

MATHEMATICS EDUCATION: A VERITABLE TOOL FOR GOOD GOVERNANCE

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Abstract

Governance has to do with decision making and its implementation for the well being of those governed. In most developing nations including Nigeria, the citizens are still searching for good governance as there is a clear absence of the essential attributes of good governance. In the light of the above, mathematics is seen as a veritable tool that enhances good governance in most societies. The paper focuses on the concept of good governance, the role of mathematics in enhancing good governance, and the implication to mathematics education in Nigeria. The paper recommends among others the inclusion of basic mathematics proficiency and a pass in O'level mathematics as a requirement for eligibility for positions in government.

Keywords: Good Governance, Mathematics Education, Decision Making, Veritable Tool, Nigeria

Introduction

Mathematics is as old as man itself; man used and developed mathematics in order to cope with the societal needs of survival in the environment. Right from creation, man needed mathematics to count, keep records and trade items in various societies. In its powerful reasoning, decision making, advancement in science and technology, economic and social development etc. all lay credence to the queen (mathematics). Effiom (2015) asserted that without mathematics, there is no science, without science, there is no technology; without technology there is no modern development. He also opined that the gap between the developed countries and the developing countries has to do with the teaching and learning of mathematics.

A lot of researches dwell on the usefulness of mathematics in enhancing science and technology but not much seems to be mentioned about the usefulness of mathematics in good governance of any society. Mathematics is needed in all aspects of human life in the society including governance.

Concept of Good Governance

In any democratic governance, decisions and policies are arrived at based on numbers and record of phenomena. (Azuka, 2015) Every government, whether military, civilian or monarch is measured as either good or bad based on some parameters and yardsticks set out to measure their performance.

Kaufmann (2002) opined that the concept of good governance often emerges as a model which compares ineffective economies or political bodies with viable economies and political bodies.

The concept centre's on the responsibility of governments and governing bodies to meet the needs of the masses as opposed to selected groups in the society.

The characteristics of good governance as highlighted by Thomas (2000) include being consensus oriented, being participatory, the rule of law that is effective and efficient, absence of violence, accountability, control of corruption, transparency, equitable and inclusive etc. Mathematics on the other hand is viewed as a service provider for all disciplines and it contributes immensely in deciding directions of activities in all areas of human endeavour such as economy, banking, market transactions, legal jurisprudence, engineering and so on (Imoko & Isa, 2015).

Mathematics is a creative discipline and its language is international. This vital discipline transcends cultural boundaries and its importance is universally recognized, hence it cannot be considered as a classroom discipline only. The role of mathematics in the area of logical thinking, reasoning, and problem solving, human and national development speaks volume even in governance. It is because most leaders of the world lack adequate knowledge of the field that accounts for a lot of the shambles witnessed today. Utegi (2015) is also of the view that many economic, social political and military decisions cannot be taken without statistical techniques.

Governance deals with the structures and dynamics of rule-making and action in the society (Akomode & Akomode, 2012). It is the manner in which power is exercised in the management of a country's economic and social resources for development. It is the use of political authority and exercise of control over a society and the management of its resources for socio-economic development (Kabir, 2008). Every citizen aspires to have a government that is able to cater and provide for the needs of the people in mostly the basic necessity of living in the society. A nation with good governance is expected to provide all citizens with good food, clothing, health facilities, education and infrastructural facilities.

Accordingly, Akomode and Akomode (2012) submit that good governance is prerequisite for nation building and national development. He goes further to assert that it is ruling the people well within the tenets of the constitution and enabling legislations. Kabir (2008) posits that good governance depends on the extent to which the government is perceived and accepted as legitimate, committed to improving the public welfare, responsive to the needs of its citizens, competent to assure law and order, deliver public services, creates an enabling environment for productive activities and equitable in its conduct.

Unfortunately, in many African countries including Nigeria, good governance seems to have eluded the citizens. Instead like in the case of Nigeria according to Adenji & Ibrahim (2010), poverty, unemployment, lack of power and other basic and political instability is what we get. Therefore, education in general and most importantly mathematics education is what is needed to prepare the citizens for good governance.

