THE ROLE OF MATHEMATICS TEACHERS IN RESOLVING SECURITY AND ENVIRONMENTAL PROBLEMS IN NIGERIA

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Abstract

The progress of any country depends on the quality of education offered and its practices. Nigerian security and environmental problems can only be tackled through educating its citizens which can be achieved with the help of mathematics education. This paper highlights ten roles that mathematics teachers play to produce effective mathematics students, how the teacher can create a safe and secure classroom environment for mathematics teaching/learning processes and how to encourage effective participation by students in the class as mathematics is the solution to most of Nigeria’s problems.

Introduction

Security is the state of feeling safety or the condition of feeling safe and protected, we can also say that security is the freedom from worries and a state of being free of harm from person or things at any time. According to Oxford Advanced Learners’ Dictionary, eight edition, security is the activities involved in protecting a country, building a person against attack, danger, etc, but what is happening today in Nigeria and other countries is the reverse of the above definitions. Peoples’ lives and property worth millions and billions of naira are lost daily to insecurity. The question here is; should Nigeria or her citizens live in chaos? The answer to this question is embedded in mathematics education. Mathematics can solve this problem through the integration of mathematics research centres with national security offices. This can be done by employing only qualified mathematicians and statisticians in the mathematics department at national security sections so that they will be reading and interpreting numerical values. On the other hand, environmental problem is characterised by pollution and degradation of land, air and water.

Mathematics teachers are the key players in improving the learning of our children in schools, they have a positive attitude to environmental issues and endorse desirable environmental practices. This is because mathematics is considered as the mother of all sciences, the large majority of the world’s population have school experience and the job of the teacher may seem obvious, however detailed studies show the complexity of the role of the teacher, especially where the teacher is responsible for the majority or the entire curriculum.
Mathematics teaches one how to think logically and approach problems in analogically and creative ways. Mathematicians apply their problem solving and data analysis skills to solve problems in a wide variety of fields including: (Lovitt, and Clarke 1992).

- Banking and finance (through finding possible ways of maximizing project and minimizing loss)
- Information security (this include coding and cryptography)
- In engineering (this is by applying mathematics in guide mechanics, optimizing, industrial processes and so many other areas.)
- Sports statistics (in sports science performance analysis and sport economics.)
- Environmental modeling (Resource biodiversity, whether and climates)
- Medical Research (It is applied in treatments and drug efficacy)
- Marketing (In market segmentation and clustering)

Mathematics education helps one to conduct teaching and research in a wide variety of mathematical areas including the study of resource modeling and management, discrete mathematics, information technology and security. Also mathematics involve applications in statistics and operations research control theory and optimization modeling of physical problem and applied and computational mathematics. (Odili, 2006).

Due to advanced analytical and numerical skills, mathematics educators are at a high demand in the area of work. Mathematics prepares one for a career in a diverse range of areas and as science and technology become integrated in to more and more aspects of our lives, employers are seeking for employees with skills and problem solving abilities.

Mathematics education is a great major for resolving most security and environmental problems Nigeria is facing, because it develops analytical skills and the ability to work in a problem solving environment. Mathematicians use high level mathematics and technology to develop new mathematical principles between existing principles and solve real-world problems. If mathematicians can resolve our country’s problems through mathematics education, how mathematics education is transferred from one generation to another is something to consider. This can be done by effective mathematics teaching, because students are introduced to the power and beauty of mathematics in their elementary, junior or high school mathematics courses. There is therefore the need to provide opportunities to acquire the knowledge, values and commitment required to protect and improve the environment. This is why mathematics teachers are the role model for their students in particular and for their society in general.
Who is a Mathematics Teacher?

According to the free Encyclopedia Dictionary (2013), A Mathematics teacher is someone who teaches mathematics. Mathematics teachers open doors to all kinds of options for students. A mathematics teacher is the one who pictures himself in a classroom where he and his students work together to identify, analyze, and solve problems relevant to the real world. A mathematics teacher is the one who has the challenge of educating tomorrow’s citizens, because mathematics today is the foundation for future decision making.

