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PROBLEMS ENCOUNTERED BY STUDENTS IN LEARNING MATHEMATICS

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ABSTRACT

Mathematics is compulsory subject at primary and secondary level. But students have low interest in this subject. In this paper, we discuss about some of reasons behind lack of interest in mathematics paper among students at school/college level. We have discussed place of mathematics in academics, aims of teaching mathematics, why do students struggle with mathematics and how to arouse interest in mathematics?

KEYWORDS: Mathematics, Interest, Learning, Factors, Knowledge.

I. INTRODUCTION

Mathematics, in a way, is a logic and reasoning based language that gives us a set of rules and code to write and communicate logic, as well as to derive conclusions from it. "Mathematics is not about answers, it's about processes". From an elementary school volunteer, "Mathematics is more than a subject we learn in school. Mathematics is every breath we take and every second of the day. From the moment we wake up in the morning mathematics is core of everything we do." From a first grade Teacher:

Math is you.

Math is me.

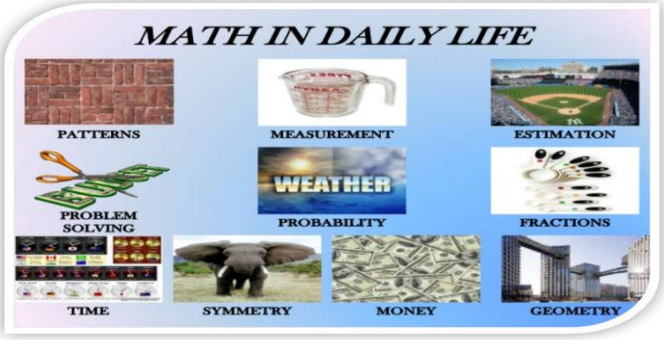
Math is everything we see!

Infinity and beyond our wildest dreams

Math encompasses all extremes!"

1. 'Mathematics is the science of quantity' (Aristotle)
2. Mathematics is the language with which God wrote the universe' (Galileo)
3. Mathematics is a gate and key of sciences! (Bacon)

Hence, Mathematics is the cradle of all creations without which the world can't move an Inch. Be it a cook or a farmer, a carpenter or a mechanic, a shopkeeper or a doctor, an engineer or a scientist, a musician or a magician, every one needs mathematics in their day to day life.



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Even looking at all relations and uses of mathematics with other streams, we find there is lack of interest among students in learning of Mathematics. There are several factors affecting this learning. But there are also some solutions for arousing interest in mathematics.

II. AIMS OF TEACHING MATHEMATICS

Before teaching mathematics, one should necessarily know the aims/objectives of teaching mathematics.

2.1 Intellectual and disciplinary

2.2 Social and moral aims

2.3 Inter-disciplinary aim

2.4 Self learning aim

2.5 Cultural Aim

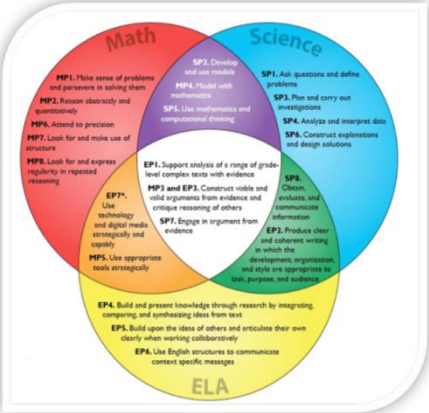
2.6 reoperational aim

2.7 Vocational aim

2.8 Utilitarian aim

2.9 Aesthetic and recreational aim

III. MATHEMATICS AS A LANGUAGE



IV.PROBLEMS OF STUDENTS IN LEARNING OF MATHEMATICS

Mathematics is critical to the study of any STEM subject indeed historically the development of science, technology, engineering and mathematics has often gone hand in hand. In this we explore some of the main mathematical problems arising far from simply a lack of content knowledge, we believe that the main area of concern is in mathematical process skills.

