THE ROLE OF MATHEMATICS EDUCATION IN ACHIEVING SUSTAINABLE DEMOCRACY AND POLITICAL STABILITY

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Ezenweani ABSTRACT:
This paper stressed the role of Mathematics Education in preparing a nation for stable governance with special reference to Nigeria. Mathematics and Political Science were linked up using their common areas of intersection, knowledge obtainable from their respective concepts and Principles that enable us integrate them properly for the purpose of sustainable democracy. Major areas dealt with include randomization process in selection of representatives in government with emphasis on homomorphic representation leading to full participatory democracy. Other areas include the use of mathematical models in decision making as avenue towards development of political technology to remove some factors militating against stable government in the country.

INTRODUCTION
Nigeria has suffered from unstable governments as a result of truncated civilian governments with the military leadership. This is evidenced in the so far four Republics each characterized by a factor giving room to instability. For example, the First Republic fell because of some leaders who saw themselves as regional party leaders thereby sectionalizing political parties. The Second Republic dropped also due to composition of parties by leaders who saw themselves as privileged few that confiscated the national power; while the third republic was over thrown due to few individual that possed themselves as Kingmakers or power brokers. These are facts known to be obvious cases.

How do we then get out of these syndromes that dragged the country back? We then demonstrate that the knowledge of mathematics education can be seen as vital in this regard. Starting with the concept of set as the basis for mathematical principles, we consider how best its sub-sets can be properly and firmly represented. In-the evolution of new and better ideologies to be referred to here as laws or legislation they can be applied.

A set is commonly identified by certain characteristics distinct from other sets except for join sets. By these characteristics, their elements are identified also. Here we consider "Nigeria (a nation) as a set whose subsets are the geo- political groups like the States, Local Governments, Senatorial districts or constituencies. Each of these groups are represented in the government policy making bodies and their representatives are expected to carry forward the ideologies, norms and beliefs of their groups to the house. Therefore the process of selecting these representatives is very crucial for stable government. One sure process of set transformation is the homo-morphism.

THE NIGERIAN FACTORS
With a critical look at what happened in the previous government of Nigeria, certain problems are identified as peculiar at least to great extent. Some of the problems are referred to as Nigerian factors by Chukwurah, (1997:22-46) when he observed the political situation of Nigeria in which "decent rules of games of politics are crafty violated and opponents are craft to defeat", In another view, Nzeribe (1986: 54) advanced that "there has been no theory that derives from, and in development and application, can relate to the Nigerian environment, experience and political culture". These imply that even accepted theories of democracy and their principles never succeed in the Nigerian environment. Indeed Chukwurah (1997) sees Nigeria as a nondemocratic nation for he says "democracy demands an environment where scientific management principle is practiced". This may appear as personalized opinion yet it is obvious for the principles of democracy are yet to be entrenched and operated in the country. We liken a democratic nation to a system where the components (the populace ) share common
ideologies evolving through various contributions by different groups and particular individuals to reach acceptable compromise. Such consensus agreements are attainable through contribution by majority of the representative bearing in the yearnings of the nation is a pointer to the true democracy. Indeed, development of policies that ensure massive participation by people in government removes endemic factors leading to instability in the country's system of government.

THEORIES OF REPRESENTATION

The Nigerian factor experienced in the previous civilian governments are the cases where the elected representatives quickly turned their back against the electorate on selfish grounds leading to breakdown of laws and order. According to Orewa (1997:69-71) the previous system of political representation suffered "poor representation" due to formation based on language factor, concentration of power in few hands and those who acted like robots exercising powers that are indifferent to public yearning. These few amass wealth to themselves and located few projects to their areas through bribing the legislators to steamroller the passing of necessary bills. A kind of representation that did not give room for the participatory, democracy which Ayo Irikefe panel (Nzeribe, 1986 :70) advised that -: to ensure the rapid economic development among all ethnic groups, increase participatory democracy as an insurance against political instability, promote and institutionalize a balance and stable federation.

The principle of participatory democracy is based on fair representation in both party formation and in government. This owes much to the idea of individual liberty and dignity that developed in the world over. It is a system that demands openness where the legislators not only control the government but should give feedback to the electorate on critical issues. To this Clem (1986, 37), says :-
the meaning of representative government is that the whole people or some numerous portion of them, exercise through deputies periodically elected by they themselves, the ultimate controlling power which, in every constitution, must reside somewhere.

In the system of participatory representative government, mandate are given to the electorate to assess the worth of their representatives either to re- elect them or drop them. No aspirant in this way will have the power to dominate against the will of the electorate. This can be ensured by the principle of homomorphic process.

A HOMOMORPHIC REPRESENTATION

To ensure representative democracy, the true representatives of the people should be allowed to emerge without bias or intimidation and not through hand- picking. A homomorphic representation is thus the process which ensures that members of the electorate have the power to identify their representatives that indeed understand the plight of the people, who identify with the aspiration of people and share the same. The concept of homomor- phism is a one -to - one mapping which is the process of transformation that preserves the rule for the transformed member to easily come back for feedback to the people. It is a principle of randomization with high level of people participation of which every member has equal chance of being selected. We then see the populace the set with the elected member as the subsets sharing common characteristic features with the members of the major set. The idea of randomization means that no special subgroup of the population is particularly favoured in sample selection (Mkpa; 1988.46).

