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The Need for Mathematics Education in Addressing Insecurity in Nigeria

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Abstract

The role of mathematics education is critical to the attainment of a state of security in the Nigerian society. This is because, without a strong basic foundation in mathematics, creating and maintaining a secured society is unlikely. This is emphasised in a document released by the office of the National Security Adviser (NSA) for the National Security Strategy, 2019. It was highlighted clearly that security is the cornerstone of development and progress in a free society and that security is a guarantee of the wellbeing of citizens and stability of the state. Also tracing the history of developed countries such as America, they have arrived at their developed levels after suffering from series of wars. Those wars were won with scheming strategies in which mathematical knowledge form the basis, because the service of great mathematical minds were employed to analyse movements, proportions, trajectories, implications (economic, population, etc.) as well as development of calculating and war machines with accuracy and precisions, among other things. This paper therefore justifies the need for mathematics education in addressing insecurity in Nigeria as it x-rays the major mathematics skills needed to build security conscious individuals and concludes as an eye opener to the fact that mathematics remains a functional field of study embedded with necessary prerequisite skills needed for confronting rising insecurity issues and other challenges in the society.

INTRODUCTION

Insecurity, in the broad sense encapsulates a wide spectrum as it could be applied to various areas of life. Insecurity is the absence of security; and security has been defined as freedom from danger and anxiety. Also, insecurity has the explanation of a product of the bestiality of man. (Adebowale, 2014). It results from the failure of government to maintain security and provide effectively for the welfare of the people.

The problem of insecurity in Nigeria is of serious concern to a conscious citizen as it now progresses without a comprehensible process. Insecurity in Nigeria is a recurring phenomenon of escalating problems which are very obvious across all parts of the country. Nigeria, a country in the west coast of Africa is currently faced with diverse and sovereignty-threatening security challenges. The country is positioned at number 14 in the list of 20 most vulnerable states to fail in the world (Yaminu, 2021) partly due to the series

of security challenges weakening her fabrics of unity, peace and progress.

The south-west of Nigeria suffers from insecurity issues such as herder-farmer conflicts, kidnapping, cybercrime, armed robbery, domestic crime, ritual killings and banditry. The south-east has its own share of ritual killings, kidnapping, commercial crime, secessionist agitation, herder-farmer clashes, attacks by unknown gunmen and banditry. The south is threatened by militancy, kidnapping, and environmental agitation. (Samuel,2014). The north-east has been subjected to humanitarian crisis, subsequent to the insurgence of the Boko Haram and the north-west is a haven for illegal mining, ethnoreligious killings and banditry.

Instances of kidnapping include a January 10,2011 case of the wife and three children of Nollywood's ace comedian, John Okafor popularly known as *Mr. Ibu* who were kidnapped right in front of his house and a ransom of fifty million naira was demanded (Amatus in Umukoro,2014). Also, late 2012 witnessed the kidnapping of a notable actress, Nkiru Syvalnus and Kenneth Okoye, the first runner-up of Mr. Nigeria 2010 with a ransom of one hundred million naira demanded (vanguard online,2012). The implication of all the aforementioned scenarios include threat to the nascent democracy, abuse and infringements on fundamental human rights of citizens, loss of investments opportunities due to capital flight and wanton destruction of property and infrastructure.

The primary role of a government to secure lives and properties of the citizens is thereby truncated when there is insecurity in the land. In a bid to finding solutions, mathematics is perceived as a discipline that has huge roles to play. One of the essences of teaching and learning mathematics is to serve as a tool needed to raise responsible citizens and not terrorists. If mathematics education is well-developed, improved and adequately managed, it can lead to the acquisition of mathematical literacy skills which can help in achieving security purposes.

Therefore, the paper shall trace the root of insecurity in Nigeria, identify the consequences of insecurity in Nigeria then, consider the objectives of mathematics education in Nigeria, as well as the corresponding perspective of mathematics to insecurity. Also, analysis of mathematics skills which are necessary for tackling insecurity challenges shall be done. This will lead to examining the impacts of mathematical skills on national security in order to draw a conclusion and present appropriate recommendations.