Students don't know enough mathematics. Sometimes certain content knowledge was lacking those teaching biology, chemistry, physics and engineering courses often claimed that students did not know enough about various topics in mathematics. Sometimes this lack of content knowledge was obvious. Students in engineering need to know about complex numbers. Biologists needed to know about graphs and equations.

The following core topics seemed to emerge across many disciplines:

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Sr. No.	Topics	Easier Application	Harder application units
1.	Measurements	Interpreting animate	Units
2.	Estimation	Real wood contexts	Problems with missing data
3.	Equations and graphs	Growth curves	Scientific curves
4.	Areas and Volumes	Approximating natural shapes	Packing structure
5.	Calculus	Finding Maxima and Minima	Rates of Changes

4.1 Lack of Multi – Step Problem Solving Skills

As in Mathematics there is one more common problem, there are students who are not well versed in solving multi – step application of their mathematical knowledge.

4.2 Lack of Ability to Make Approximations or Estimations

In order to apply mathematics predicatively approximations or estimations will need to be made. To make approximates or estimations requires the students to rarely understand the meaning and structure or mathematics along with the underlying scientific meanings.

4.3 Lack of Practice

There are two ways in which lack of practice can impact mathematical or symbolic manipulation. Second is lack of practice at thinking mathematically in a scientific context.

V. WHY DO STUDENTS STRUGGLE WITH MATHEMATICS

A major component of the child control systematic teaching approach is content. The discipline of mathematics presents many challenges to dissimilar learners.

Mathematics has often been termed the 'gate keeper' of success or failure for high school raduation and carrier success. It is essential that mathematics become a pump rather than filter in the pipe line.

Students fall below their expected level of mathematics achievement for a variety of seasons. When asked why they were not as successful in learning mathematics? Many people reply that "never understood math" or "never liked it because it was too abstract and did not relate to them". These reasons and others associated factors can be categorized in general as environmental or personal individualized factors.

5.1 Factors Affecting Learning of Mathematics

5.1.1 Demographic factors: Various demographic factors are known to be selected to mathematics achievement gender. So do economics static's and parent's educational level are factor that have been analyzed in this study or predictors of math achievements.

5.1.2 Gender: Gender issues on math achievement are studied most frequently by researchers. For instance a study through meta – analysis reveals that males tend to do better on mathematics tests that involve problem solving (Hyde, Fennema and Lanon 1990). On the other hand, females tend to do better in computation and there is no significant gender difference in understanding math concepts. An another study shows that females tend to earn better grades than males in mathematics (Kimball 1989). Gender

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differences in attitudes and perceptions of the usefulness of mathematics for middle school students were found statistically important. For example female students show less interest in mathematics and have negative attitude towards mathematics. It is also reported that girls tend to learn mathematical concepts by means of rules or cooperatives activities. While boys have a tendency to be in competition to master mathematical concepts (Fennema and Peterson 1985). The literature or gender differences provides evidences that gender issues impact achievement in mathematics. Hence it is crucial for educators and researches to pay attention to gender differences in the design of mathematics instruction.

5.1.3 Socio – Economic status:- A number of studies shows that parents with higher socio economic status are more involved in their children's education than parents of lower socio economic status. This greater involvement results in development of positive attitudes of children toward school, classes and enhancement of academic achievement. It is believed that socio economic status negatively influences academic achievement because it prevents students from accessing various educational material and sources and creates a distressing atmosphere at home. For these reasons socio economic status of student in a common factor that determines academic achievement.

5.1.4 Parents educational level: Parents educational level has been shown to be a factor in academic achievement. Parents always serve as role model and a guide for encouraging their children to pursue high educational goals and desires by establishing the educational resources on hard in the home and holding particular attitude and values towards their children's learning. So educational attainment of parents serve as an indicator of attitudes and values, which parents use to create an environment that can affect children's learning and a chievement.