Role of Mathematics in Good Governance

Mathematics is an indispensable tool for good governance in any society. Mathematics enhances good governance in the following ways:

(a) Criteria for the Appointment of Politicians for Governance

Nigeria is a multi-racial society with so many ethnic groups. Good governance demands that the appointment of politicians from various ethnic groups has to be equitable, fair and transparent. For instance, in Nigeria a criterion is set to elect a governor per state, 3 Senators per state, 6 houses of Representative members per state. In all appointments in Nigeria, the national character is put to play to determine the number of people appointed per state. All these have mathematical underpins using numbers as criteria. It is only when these mathematical criteria are met that any appointments in any government could be seen to be fair, equitable and acceptable by the citizens in the society. Appointments into political offices are expected to be reasonably equalized among the various interest groups or evenly distributed for acceptability by all. This could be achieved by proportional distribution using ratios or percentages. For instance, this principle was adopted in the selection of delegates for the last Nigerian National Confab to ensure that all strata of the Nigerian society were represented. This enhanced the acceptability of the composition of the members of the National confab and the report of their deliberations. Thus mathematics helps to ensure equity and fairness in all appointments which are essential ingredients for good governance.

(b) Determination of the Resource needs for Various Communities to Promote Socio-Economic Development

One of the ingredients of good governance is fairness in the distribution of the wealth and infrastructural facilities among the ethnic groups in the country. Mathematics could be used to determine the resource needs (Hospitals, Schools, Electricity, Water projects etc.) for the various communities that make up the country. For instance, the data of the population, schools, hospitals, water projects etc. in communities is required by the Government to plan and provide the resources for the general populace. This also helps to ensure that all communities have a fair share of the resources to be provided by the government.

Mathematics therefore plays important role in shaping the social reality of any society and ensures good governance by helping to determine the resource needs of any society. An example of this is the "marginalization Index" used in Mexico (Sanchez, 2009, 2010). This is a measure based on mathematical model used by the Mexican government to define the municipalities in Mexico that are in need of resources to promote development. It is used by the Mexican government to determine who the Mexican's most marginalized municipalities are. This measure is calculated using a mathematical model. The mathematical model measures nine socio-economic indicators for each municipality. The nine indicators are: percentage of illiterate population, percentage of population without complete primary education, percentage of population without toilet or drainage, percentage of population without electricity, percentage of population without access to piped water, percentage of private homes with a level of overcrowding, percentage of population living with a floor made of soil, percentage of population in localities with fewer than 5,000 inhabitants, percentage of the employed with income less than or equal to twice the minimum wage. The marginalization index helps to describe the welfare level of Mexican municipalities and it also indicates where the resources for social development should be targeted. One of the Socio-economic indicator models helps to indicate the percentage of employed population with incomes less than or equal to twice the minimum wage. This indicator is calculated using the following formula

$$I_{i9} = \frac{P_i^{sm \leq 2}}{P_i^0} \times 100$$

Where

$P_i^{sm \leq 2}$ Is the part of the employed population who receive less than two minimum wages.
 P_i^0 represents the total of the employed population.

This model if properly carried out would help the Government in determining the socio-economic state of any community with a view to helping in the provision of facilities. There is need for such a model for the Nigerian case.

(c) Legitimization and Justification of Political Decisions in Governance

In the governance of any society, there is always the need to take decisions on issues concerning various groups in the society. Most times, there are divergent views and opinions of people on issues without consensus. In meetings of Senators, House of Representatives members and National Executive Council members etc., different views and opinions are raised by various interest groups. Usually when there is no consensus opinion on any issue, the last resort is the application of mathematics. Mathematics topics such as percentages, ratio, and fractions of people with various views are used to resolve any divergent views of people at any conference, referenda or proceedings where political decisions affecting governance are taken. For instance, in 2016 the Nasarawa State House of Assembly had 18 members that voted for the suspension of 6 other members who were alleged to have disrupted the proceedings of the house. The fraction of 18 out of 24 was high enough for the suspension to be upheld and implemented. In the 2016 Area Council election in FCT, Abuja, the elections in Kuje, Gwagwalada, Abuja Municipal and Abaji Area Councils were declared inconclusive because the numbers of cancelled votes were more than the gap in the number of votes obtained by the party that scored the highest number and the second highest scorer in the election. Also the numbers of registered voters were less than the total number of votes casted. Therefore, mathematics can be used to legitimate and justify political decisions that directly and significantly affect the socio-economic dynamics of Communities and the lives of the inhabitants (Bhatnagar, Jha & Singh, 2010)

(d) Socio -Economic Planning

Good governance requires effective planning in the economic, social and technological spheres of the society. To effectively plan for the future, the Government requires numerical data of human and physical resources in the society. Also, the government needs to budget for the physical and human resources required by the society. The annual budget of Nigeria and that of the states are prepared using numerical figures. All these require the use and applications of mathematics. Any plan by the government without sound Mathematical underpinning is bound to fail.