Example on how mathematics plays an important role in solving environmental problems is population growth and decay. The rate of population growth \( \frac{dp}{dt} \) is proportional to the population \( P \) i.e

\[
\frac{dp}{dt} \propto P \tag{i}
\]

\[
\frac{dp}{dt} = kp \tag{ii}
\]

Where \( k \) is proportionality constant

\[
\frac{dp}{p} = kdt
\]

Integrating we have,

\[
\int \frac{dp}{p} = \int kdt
\]

\[
\ln p = kt + c \tag{iii}
\]

Where \( c \) is the constant of integration, at the initial value of the population \( p_0 \), the time \( t = 0 \), from eqn. (ii)

\[
\ln p_0 = c
\]

Substituting in equation (ii)

\[
\ln p = kt + \ln p_0 \tag{iii}
\]

\[
\ln p - \ln p_0 = kt
\]

\[
\ln \left( \frac{p}{p_0} \right) = kt
\]

taking exponential of both sides
\[ \frac{P}{P_0} = e^{kt} \]

\[ P = P_0 e^{kt} \]

If \( k \) is positive we have an exponential growth, if \( k \) is negative we have an exponential decay

i.e \( p = p_0 e^{-kt} \)

if \( k = 0 \) we have a constant growth

i.e \( p = p_0 \)

**Ten Roles of Mathematics Teachers**

According to Cathy and Seeley (1994) the ten roles of a mathematics teacher are:

1) **Mathematics teacher as an architect:** - Architects create the environment in which we live and work both the buildings and the feelings they evoke. Similarly, the teacher as an architect creates the learning environment for students. From the arrangement of the furniture that facilitates discussion, thought and exploration to the feeling students experience when they walk in to the classroom, the teacher establishes an atmosphere where mathematics teaching and learning are important. Most of all, the teacher creates a place where students feel safe to take risks and share ideas, while learning to value the opinions of each other.

2) **Mathematics Teacher as a composer:** - As a composer creates a musical score for performance by musicians, the teacher creates the tasks in which students will engage. Within the rich environment created by the teacher as architect, the teacher as a composer designs or selects something for students to do that will engage their intellect, strengthen their thinking, increase their mathematical understanding and expand their toolkit of how to solve problems in their real world.

3) **Mathematics teacher as a movie director:** - once a teacher creates the learning environment and develops the tasks which students will spend their time, the teacher as movie director steps in to determine how the actors will relate to each other, their tasks and their environment.

4) **The teacher as a stockbroker:** - stockbrokers constantly analyze the stock market, the teacher as a stockbroker constantly analyzes the teaching and learning that occur within the classroom. What worked today and what didn’t work. What will be different next time? What is worth the precious investment of my students’ time tomorrow?
5) **The Teacher as a ship captain:** - when captains of large ships have set off a course, they cannot afford to sit back and wait until they either arrive at their destination or crash on the rocks. Ship captains are constantly alert of shifts in weather, ship traffic and coastlines. They must be prepared for unexpected disasters. The teacher as a ship captain deals with even more unpredictable factors than nature and commerce and most constantly are evaluating how and what students are learning. We cannot afford to wait until a student crashes on the rocks before noticing a pupil has gone off course, the teacher must work closely enough with students so that he provides corrections whenever there are misunderstandings. The teacher as a ship captain may not always correct the students directly or immediately, but rather the teacher makes a decision about what kind of experiences can help the student to get back on course in a meaningful and timely way.

6. **The Teacher as the Red Jacket:** a traveler making a long trip is likely to pass through an airport hub. In these hubs, hundreds of planes land and take off and thousands of travelers make connections between flights every day. The teacher can serve the role of the person wearing a red jacket who greets the weary, confused and distracted traveler and assists him. Teachers make connections between the threads of mathematics like algebra, probability, measurement and geometry. The teacher as the red jacket helps students see the connection between mathematics and science, social studies, physical education and the art. The teacher as the red jacket helps students make the vital connection between mathematics and the world outside of the school.

7. **The teacher as mayor:** the mathematics classroom is described as a mathematics community, where students and the teacher are actively involved in creating their learning experiences. This learning community needs the strength of a knowledgeable and compassionate leader who considers the needs and talents of the student citizen, while providing a vision of where the community is headed and support for getting there. Giving students responsibility for their learning means giving up some control and creating a new kind of classroom leadership that truly guides, encourages and enlightens along the way.

8. **Mathematics teacher as a student:** Today’s teacher cannot afford to remain static for more than a short while. The world is in a state of dynamic flux and we daily witness change in technology, mathematics, schools, students and the society. In this setting, the teacher as a student makes a life long commitment to professional development.