TRACING THE ROOT OF INSECURITY IN NIGERIA

Six years after independence, Nigeria experienced a coup which can be taken as being responsible for the insecurity experienced today in Nigeria. The consequence was that distrust among various ethnic groups in the country emanated. The Igbos persistently feel marginalised in the Nigerian government and the militants living in the east continuously attack government security agencies, government infrastructure and installations, as well as oil exploration installations of foreign multinational companies. Also, the Niger Delta militancy developed in kidnapping for ransom. Herdsmen continuously trespass the farmlands in the south with their herds, thereby causing clashes between local farmers and the herdsmen. Lives of southern farmers are not safe from the brutal acts of the herdsmen in raping the female farmers and killing the male ones. (Samuel,2014).

Around the year 2000, Islamic missionaries with extremist orientation as Al Qaeda and the Islamic State set foot on some

parts of northern Nigeria's soil. The inspiration persists to give birth to Boko Haram in 2009 while the sect later sworn allegiance to the Islamic state. It is not a gain saying to submit that the government has not done well to contain the insurgency due to political greed which pushes them to employing and manipulating the sect. Hence, room for expansion of insurgency is widely created. The existing unemployment, poor education and lingering poverty in the society among the Nigerian youths also gave a strong hold for the perpetration of various forms of insecurity acts.

THE CONSEQUENCES OF INSECURITY IN NIGERIA

The consequences of insecurity in Nigeria cut across all facets of the country, ranging from agriculture, economy, telecommunication and to education, just to mention a few. Furthermore, there is migration of people from the north-east area to other safer states, terrorism and insurgency activities, fear of the unknown and reduced revenue of the government. (https://emerald.com,17 May,2022). As of 2020, over $40.6billion worth of foreign investments were redirected from the Nigerian economy as a result of insecurity according to the Global Terrorism Index. In 2021, as compiled by the Institute for Economics and Peace, Nigeria was ranked 146th out of 163 countries with a score of 2.712 reflecting a poor Gross Domestic Product(GDP). According to Business Day, rising violence in the country cost Nigeria 11% of its Gross Domestic Product(GDP) with ₦119 billion. Similarly, projects worth ₦12 trillion were abandoned across Nigeria due to insecurity challenges according to Town Talk solutions. (Samuel,2022).

Telecommunication companies are also affected. For instance, the Mobile Telecommunication Network (MTN) projected a possible disruption in service provided due to rising insecurity challenges. (Funmilayo,2023). In education the country has recently come under significant threat due to the increased number of mass kidnappings of students from schools. This is a new strategy adopted by terrorists and bandit groups. Kidnappings in schools have become a great disincentive for both parents and students alike, for enrolling in schools, opting to stay at home in order to ensure their safety. Today, Nigeria has one of world's highest numbers of out-of-school children,13.2 million, according to the United Nations Children's Fund(UNICEF). A wave of school kidnappings has worsened the situation, with some state governments closing boarding schools in their states until security is guaranteed. For instance, between December2020 - June 2021, over 1000 students and staff have been kidnapped in 9 school abductions reported in the North West Zone. (Yaminu,2021). For instance, very recently, on September 22, 2024, gunmen invaded the Federal University Gusau in Zamfara State and Kidnapped 24 female students. Security forces reportedly rescued thirteen students, but 11 remain in captivity. Less than two weeks later, on October 4, same year, suspected terrorists attacked the Federal University in Katsina and kidnapped five female students. (Business day.ng, 2023).

In terms of food insecurity, the situation has been aggravated by the activities of bandits and herdsmen/farmers crisis. The displacement of farming communities as a result of insecurity is associated with a rise in food and nutrition insecurity due to non-availability of food. (Yaminu,2023). Therefore, food insecurity is inimical to national security. Nigeria ranked 8th among the top 10 countries with the highest level of terrorism in the world. The Global Terrorism Index(GTI) 2023 assessed terrorism impact in 163 countries. With a

score of 8.065, Nigeria has a terrorism impact that is very high.

