LEARNING ENVIRONMENT: A SINE QUA NON TO LEARNING MATHEMATICS

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ABSTRACT
Environmental influence is a strong determinant of students' performance in school Mathematics being a subject that dread so many students, is supposed to be learnt in a conducive environment where everything needed for its effective teaching is adequately provided for to ensure its effective impartation. In Nigeria, environment has been a major problem to the achievement of the goals and objectives of education. In this paper, the various environmental factors that can greatly influence students' performance in mathematics were considered. It was therefore recommended that government should provide learning environment that supports values, and affirms the diverse needs of all learners and also to design and equip classrooms that encourage active learning and use of technology.

INTRODUCTION
Factors Affecting Learning of Mathematics

1. LEARNING ENVIRONMENT
Many factors affect student learning of mathematics and other subjects. One of such factors is learning environment of students. Learning environment is majorly concerned with the space and setting where teaching learning activities take place.

Learning environment is not all about classroom arrangement and school buildings, but embraces so many factors like social environment, structural environment, human resource, political environment and cultural environment of learning Tarn (1994). For comprehensive understanding of learning environment, the factors mentioned above shall be extensively deliberated upon.

a. **Social Environment:** Social environment of a school includes human behavior, perception and belief, and these may change with time. Social environment deals with relationship among students, relationship between students and teachers, how students respond to extra curricula activities, how they interact with learning environment etc. when social environment is conducive, students tend to cooperate more among themselves which can have great influence on students performance in mathematics and other subjects. Students can be successful in mathematics when students, faculty and institutions collaboratively develop strategies, constructively confront the changing mathematics environment.

Communication of mathematical ideas can extend beyond the classroom door. "Learning occurs within the boarder of social system that pervades the campus". Thus, mathematics department needs to look for ways to encourage school or faculty-student and student-student interaction outside of the mathematics class through mathematics clubs, local internships, speakers, mathematics-related field days, mathematics" contests, study groups and peer tutoring. Students can also benefit from a college tutoring center or mathematics resource center, staffed by qualified trained tutors who themselves are students or employees of the college. To enhance effective studies based on the social environment, mathematics centers are to provide the following, multiple and varied resources for students, peer and professional tutoring, student workshops focusing on learning styles and reducing mathematics anxiety, opportunities for students to work individually and in groups and adequate space for mathematics tutoring.

An academic testing center can supplement classroom activities by offering out-of-class testing, make-up testing and placement testing. From the classroom to the testing center, from the mathematics club to the tutoring center, a successful environment is the result of careful planning and input from mathematics faculty/school and cooperation and commitment of everyone within the institution.

Social environment is enhanced by moderate school size. Bates (1993) noted that people in small schools and units come to know and care about one another to a much greater degree than is possible in large schools. Communication is an important factor for effective learning but where there is a large class, communication will be ineffective as large class is plagued by noise, distractions and truancy among the students. Smaller classes allow teachers to provide individual attention to students who need help, and reduce discipline problems so, teachers can teach and students can learn. Berlin and Cienkus (1989) are of the opinion that staff and students generally have a strong sense of personal efficacy in small schools and units and that, students take more of the responsibility for their own learning, learning activities are more frequently individualized, classes are smaller, and scheduling is much more flexible.

Social environment of a school can influence the attitudes of students toward school and is greatly associated with social activities taking place in schools. Students1 attitudes to school proved to be weakly and inversely associated with school outcomes. Ainley, Foreman & Sheret, (1992) noted that positive school attitudes are not necessarily associated with school achievement. Student can find school a satisfying experience regardless of their achievement levels or commitment to completing then schooling. Silins and Murray-Harvey (1998) emphasized that students achieving at lower levels can find school satisfying in terms of social engagement and relevance of the work they undertake. Perhaps students who place a value on the social interaction aspect of school may have less time for, and be less inclined towards academic pursuits.

b. **School Environment**

i. **School Building:** School buildings are physical structures/facilities constructed for leaching learning laboratories activities to take place in. when schools have decent buildings, standard classrooms with good furniture, mathematics tutoring laboratories and learning centers, effective learning can take place due to the availability of conductive learning environment. But the revise is the case in most public Nigerian schools, Bolarinwa (1996) expressed the situation of Nigerian schools that school environment is another problem militating against the standard of education in Nigeria now. According to Bolarinwa (1996) most of the old schools now have decapitated buildings they are never renovated while the new ones have most of their buildings to contain 25 students now contain more students. What do we expect in this kind of situation? Even with the best teacher, little will be achieved since class size affects students' performance.