5.2 Instructional Factors

5.2.1 Curriculum: It is observed that the existing math curriculum emphasize not so much a form of thinking. The process of calculation or computation only involves the deployment of set routine with no room for ingenuity or flair, no place for guess work or surprise, no chance for discovery, no need for the human being in fact.

The concerns have here are not that students should never learn to compute but that students must learn how to critically analyze mathematical problems and produce effective solutions. Many mathematics curriculum over emphasize memorization of facts and under emphasize understanding and applications of these facts to discover, make connections and test math concepts. So this is also a major factor affecting learning of mathematics in students.

5.2.2 Instructional strategies and methods: Being successful in mathematics involves the ability to understanding one's current state of knowledge, build on it, improve it and make change or decisions in the face of conflicts. It is pointed out that for students to accomplish learning teachers should provide meaningful and authentic learning activities to enable students to construct their understanding and knowledge of this subject domain. Instructional strategies shake the progress of student's learning. So instructions, strategies and methods must be designed that will provide students with learning situations, where they can develop and apply higher order operations and critical for mathematical achievements.

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5.2.3 Teacher competency in math education: Many studies report that what teacher know and believe about mathematics is directly connected to their instructional choices and procedures. In 21st century one shifting paradigm in education is about teachers in roles and competencies findings from research on teacher competency point out that.

If teachers are to prepare an ever more diverse group of students for much more challenging work for framing problems findings, integrating and synthesizing information – creating new solutions, learning on their own and working co – operatively, they will need substantially more knowledge and radically different skills than most now have and most schools of education and develop.

5.2.4 School contexts and facilities: School content and its facilities is also an important factor affecting the students achievement. In fact identifying factors related to school environment has become a research focus among educational practitioners. Research suggests that student's achievement is associated with a safe and orderly school climate. Researchers also found a negative impact on student achievement where deficiencies of school features or components such as temperature, lighting and age exist. The findings indicated that a high population of students had a negative effect on student achievement.

5.3 Individual Factors

5.3.1 Self direct learning: Self directed learning could be a factor in student's math achievement. Mathematics learning requires a deep understanding of mathematical concepts, the ability to make connections between them and produce effective solutions to ill structured domains. There is no perfect well – structured planned or prescribed system that lets students think and act mathematics. It can be done if and only if students play their assigning role in their learning process.

5.3.2 Arithmetic ability: Arithmetic ability could also be another predictor of math achievement. Arithmetic ability includes the skills such as manipulating mathematical knowledge and concepts in ways that transform their meaning and implications. It allows students to interpret, analyze, synthesize, generalize or hypothesize the facts and ideas of mathematics. Students with high arithmetic ability of mathematical reasoning can engage in tasks such as solving complex problems, discovering new meanings and understanding and arriving at logical conclusions.

5.3.3 Motivation or Concentration: Mathematics education requires highly motivated students because it requires reasoning, making interpretation and solving problems mathematical issues and concepts. The challenges of mathematics learning for today's education is that it requires disciplined study, concentration and motivation. To meet these challenges learning must be focused and motivated to progress.

VI. AROUSING AND MAINTAINING INTEREST

To arouse and maintain the student's interest in mathematics is a major problem for the teachers. He knows that loss of interest is one of the principal causes of student failure. Students work most effectively at tasks in which they are genuinely interested. Students, as a rule, readily become interested in things which are new or exciting, for which they can perceive practical values and which involve puzzle elements or elements of mystery. Their

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interest is easily caught by anything new, but such interest is fleeting. It is easier to interest students in their work than it is to keep them interested after the novelty of the work has worn off.

The elements of novelty, usefulness, and sheer intellectual curiosity are the primary stimuli for the awakening of interest. The work should present a continual challenge, but it should be a challenge in the real sense and not merely drudgery at meaningless, difficult tasks. Interest in the subject can be effectively aroused and maintained by numerous special devices and activities.

