 7, 72 - 79.

Bidwell, J. K.(1993). Humanize your classroom with the History of Mathematics. *The Mathematics Teacher* 86(6); 461 – 464.

Blake, S. (1994). " Does Maths Teaching Matter?" *Mathematics in School* 23(2), March, 30-31.

Egara, O.F.(2010). *Effect of Computer Simulation on achievement and interest of students in Algebra at junior secondary school level* (Unpublished M.ED thesis). University of Nigeria, Nsukka.

Ezekute, O.G. & Ihezue, C. (2006). The History of Mathematics for Tertiary Institutions. Onitsha:Symac Printing & Design Ltd.

Fishman, J. (1965). *Trends in secondary school mathematics in relation to educational theories and social changes:* 1893 – 1964. Unpublished doctoral dissertation, New York University, New York.

Grantan – Guiness, I. (1978). On the relevance of the history of the history of mathematics to mathematics education. *International Journal of Mathematics Education in Science and Technology*, 9, 275 – 285.

Harbor-Peters, V.F.A. (2002). Attitude and interest of the students to the mathematical science in Nigeria. *A commissioned Paper for the Mathematical Sciences Education Summit,* organized by National Mathematical Centre, Abuja.

Hornby, A.S. (2010). *Oxford Advanced Learners Dictionary of Current English 8th Ed.* Oxford: Oxford University Press.

Iweka, S. (2006). *Effect of inquiry and laboratory approaches of teaching geometry on students' achievement and interest* (Unpublished M.Ed. thesis). University of Nigeria, Nsukka.

Jones, P.S. (1957). The history of mathematics as a technology tool. *The Mathematics Teacher,* 50, 59 -64.

Jones, P.S. (1980). Speech given at Valparaiso University, Valparaiso Indiana, 25 April, 1980. Unpublished.

NCTM (National Council of Teachers of Mathematics), (1969). *Historical topics for the mathematics classroom.* Thirty – First Yearbook, Washington D.C.

NMC (National Mathematical Centre),(2002). *Mathematical Games for Secondary Schools*. Abuja: Marvelous Mike Press Limited.

Obodo, G.C. (2004). *Principles and practice of mathematics education in Nigeria*. Enugu: Floxtone Press.

Odili, G.O. (2006). Mathematics in Nigerian secondary school: A teaching perspective. Port- Harcourt: Anachuna Educational Books.

Ohuche, R. O. (1989). *Teaching senior secondary school mathematics creatively*. First Edition. Onitsha: Summer Educational Publishers (Nig.) Ltd.

Ojo, S. G. (2018). Teaching Logarithm through 'Historico – Genetic' Approach. *National Mathematical Centre's Mathematical Sciences Education Journal* 5(1), 792.

Owora, N. O. and Chika, C. U. (2019). Strategies for Arousing Students' Interest in Mathematics, ABACUS; *Journal of Mathematical Association of Nigeria*; 44(1): 201 -210.

Read, C. (1970). Periodic articles dealing with the history mathematics: A Bibliography of articles in English appearing in nine periodicals. *School Science and Mathematics*, 68, 415 -453.

Sobel, M. A. (1975). *Teaching Mathematics. A sourcebook of aids, activities and strategies*. New Jersey: Prentice Hall, Inc.

Tapson, F. (1997). Mathematical Games. Mathematics in School, 26(4), September, 3-5.

Thomaidis, Y. (1987). *Genesis and development of logarithmic concepts*. Thessaloniki study Group on the History of Mathematics (in Greek).

Toumasis, C. (1993). Teaching Logarithms Via Their History. *School Science and Mathematics*, 93(8), 428 – 434.

Usman, K.O. and Nwabueze, M. U. (2011). Promoting Students' Interest in Quadratic Equation Area- Tiles to Approach Mathematics Instruction, ABACUS; *Journal of Mathematical Association of Nigeria*; 36(1): 74 -84.

Walter, P. (1975). *History of mathematics topics for schools*. Milton Keynes U.K.: Open University Press.

WAEC (2006). *Chief Examiners' Report*.