9. **Teacher as Recruiter:** mathematics teachers have traditionally done a good job of encouraging students to pursue mathematics-related fields. The responsibility of the teacher as a recruiter is to communicate not only to students but to the broader community how important and rewarding our professionals can be. We can all truly
hope that the torch will continue to be passed from generation to generation so that some of our minds can continue to prepare new generation of students who can think and learn mathematically.

10. **Mathematics teacher as prospector**: This is the bottom line of teaching. A teacher keeps teaching and teaching when new expectations seem unattainable.

**Creating a safe and secured classroom environment for Mathematics teaching**

Mathematics is a subject to be learned by attentive listening, therefore, there is a need of promoting student competencies and motivation in creating a secured and supportive classroom environment in which the pupils/students learn. The movement of the teacher around the classroom helps to make teaching more engaging and also help with classroom control (Odili, 1986).

Students need to feel safe in order to learn. They need to feel secured in order to want to participate. There are a number of things teachers can do to set up classrooms that feel safe and well organized. According to (Iweka, 2010), they include;

- **Being sure that the classroom is clean, orderly and inviting**: Look at your classroom and ask yourself if it is a place that is distracting or a place that encourages students to do their best. If there are papers on the floor or things falling out of desks, it is distracting.
- **Arranging your classroom so that you have all the resources you need**: All the books, calculators, and other materials should be kept away so that you don’t have to stop teaching or turn your back on your students.
- **Making it easy to supervise your students**: Place mirrors next to the chalkboard so that even when you may have to turn your back to write on the board, you can still keep an eye on students.
- **Asking students to write on the board for you**: It helps to be directly involved, it helps them develop basic writing skills, so that others can read what they write, and most importantly, it will save your work and allows you to keep your eyes on the students. This is important for classroom control especially when you are using active teaching methods that invite students’ participation.
- **Organizing the physical space of your classroom for movement and interaction**: Make it easy for students to pull their desks together to do small group work.
- **Making it safe for students to participate and ask questions no matter what a student says**: Make it a habit to respond with respect and teach the students to show respect for one another.
- **Thinking about the environment of the school beyond the classrooms**: Some schools give the feeling of being in a prison where students may not even be allowed to talk...
and students may seem overly compliant. Work together with other teachers and administrators to encourage positive interaction among students. If you want students to be interactive and engage in your class what happens at school after they leave your class also matters.

**Encouraging effective students’ participation by the teacher**

According to Margaret, (2012);

- Do not be angry, if a child cannot understand some things or makes a mistake. Anger can lead students to fear or failure.
- Show students how to recover from their mistakes and try again
- Tell them about famous people who were not afraid to make mistakes or about some of the mistakes you have made, also encourage accuracy and patiently ask them to correct their careless errors.

**Conclusion**

Teachers have positive attitudes to environmental issues and endorse desirable environmental practices. By their individual and collective behavior, humans make significant positive or negative impact on the natural resources and non-human environment of the country. Mathematics education and mathematicians are the solution to the security and environmental problems Nigeria is facing in particular, and to most of the problems the country is facing in general. This can only be achieved with the help of mathematics teachers, therefore, there is need to provide opportunities to acquire the knowledge, values and communication required to protect and improve the environment, because mathematics teachers are the role models for their students and the society.

**Recommendations**

- Mathematics teachers should be integrated with the national security office so as to analyze and interpret security information.
- Government should take mathematics teachers more seriously by paying them mathematics allowance.
- Mathematics and statistics departments should be created at all security sections in Nigeria and must be run by qualified mathematicians and statisticians only.
- Security agents must be mathematics literate.
➢ Government should provide conducive atmosphere for the teaching of mathematics, for example, mathematics laboratories should be built at all schools of learning to enable mathematics teachers and the students put mathematics knowledge into practice.

➢ Efforts should be made to reduce the incidence of large sized classes making them manageable to encourage and facilitate individualized instruction.

➢ Mathematics teachers have to be adequately empowered for efficient service delivery. This can be achieved through enhancing their professional status, competence, knowledge, skills and attitudes through exposing teachers to constant training and re-training, adequate remuneration, provision of mathematics teaching and learning facilities and environment and ensuring that only qualified candidates teach mathematics.
References