A mathematical illustration of this given by setting out as follows. Let the members of electorate be considered as the set (E) and the members of the legislator constitute the set (L), then the set of decision taken by the legislature is set (P). Now homomorphic process preserves the idea that the set (P) would also have been obtained if other true shown diagrammatically in fig 1.
The set \( P \rightarrow F(E) \) is a peculiar characteristic of homomorphism because for every \( e \) in \( E \), the policy \( P \) in \( P \) is obvious and hence \( F(E) \) is the general view of \( E \) decided by \( L \).

**MATHEMATICS AND POWER FUNCTION**

Power and government are often associated with each other. For instance democracy is seen (Odufe, 1999: 5) as power expressed in the idea of freedom and liberty as against dictatorship and arbitrariness as best means of engendering good life. But in many cases, where power is exercised, people tend to abuse it on the people by taking it absolutely or selfishly. Adiele (1999:5) thus sees Nigeria as an environment that does not allow the values of democracy to be fully implemented. Rather there is self-delineation on the part of the people such that the repository of power and concept of Federation do not make any meaning in the country.

We may consider power as an enabling condition for productivity, an endowment for work to take place and yield results depending on the basis and process of exercising it. Sometimes it is exercised in unacceptable manner. In Mathematics, we have power functions as absolute where both the negative and positive are gamed into accepted norm; The exponential power which allows an individual to go to any length unchecked and the factorial power which accommodates the contribution of as many people as are needed. It is the factorial power that reflects the democratic principles. It allows collective bargaining before consensus opinion is attained in decision taking. Hence factorial authority is homomorphic since the result of decision taking follow the pattern in fig 1. above. Indeed, factorial power is established where true representative democracy is practiced because there is no high jacking of authority.

**MATHEMATICS AND POLITICAL SCIENCE**

The relationship between mathematics and political science does not easily come to mind except through their association with science. All the same, the practice of political science in relation to scientific approaches is doubtful with at least the involvement of politics in Government. This resulted to the under-emphasis on what we may called political technology. By this we mean the political ultimate’s achievable through logical derivation from the link between science and technology using Mathematics as in the case of the link between political science and its future evolution. Specifically, political technology would mean the application of political science to evolution of system of government and leadership styles based on technicalities that ensure maximum people's general satisfaction on policies that evolve.

For instance Omosohin (1999:95) described political science as the subject that deals with human behaviour in relation to distribution and exercise of power. It is also the study of administrative procedure, principles and practice of Government, election and parliamentary practices (Igweme, 1999: 112). The call for political empowerment of the Nigerian society (Chukwurah 1999:67) is an indication that the whole system of the nation should work towards the application of appropriate technology even in the quest for good government of the people. This may not be easy without evolving political technology which must use mathematics, as an effective tool.

We see mathematics as a subject that is meticulous with flexible principles, applicable theorems, stable rules and process as well as conformable laws to nature such that policies built on the subject and its norms should be systematic, guided, goal oriented and relatively stable. The country should strive toward political technology.

**MATHEMATICAL DECISION THEORY:**

Decision making in government should rather be scientific than otherwise. One of the models applied in mathematics is the statistical (or Bayesian) decision theory, an invaluable aid in analysis of complex modern business decision (Dickinson 1976: 287-290). A decision maker faced with numerous forms of possible courses of action open to him should design a mutually exclusive and exhaustive set of events that describe possible behaviours in the environments on which decision is to be made. To do this, he does not have control over which event that will take place. Rather, he can attach subjective
probability (a degree of belief) of occurrence each. For instance, the set \( (A) \) contained in the sample space \( (E) \) subdivided into mutually exclusive and exhaustive events \( (H_I, H_2, H_3) \) also affected the sample space as shown in fig 2.

Then the model of decision on the event \( H_I \), say, is shown with respect \( A \) by:

\[
P(\frac{H_I}{A}) = P(A/H_1)P(H_I) + P(A/H_2)P(H_2) + P(A/H_3)P(H_3)
\]

This mode can be applied by policy makers with the degree of belief that the quality of education in the country will improve in the year 2010 to be 0.90. This will be tested by considering the previous happening after predictions. Suppose that in the past a political party predicted no improvement correctly at 75% of the times but wrongly at 15% of the cases. The policy maker should then test and revise the degree of belief as follows.

\[
P(H_I/A) = P(A/H_I)P(H_I)
\]

\[
P(A/H_I)P(H_I) + P(A/H_2)P(H_2) + P(A/H_3)P(H_3)
\]

Where:

- \( H_I = \) education improves in quality
- \( H_2 = \) education will not improve in quality
- \( A = \) political party predicted that education will not improve.

Using the dates as:

\[
P(A/H_I) = 0.15 \quad P(A/H_2) = 0.75 \quad P(H_I) = 0.90 \quad P(H_2) = 0.10
\]

We observe \( P(\frac{H_I}{A}) = 0.64 \) indicating that education will not improve up to 90% as predicted. This suggests that policy making should be guided scientifically to minimize error and avoid some mistakes of the past.

**CONCLUSION:**

We recommend here how mathematical knowledge will be used by policy makers to ensure stable democracy. Policies guiding party formation should disallow sectionalism and clique domination where few individuals see political parties as their brainchild. Ideologies are never personal because they are to be accepted by the society before they are have practiced. Hence parties should have the national interest in formulation of manifests and then enshrine the various ethno-political groups. This implies that the grass not should not be left out such as subsets of a set cannot be left out in the consideration of the whole set.

During election, these small groups should be allowed to elect their representative without intimidation. This ensures homomorphic representation allowing the elected members to give feedback to the electorate on issues that affect them. This also ensures that power are given to those that are relatively selfless.

The involvement of mathematicians in politics or the principles of mathematics in policy making should also give room for the meticulous and scientific ways of taking decision which are often stable in problem solving.


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