10 countries most impacted by Terrorism in the Global Terrorism Index(GPI) 2023

S/N	Country	Total death since 2007(‘000)
1	Afghanistan	18,500
2	Burkina Faso	3,515
3	Somalia	9,057
4	Mali	3,442
5	Syria	6,048
6	Iraq	36,551
7	Pakistan	14,920
8	Nigeria	10,768
9	Myanmar	1,036
10	Niger	1,842

Table: Dataphyte. Source GPI2023. Created with datawrapper.

Also, in sub-Saharan Africa, Nigeria was ranked 3rd among the five countries with the highest number of internally displaced persons(IDPs) in 2022 with an estimate of 3.6 million IDPs resulting from violence and restiveness, 1.9 million of which are from Borno in the Northeast region. (Funmilayo,2023).

These issues of insecurity challenges had implications for job creation and economic prosperity as purchasing power declined. Nigeria is now regarded as the world’s poverty capital and has an estimated 91million people living in extreme poverty which is projected to reach 106.6 million by 2030.

The consequences are numerous and devastating. Hence, the need to find solutions. Thus, this work proffers a solution through careful and judicious exploitation of mathematics education.

OBJECTIVES OF MATHEMATICS EDUCATION IN NIGERIA.

Heralding the objectives of mathematics education will facilitate an exposition to the possibility of mathematics education in solving the problems of insecurity in the country.

The objectives of mathematics education in Nigeria according to Adedeyo (2010) include: (i) to lay a solid foundation for the concept of numeracy and scientific thinking ;(ii) to develop in the child the ability to adapt to his changing environment ;(iii) to give the child opportunity for developing manipulative skills that will enable him to function effectively in the society within the limits of his capacity and (iv) to prepare the child for higher education.

These objectives are in line with the broad aims of secondary school education as contained in the National Policy on Education (FRN,2013). All the objectives stated above are really needed in addressing insecurity in the country. The first one for instance is a necessary criterion for checking insecurity. Mathematics teaches a person how to think logically and approach problems in analogical and creative ways. Mathematicians apply their problem solving and data analysis to solve problems in a wide variety of fields (Lovitt & Clarke,2011). This includes information security, medical research, sports statistics, among others. Mathematics education is 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 and solve real-world problems. (Abubakar, 2014). The ability to

think logically and scientifically which can be inculcated by mathematics education is necessary for checking insecurity in the nation. Realising the role of mathematics education as a key to national security, the permanent secretary, Ministry of Defence, Ibrahim (2023), has called for more efforts to endear children's interest in mathematics: "Mathematics is the foundation of Science, Technology, Engineering and Mathematics (STEM) fields, and it is crucial to our Nation's security and prosperity" (Punch,27th March 2023.Retrieved from chrome). Kana expressed his pride in the role of the Armed Forces Schools in fostering academic excellence amongst students. This pronouncement of the permanent secretary is a reflection of uncompromised level of mathematics in addressing insecurity issues in Nigeria.

CORRESPONDING PERSPECTIVE OF MATHEMATICS TO INSECURITY

In a submission to the United States Congress, on the aftermath of the attack of September 11,2001 at the World Trade Center towers, Farrer in Gallagher and Schmicking (2014), emphasised the need for critical skills in Mathematics, Engineering, Information and communication Technology to enable the federal Bureau of Investigation (FBI) to exploit digital evidence and the technologies that collect, convey or process digital information about the nation's security. To complement the above emphasis, Schartz (2014) further pointed out that the United States National Security Agency hired approximately 50 highly qualified mathematicians yearly to enhance its operational work. Mathematics is therefore seen as the language of science and technology (Ugbebor,2009). Otunu-Ogbisi and Ukpebor, (2009), see mathematics as an effective tool for solving crime and security problems. It in believed that their submissions were borne out of their discoveries of relevance and efficiency of mathematics in crime and insecurity issues.

When Russia launched the first space satellite, Sputnik in 1957, the reaction of America Congress was the improvement of the quality of mathematics education for American youths. This buttresses the consciousness of America of the security of the nation and its citizenry by improving the quality of mathematics education in the states. America believed that the improvement of their mathematics and science education is the best possible way to catch up with USSR (now Russia). It will be interesting to know that the education reform in America then, spurned many great nations (such as Britain) to carry out education reforms. This can be seen through conferences such as Rehovot Conference in Israel (1960), Endicott house conference in Dedham, in Massachusetts (1961). In fact, Africa as a whole subscribed to the process of mathematics education reform through programmes such as Entebbe mathematics in Kenya which is an Africa Mathematics Programme.