Azuka (2015) opined that proper planning for the future, staffing functions, needs of an organization, budgeting, organizational appraisal, accountability, maximization of profit, problem solving and minimization of conflict all lay credence to mathematical skills.

(e) Use of Mathematics in Political Discourse in Governance

Mathematics is used by politicians to support and justify arguments with respect to issues in governance. In any political discourse, mathematical figures are needed to direct and justify

the stand of the government on the issue. For instance, the government requires the percentage of the population in each state with HIV to enable it take a stand on it, guide the government on how to tackle it and guide the citizens of the country towards it. For instance, if State A has 30% of its population with HIV and State B has 5% of its population with HIV, these will help the government to discourse on the issue in the states and direct government actions towards it. Also, the mathematical representations in percentage or graph of the prevalence of any disease can help the government to track and legitimize the outcomes of the intervention efforts of government in fighting the scourge of the diseases. Politicians and government institutions need mathematics to underpin their proposals, arguments and in decision making related to social problems (Sanchez & Blomhoj, 2014). Another example is the record of various rates of crime in States. This helps the government to plan to tackle it and track it down and successfully solves the problem. Also, various agencies of government such as Police, Federal Road Safety Corps, and Custom Service use mathematics to record and indicate the success of their agencies and even the pursuit of their mandates. This enables the society to track and evaluate the activities of such agencies.

(e) Use of Information and Communication Technology (ICT) in Governance

The revolution of ICT has its root in mathematics. ICT is used in governance to communicate to the people on any issue, for monetary transactions, issuing of international passports, Identify cards, License etc. All these information are necessary for good governance. Also, ICT promotes good governance in the following ways: (1) by increasing transparency, information and accountability; (2) by facilitating accurate decision making and public participation; (3) by enhancing the efficient delivery of public goods and services. The citizen's right to gain access to public documents is supported by government's computerization programme and availability of these documents through the internet (Magno & Serafica, 2014). Other applications of ICT in governance include economic monitoring, planning and intensive data management relating to elections, census, tax administration etc. The government can use ICT to provide, integrate governance, reach people faster, and provide efficient services, and citizen's empowerment through access to information (Bhatnagar, Jha, & Singh, 2010)

Implications to Mathematics Education

The teaching of mathematics in the schools should include the role and functions of mathematics in the society including good governance. It has been asserted that mathematics teachers should be able to teach mathematical modeling to students in such a way that the role of and functions of mathematics in the society is demystified (Roskilde University, 1975). In many countries, mathematics is taught in an abstract and isolated way especially at the secondary school level without connection to the use of mathematics in the society. There is need to change this trend. Mathematics education research should focus on the roles and functions of mathematics including good governance. Mathematics education should pay attention to the socio political uses of mathematics.

There are consequences for the lack of connection between the teaching of mathematics and the society. First, there is the risk of making students to interpret mathematics as a school subject that exist and is only relevant within the school. This situation tends to produce a poor image of mathematics in students resulting in lack of interest and poor attitude towards the subject. Secondly, the school curriculum does not encourage teachers to relate mathematics to other subjects. This creates a restricted image of mathematics (Sanchez & Blomhoj, 2014).

Mathematics teaching that has strong links with the social reality may be more attractive to the mathematics students. This would be interesting and motivating for mathematics students and teachers. Generally, mathematics teaching that is detached from the social reality experienced by the students in a country can appear de-motivating for the students. For mathematics teaching to contribute to general education, good governance and for democratic development, mathematics teaching needs to take into consideration the role of mathematics in society including good governance more seriously.

Conclusion

It has been revealed in this paper that political leaders and government institutions use mathematics to underpin their proposals, arguments and in decision making relating to governance in any society. The use of mathematics helps to certify the attributes of good governance in any society. Therefore, mathematics education should take the responsibility to provide students with a mathematics education which could enable them to take active and critical participation in good governance of the society. Mathematics education should prepare students to identify and analyze the applications of mathematics in addressing the social problems including the problem of good governance in Nigeria.

Recommendations

Based on the above discussion, the following recommendations were made:

1. The teaching and learning of mathematics should be made real and attractive to all students
2. At least a pass in mathematics at O'level should be part of the requirement for eligibility to hold position of governance
3. Policy makers and funding organizations should collaborate with the funding of mathematical education through National Mathematics Centre (NMC).
4. Attempt should be made towards reviewing the objectives of mathematics education at all levels of education to reflect the current realities especially at the secondary level (Guwan, 2015).

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