VII. INTELLECTUAL ACTIVITY

Let there be no presumption that the students are intellectually lazy. The student's interest can definitely be stimulated through a challenge to his curiosity. "Mathematical situations lack, of course, the lurid "human interest" of the ordinary mystery novel, but they do not lack the essential curiosity provoking possibilities." Mathematic exhibits fully the power of man to think consistently and logically. In the case of some students, this value of mathematics creates an appealing interest of highest importance.

A natural motive for man's fight against his environment is his desire to understand and consequently to control it in some measure to suit his own purposes.

This intellectual activity is governed by three motives : (1) thirst for knowledge, (2) love of truth and beauty, (3) desire to interpret and control environment. Of course, the cultivation of these may require certain discriminating abilities and maturity of thought which usually result from the application of more elementary means of motivation. As the student progresses in learning, these motives can become increasingly effective in controlling his activity. To make them controlling factors in the learning process should be one of the principal aims in teaching.

VIII. THE PRICIPILE OF CHANGE

Monotony should not be allowed to settle over the classroom atmosphere. A topic should not be continued for too long a period. No aid or device should be employed over and over again.

8.1 Physical Conditions for Study

Room temperature of about 68° F is considered best for study. All necessary study accessories such as paper, pencil, ruler, compasses, notebooks, mathematical tables, etc., should be at hand. Physical discomforts should be eliminated. Distractions should be removed or avoided. Work should be started promptly at a fixed time and continued without interruption until it is completed. At home, the student should be given a quiet room, well lighted and ventilated, with a chair and table for convenient work.

8.2 Psychological Conditions for Study

8.2.1 Avoid unnecessary distractions and interruptions

8.2.2 Cultivate concentration

8.2.3 Keep the mind alert

8.2.4 Develop self-confidence

8.2.5 Practice critical thinking

8.2.6 Proceed systematically and thoroughly

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8.2.7 Analyze difficulties

8.2.8 Learn accurately the fundamentals

8.2.9 Clarify thought by writing

8.2.10 Verify results

8.2.11 Be prepared for discussion

The above mentioned conditions, if provided and enforced will surely lead to better results.

IX. CATALOGUE OF GENERATORS OF INTEREST IN MATHEMATICS

9.1 **The teachers**: If the teacher is interested in mathematics, his student will also show interest in it. If, on the other hand, he dislikes mathematics his students/pupils will also dislikes it. A teacher who is interested in mathematics will regularly practice it. As a result of this he will be strong in it and teach it with enthusiasms.

9.2 **Motivation**: Motivation is the arousal of tendency to act to produce one or more effect. A motive is a force which propels or drive student in a given direction. A student therefore needs to be motivated so as to generate interest in mathematics. There are two kinds of motivation extrinsic and intrinsic; both should be used extensively in generating student's interest in mathematics.

9.3 **Effective use of instructional materials:**

Instructional materials are materials that help the teacher to pass the knowledge (message) to the pupils more effectively. They help to reduce the level of abstraction in teaching and learning of concept.

Instructional materials help to capture the learner interest. They also keep the students busy and active. They give room for effective retention of mathematical concepts. Teaching aids save time.

9.4 **Through mastery of topic before new ones are introduce:** Students should be given sufficient practice on different sums of the same type. This helps them to consolidate their knowledge. They should be given an opportunity to practice with relatively simple example before difficult ones are introduced.

9.5 **Individual differences should be catered for**: In order to as arouse student interest, exercises and examination should be well graded; i.e. there should be question for slow learner, average students and the talented students.

9.6 **Application of mathematics to other professional fields**: The teacher should always points to the students that mathematics is the key to other subject such as Anatomy, Engineering, Geology, Medicine, Commerce, Agriculture, Accounting and Banking. By pointing out these applications, teachers can render valuable service in stimulating the student's interest in mathematics. This will make student who want to be Engineers, Doctors; to pay mote attention to mathematics.

9.7 **Statement of Instructional Objectives:** Instructional objectives show the level of proficiency and conditions of performance which are expected of the student at the end of the lesson. Usually, they are stated with actions verbs. Most of the recent secondary school text books carry instructional objectives at the beginning of each chanter. Statements of objectives should be made known to the students at the beginning of a lesson in order to arouse student interest. When the students know their destination they will strive harder to achieve the objective.