MATHEMATICS SKILLS

Exposition will now be done to some of the mathematical skills which when effectively employed will provide solutions to the lingering problem of insecurity in Nigeria.

1. Problem solving skills: This is the highest level of learning according to the psychologist, Gagne (1963). These skills make a person to be relevant in any situation since human beings exist in an environment full of challenges with the weaker ones always looking up to the stronger ones for help. Problem solving cannot be taken away from mathematics. Such skills manifest from posing questions, analyzing, translating and illustrating results, drawing diagrams, using trials and error, applying rules of logic,

recognizing relevant facts and subjecting conclusion to scrutiny.

2. Operation Research is an interdisciplinary branch of mathematics which uses mathematical methods to arrive at optional decisions to problems in maximizing benefits and profits as well as minimizing costs and losses. The eventual intention behind using Operation Research is to elicit a best possible solution to a problem mathematically, which can improve or optimize the performance of the security system.

3. **Using mathematics for prediction:** Elementary notions of probability to determine likelihood of future events and identify immediate past experience that does not affect the likelihood of future events: using mathematics to help make predictions places an individual or organization in a favourable level of preparedness. This lofty skill ensures prediction and preparedness for any security challenge.

4. Appropriate computational skills: Addition, subtraction, multiplication and division with the whole numbers, decimals and simple fractions; complicated computations will usually be done with a calculator. Knowledge of simple digit number facts and mental arithmetic; use of percentages should be developed and maintained. The translation of this skill into the real life, especially in the area of insecurity, will result to precision in security measure. Alertness to radicality of result from calculating devices is an essential skill necessary to inbuild a sense of awareness as it looms in the society. This involves weather changes, economic changes and human-interest correlation analysis.

5. Statistical representation: This involves reading, interpreting and constructing tables, charts and graphs**,** putting information into manageable and meaningful terms and using conclusion with simple tables, maps, charts and graphs are strategic and systematic training skills which translate into real life situations to tackle security challenges through statistical collection of data, analysis and deduction of relative, appreciable and applicable solutions in form of conclusion.

6. Computer Knowledge: Understanding what computer can/cannot do. Mathematicians with their training in logical and precise thinking are highly prized in this field. The knowledge of computer traced back to abacus, ready reckoner, difference machine, Electronic Numerical Integrator And Computer (ENIAC) is proof that the knowledge of mathematics in inventing the aforementioned earliest computers which have metamorphosed to the present 5^{th} generation computer remains applicable to solving insecurity challenges. The Closed Circuit Television (CCTV) camera installations, phone and car tracking systems among other things are various application of computer knowledge in providing adequate security measures.

5. Geometry: concepts of points, lines, plane, parallel, perpendicular, basic properties of simple geometric figure with emphasis on measurement on problem solving; recognizing similarities and differences among objects can also translate to understanding topographical and geographical terrains**.** Measurement of distance, weight, time capacity, temperature and angles; calculating simple areas, volumes; using both metric and customary system with appropriate tools. All these are needed for determining the capacity and area of security measure required and the amount realizable.

6. Estimation and approximation: Technique for estimating quantity, length, distance, weight, etc.; knowing when result is

precise enough will be useful for security purposes at hand.

THE IMPACTS OF MATHEMATICAL SKILLS ON NATIONAL SECURITY

The impact of mathematical skills in a nation's security can be highlighted as follows

1- **Wavelet Transformation (Signal Intelligence)**: This is a new technique which is very important in all types of signal transmission and it is based on transmission of a series of numbers. Wavelet analysis is an exciting new method which applies principles of mathematics and physics in solving difficult civil and security problems. Some applications of wavelets are powerful statistical tool which can be used for a wide range of applications such as signal processing; data compression; wave propagation; image processing; pattern recognition; detection of aircraft and submarines; fingerprint for detecting the properties of quick variation of values. It is also used in internet traffic description for designing the services size; industrial supervision of gear-wheel; and computer graphics and multi-fractal analysis.