Nwabueze (1995), also lamented the situation of Nigerian public schools and noted that large proportion of today's young Nigerians are coming away from school with neither practical nor intellectual skills because they are hardly being taught and their school environment is primitive and uninspiring. It is also expressed that hundreds of thousands of Nigerian children in the last decade of the twentieth century have only cement blocks as chairs, they sit on bare floors in the midst of crumbling walls and blown off roofs or have only shades of trees as classrooms. They have no books and no hope of possessing them. Even in schools were the walls are standing and the roofs are on, classes are over crowded in urban areas, some times with up to 120 children in one class.

ii. **School Structure:** This has to do with the design of school activities, the uranium of the school or the programme of events. A school structure which places too much emphasized on written policies and established procedures is counter productive to the learning of mathematics according to Tarn (1994). Tarn (1994) stressed that an over formalized school structure produces more harmful effect on the academic performance of the male students than that of the female. Also, the same type of formalized school structure produces more deleterious effects on the mathematics performance of students who have low learning efficacy than students who have high learning efficacy. These imply that a formalized school structure is an important organizational factor which will influence the behaviour of its members.

Formalization in the school process will facilitate a smooth operation according to the established goals of the school, and that communications may not be easily misunderstood but when this is carried out to an extreme, people may be required to abide by the school rules just for the sake of the written policies.

Therefore, school administrators should consider school structures which will fulfill the needs of the organization and its members.

iii. **Classroom Organization:** The physical environment of the classroom and the support services available outside the classroom influence students* success in mathematics. Every classroom develops its own social characteristic. Yackel and Rasmussen (2002) noted that institution needs to create the best environment for the learning of mathematics and support the characteristics of social interaction. The classroom layout, furniture and the ease of bringing technology into the classroom all contribute to the learning of mathematics. As an example, classroom lighting needs to be flexible to support the use of technology and may require multiple light switches and the ability to dim the lights.

The study of National council of teachers of mathematics (2008) on the "Impact of middle-grades mathematics curricula and the classroom learning environment on student achievement" found out that students learnt best in classes in which students were grouped according to ability.

Gifted students in the study of "the relationship between classroom environment and the learning style" expressed preference for an informal seating design, which indicated a need for an environment to be flexible and allows students to change their seating based on the nature of the learning activity Rayners, Gerber and Wiley (2006).

iv. **Class Size/Teacher-student Ratio (TSR):** Class with low TSR tends to have warm relationship with teachers. James (1993) says "know all the faces of pupils in your class and their names. This will enhance effective teaching". This can only be possible with low TSR and the teacher will be able to effectively monitor them. That was why the federal Government recommended in the National policy on education that the Teacher-Student Ratio at secondary school level should be 1:40. In a large class that is a class with over 1:40 TSR, the teacher finds it difficult to see all the students at once, know them facially and by names. Thus, the teachers cannot really know the abilities of the students and their problems which would have been a good key to enhancing teaching learning activities.

Lee and Smith (1997) investigated the relationship between secondary school size and student learning in reading comprehension and mathematics. They found larger size effects for learning mathematics than in reading comprehensive. However, the results favoured "moderate-sized high schools neither so small that the curriculum students experience is inadequate nor so large that some students drop through the cracks in some schools to create socially stratified learning experience".

v. **Instructional Climate:** The instructional setting created by the teacher has long way to enhancing learning of students. For the school with above average academic performance, a proper level of spirit of competition is related to a positive social climate among the students. The teacher should be able to distinguish between positive and negative competitions. The positive competition is associated with a positive social climate, the negative is damaging to the morale of the students Tarn (1994).

Bono (1991) noted that girls show positive attitudes toward mathematics when taught in a cooperative setting. In the same vein, Diamond, (1994) noted that in order to encourage girls performance in mathematics, mathematics teachers should consider a more cooperative approach (group learning) to mathematics as well as curriculum that gives girls more experiences in mathematics. Li and Adamson (1992) emphasized that senior high school girls prefer working in non competitive, individually oriented mathematics classes, while boys prefer working in competitive, individually oriented mathematics classes. They added that if mathematics classes are individually oriented but less competitive, girls would be more enthusiastic about mathematics.

Teachers (mathematics teachers) have to create conducive learning environment/climate for the learners.

2. HUMAN RESOURCES

a. Supply of Teachers and Impact on Students' Performance: The problem encountered in trying to provide education for all in Nigeria and in Edo state in particular, in the prevailing situation of high enrolment ratio, is the provision of physical and human resources to maintain quality. The tremendous increase in both primary and secondary school enrolments have led to acute shortage of teachers, classrooms, funds and facilities. For any policy in education to be effectively carried out, there must be

enough qualified teachers to meet the growing students' enrolment. Due to the importance of teachers in the educational sector, they are regarded as parameters in educational planning.

The acute shortage of teachers in schools has negatively influenced the teacher/students ratio in schools. No doubt, this situation has created unconducive learning environment which has impact on the quality of students/performance of students especially, in mathematics.

b. **School Administration:** Tam (1994) emphasized that the implication to school administration is that the school environment may be related to the contextual factors of the schools, such as age, size, experience of the teachers, etc, which is not under the control of the school administrators, but they have the authority to plan and implement suitable policies which can reduce the negative effects of the school contextual factors. Another implication is for the school administrators to keep in mind that though school environment is complicated, the different aspects of school environment are interacted, and they need to take a holistic view about school environment, and that school management should not be conducted in a piecemeal fashion.