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9.8 **Principle of Change:** If interest is to be aroused, monotony should not be allowed to settle over the class atmosphere. A topic should not be continuing for long period. No teaching aid should be used over and over again.

9.9 **Recreational Values:** The aim of teaching mathematics for fun should receive some attention. The use of mathematical puzzles context and quiz also attract student's attention to mathematics.

9.10 **Mathematics Laboratory:** The establishment of a mathematics laboratory is another way of stimulating interest I learning mathematics. A mathematics laboratory is a place where geometric shapes/models can be constructed. Teaching aids can also be made and kept at mathematical laboratory.

9.11 **Mathematical Game:** The teaching of many topics in mathematics can be based on the principle of learning through play. The following are good example of game. Shopping game, lido, what is my line?

9.12 **Pattern Arouse students Curiosity**: Curiosity is a powerful motivator and the search for pattern arouses student's curiosity when students start to think of mathematics as the study of search for patterns, they develop far greater and more intelligent interest in the subject.

i) e.g. 37 X 3 = 111

37 X 6 = 222

37 X 9 = 333

37 X 12 =----------

37 X 15 = ----------

ii) e.g. $(1)^2 = 1$

$(11)^2$=121

$(111)^2$= ----------

9.13 **Mathematics Club**: Like other subject's clubs and societies, there is a genuine place for a mathematics club in our schools today. Broadly speaking it can be organized in the same way as other clubs or even co-curricular societies like Literary and Debating society, Dram Club and many more. The club can serve the following purpose:

9.13.1 It can provide a forum for mathematics activities

9.13.2 The club will be a medium of developing student interest in the subject.

9.13.3 It will provide to the students an opportunity of listening to expert and teachers from outside.

9.13.4 It can provide an agency for providing intra and inter school mathematics competition.

9.14 **History of Mathematics**: Another medium of generating student interest is the use of history of mathematics. Children like listening to stories. If teachers tell the students the history of great mathematicians such as Gauss (who invented the formula for summing 'n" numbers when he was in primary school) they will surely arouse student's interest in mathematics.

9.15 **Computer Aided Learning:** Computer is becoming more common all over the world. Teachers can use computer assisted learning packages to stimulate student's interest in mathematics. There are also

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so many tutorial lessons, mathematical games on line. Children who are computer literate can take advantage of these facilities.

9.16 **Practical Values:** In order to arouse student's interest, more practical lesson should be given attention in our schools in addition to mathematics laboratory. When it comes to topic like measurements of length, weight and capacity, practical should be given emphasis. The writer from experience has seen several situations where children can add, subtract, multiply, and divide quantities in meters and centimeters, but they do not actually know how long 1m is.

9.17 **Exercise should be relevant to student's experiences:** In order to make learning more meaningful and more interested, the exercises given to the students should be more relevant to their real life experience. E.g Shopping, it not feasible to spend 10 kobo, 5 kobo, 15 kobo any more in most of our towns, therefore exercise should reflect what is obtainable at present.

9.18 **Teachers' motivation:** Mathematics teachers need to be motivated. They should be given special allowances, so that they will be more dedicated to their work. It's when they are motivated that they will arouse the pupils' interest.

9.19 **Student Scholarship**: National Mathematics center, Mathematics Association of Nigeria and other mathematics bodies should continue to give scholarship to students who study mathematics at higher level. This will attract more students to the field.

9.20 **Retain the teachers.** This can be done by reviewing the salary of teachers and front payment of such salaries monthly.

X. CONCLUSION

Having listed some of the causes of low interest in mathematics and how to arouse student's interest in, mathematics it's important for the teachers of mathematics to reflect these points in their teaching so that they can attract more people to this important subject. The government at all levels should give mathematics the attention that it deserves because without development of mathematics, significant progress in science and technology is not possible.

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