Wavelets process complex information at different positions and scales and reconstructs them with high precision. (Zakariya & Barwa, 2013).

2-**Financial security**

According to Abubakar, Charles-Ogan and Albert (2014), financial security involves financial instrument which is a tradable asset of any kind, either cash, evidence of an ownership interest in an entity or a contractual right to receive or deliver cash or any other financial instrument. Mathematics skills such as counting and budgeting are needed for personal financial security. Also, skills such as identification of numbers and correct valuation of money are needed for easy assessing of Automated Teller Machine (ATM) cards and detection of fraud respectively. In the banks, savings, assets and liabilities, and bonds are valued using numbers. Loans, overdrafts and Commission on Transaction (COT) are given out using simple or compound interest rates.

Also, mathematical skills consistency is required when for example a share price is taken and stochastic calculus is used to obtain the corresponding value of derivatives of the stock.

3 - **Economic security**

Economic security is measured using economic indices to measure the economic wellbeing of a nation. Mathematical skills are utilized to measure these indices. One primary indicator used to gauge the economic health of a country is the Gross Domestic Product (GDP). A negative GDP is a sign of recession which signifies unhealthiness while a positive GDP implies healthiness. Other economic indicators that require mathematics skills are: Human Capital Index (HCT), Education Index (EI), Mean Years of Schooling Index (MYSI), Expected Years of School Index (EYSI), Income Index (II) and Consumer Price index which is used to measure reflection ultimately, the aspects of ratio, percentages, ordinal counting and algebra of numbers are essential mathematics to be used to interpret the economy of any nation.

4 - Cryptography (Data security)

This makes use of Number Theory (Modular Arithmetic) and concept of Prime Number, and is the science of using mathematics to encrypt and decrypt data. Data security is a chief security concern when it comes to transmission of computer passwords, electronic ecommerce, private conversations and Automatic Teller machine (ATM) cards

(Jiang, 2013). Cryptography is the practice of hiding information, converting some secret information to a non-readable text. It enables one to store sensitive information or transmit it across insecure networks (like the internet) so that it cannot be read by anyone except the right person(s). Applications of cryptography include military information and intelligence, electronic commerce, bank and payments and electronic building access. It is one of the cornerstones of internet security (Zakariyya & Barwa, 2013).

CONCLUSION

Mathematics is a basis for advancements and developments. America resorted to improving the quality of their mathematics education in order to meet up with technological advancement among the countries in the world especially Russia. Saudi Arabia had invited mathematicians, statisticians and economists to provide a way out when they were in crisis of economic recession. Japan once gathered mathematicians to help and redefine the basis of her technological and scientific advancement. Almost all useful products from advanced countries are usually with a mathematical label. This justifies a claim that a drug cannot be synthesized until its mathematical code/model is found. All these are underlying facts that mathematics can be put to function in all ramifications and should be seriously taken as being needed in tackling insecurity in Nigeria. Hence, Nigeria should go beyond the scope of just teaching mathematics for grades but work towards its applicability especially in the area of insecurity in the country.

RECOMMENDATIONS

Insecurity is an occurrence which makes it very impossible for progress to thrive in a society, as it endangers lives and properties of the people in the society affected. Upon the discovery of this crucial problem, then it becomes imperative and demanding to find a solution to the nemesis. In a bid to do this, acquisition of mathematics skills through mathematics education has been identified as a potential armour needed to be armed with. Such skills pose to be potent enough to tackle insecurity challenges in the country given the objectives attainable from mathematics education.

Therefore, the following submissions would be made in form of recommendations on the needed measures to be put in place to make the proclamation a reality.

1. Mathematics teachers and instructors should consider it a point of responsibility to be armed with teaching strategies required in the teaching of mathematics skills to meet up with security challenges.
2. To encourage critical and logical thinking, a sizable number of mathematics graduates should be included in the security workforce of the country.
3. Given its importance in addressing crime and security issues, government at all levels should keep offering functional mathematics education at all levels.
4. It becomes a wakeup call to mathematicians and government to carry out more rigorous work/study on how mathematics could be effectively utilized to address security issues in the country.
5. Mathematics oriented individuals should also be considered for variety of employment in the country.

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