In addition, since the principal is in a key role in the creation of a good school environment, which would be beneficial to the learning of the students and the success of the teachers, it implies that selection and training of principal should be given prominent attention by the policy makers and education department. The stability of leadership effect implies that in order for the leadership effects of principals to take root, the incumbents should not change too often. Also, because a principal has multiple roles, he/she is an educational leader, a structural leader, a human relationship leader, a political leader and symbolic leader.

Students, faculty, and institutions play important roles in creating productive learning environments to learn mathematics. Strategies for addressing initial placement into mathematics course, the needs of the diverse student population, differences in student learning styles and problem solving skills, the impact of mathematics anxiety, ever changing instructional formats, and planning for facilities and resources are best managed when all stakeholders actively participate are guided by research. Mathematics faculty should set high academic goals for all students and complemented by programs and processes that help students achieve those goals.

3. POLITICAL ENVIRONMENT

Government has the highest influence on school and can determine whether or not to provide adequate learning environment for teaching/learning activities. The state of our educational setting today is based on the type of learning environment created by government. If government provides the most adequate learning environment for her citizens, more schools will be built, adequately staffed and well equipped for effective studies which in turn can lead to moderate class size and have positive influence on teaching/learning activities and thereby enhancing students' performance. Nwadiani, (1998) emphasized that national leaders make public pronouncements about educational policies or programmes without any regard to due planning process. According to him, he expressed that, this they do to score political points.

Most political leaders do not take education of their citizens as their first priority even when it is obvious that education is a major tool for natural growth and development of any country and the development of the individual. They tend to shy away from it due to its intensive financial involvement thereby creating unfair political environment for learning. They give huge financial allocations to other sectors to the detriment of our educational sector. The administration led by late President Omaru Musa Yar'dua placed education of the seven point agenda as last to be attended to. The implication of this is that the present political Era does not want to fully provide friendly environment for teaching/learning activities.

4. CULTURAL ENVIRONMENT

Children from various cultures bring the strengths of their culture to school with them. Schools that recognize those strengths and build upon them, rather than trying to change or dismiss them may help the children to be more motivated toward academic pursuits and achieve better school performance Karweit and Wasik (1998). The mind set of group of people, community, nation etc towards a particular course or subject can greatly influence the attitude of students in that group, community, nation etc.

towards the course or subject thereby having an effect on the performance of those students in the course or subject.

Tim (1999), noted that today students study mathematics in an environment with societal attitudes that are often indifferent and/or hostile to the learning of mathematics. According to Tim (1999) for some people, mathematics is revered and feared, and for others, mathematics and those who study it are ridiculed. Poor performance in mathematics in such society is socially acceptable. These public perceptions (cultural) encourage low performance expectations in mathematics instead of the high expectations that are needed. Wade and Caryn (1998) noted that increased motivation of African-American children is generally obtained in the context in which the Afro cultural themes of movement, communalism, and physical stimulation are employed. Wade and Caryn (1998) also noted that research findings suggested that context for learning and performance which is more responsive to the child's familiar and existing cultural experiences may facilitate the child's cognitive functioning and, consequently, his or her achievement. By implication, if importance of mathematics is continually communicated to the people and mathematical curriculum structured based on their values and presented in their cultural way, they can easily learn. Clewell and Anderson (1991) noted that women/girls of colour are often studies with regard either to gender or ethnicity. Race and ethnicity may influence science achievement and attitudes toward science. In the international study (1AEP, 1992), the highest-performing 13-year-old students were those in Korea, Taiwan, and Switzerland, students from seven countries including France, Scotland, Spain, the United States, England and China performed at the IAEP (1992) average of 67 percent. This no doubt is based on their societal values and respect for sciences.

THE RELATIONSHIP/INTERACTION BETWEEN ENVIRONMENT AND PERFORMANCE OF STUDENTS

The national council of teachers of mathematics NCTM (2008-09) in their study noted that the interaction between the curriculum and a standard based learning Environment was associated with a significant impact on student's achievement. Tarn (1994), noted based on the findings of his studies that student's learning efficacy has been found to interact with school environment and the effects contribute significantly to their academic performance. And that a competitive study environment can enhance better social relationship among the students and increase the students' engagement in study. Also, he expressed that interaction between environmental factors and the personal characteristics of students do exhibit significant effects on the academic performance of students. He however noted that the relationship between school environment and performance of students did have theoretical and practical implications in school management.

RECOMMENDATIONS

To ensure effective studies of students in mathematics and other subjects, the government should:

1. Provide learning environment that supports values, and affirms the diverse needs of all learners.
2. Provide facilities, adequate and well trained mathematics teachers.
3. Use multiple measures to place students in mathematics courses.
4. Provide professional development regarding learning styles, mathematics anxiety, and multiple problem-solving strategies so that faculty and instructional staff have the skills needed to address the diverse students' population and dynamic curriculum.
5. Design and equip classrooms that encourage active learning and use of technology.

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