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Opinion Article

Interdisciplinary Research: A Key to Quality Assurance in Nigerian Educational System

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ABSTRACT: *Unarguably, education is an instrument "par excellence" for achieving Nigeria's National Development goals. However, it is only qualitative education that can achieve this by fostering the worth and development of the individual for each individual's sake and for the general development of the society. This study unveils the vital role of interdisciplinary research in promoting objectivity, creativity and innovations in educational research. Concepts of research, interdisciplinary research and quality assurance were discussed in perspective. Interdisciplinary research was portrayed as a major guarantor of quality assurance in any educational system. Consequently, it was recommended among other things that research experts in education should embrace interdisciplinary research so as to improve educational reforms and policies which are usually derivatives of research findings.*

Keywords: *Education, Quality Assurance, Research, Interdisciplinarity, Interdisciplinary Research.*

I. INTRODUCTION

Human resource development is the process of increasing the knowledge, the skills and the capacity of all the people in the society for promoting its economic, political and social growth, [1]. Evidently, the greatest tool for human development is education. The role of education in bringing about human development cannot be over-emphasized. This is because education embraces all processes by which a person acquires knowledge and skills to live well in his society. Education is a tool with which people, using the human ability to respond to, and interact with the environment, pass on from generation to generation, those aspects of their culture and values which they consider to be worthwhile. It remains an undisputable fact that no society or nation can rise above its educational level.

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Education is the aggregate of all the processes by which a child or young adult develops the abilities, attitudes and other forms of behavior which are of positive value to the society in which he lives, in other words, it is a process for transmitting culture in terms of continuity and growth and for disseminating knowledge either to ensure social control or to guarantee rational direction of the society or both, [2]. [3] defined education as a social process designed to induct the rising generation into the membership of their society. The Federal Republic of Nigeria recognizes the importance of education in attaining her national objectives. The five main national goals of Nigeria is to build; a free and democratic society, a just and egalitarian society; a united, strong and self reliant nation; a great and dynamic economy and a land full of bright opportunities for all citizens, [4].

Consequently, Nigeria's philosophy of education is based on; the development of the individual into a sound and effective citizen; the full integration of the individual into the community; and the provision of equal access to educational opportunities for all citizens of the country at the primary, secondary and tertiary levels both inside and outside the formal school system, [5]. From the foregoing, it is clear that the Nigerian nation believes that education is an instrument "par excellence" for achieving national development as it (education) fosters the worth and development of the individual, for each individual's sake and for the general development of the society.

The role of education in bringing about human development cannot be over-emphasized. Perhaps, the most important function of education is that it liberates the individual from ignorance, lack of awareness and high rate of docility. However, it is only qualitative and functional education that can achieve all these laudable objectives. Qualitative and functional education can only be grantee through effective quality assurance in the system. Quality assurance (QA) is part of quality management focused on providing confidence that quality requirements will be fulfilled. Simply put, quality assurance is a way of preventing mistakes or defects in a system. No doubt, quality assurance in the educational system hinges to a large extent on effective and efficient research. It has been widely recommended that interdisciplinary research is major way of attaining effective and efficient research. This is because interdisciplinary research involves creating something new by thinking across boundaries, that is, combining two or more academic disciplines into one activity using methods and insights of several established disciplines or traditional fields of study. This study therefore is a deliberate effort to portray Interdisciplinary Research as a Key to Quality Assurance in Nigerian Educational System. This is with a view to encouraging researchers adopt this creative innovative and most profitable approach. Perhaps, this will bring about the foundation of a functional education upon which Nigeria's philosophy of education is based.

II. Concept of Research

The word "re-search" means "to search again" with a view to rediscovering better ways of improving the existing situation. [6] defined research as a careful study of a subject, especially in order to discover new facts or information about it. When research is annexed with "development," it means an industrial work process that tries to identify new products and processes or to improve existing products or procedures. [7] stated that research is simply the process of arriving at dependable solutions to problems through planned and systematic collection, analysis and interpretation of data. Again, [8], defined research as any organized enquiry that aims at providing information for solving identified problem. All these definitions present research as a human activity and a veritable tool for advancing knowledge for promoting progress, and for enabling man to relate more effectively to his environment, to accomplish his purposes, and to resolve his conflicts. Research is a human activity which is oriented toward the discovery of the relationships that exist among the observable issues or phenomena in the social environment in which we live.

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Consequently, any research that failed to contribute to existing body of knowledge would be considered as trite. Research should be result-oriented by way of discovering new ideas or methods or replicating existing research with a view to affirming its validity. Research is a "systematized effort to gain new knowledge." It is actually a voyage of discovery. We all posses the vital instinct of inquisitiveness for, when the unknown confront us, we wonder and our inquisitiveness makes us probe and attain full and fuller understanding of the unknown. This inquisitiveness is the mother of all knowledge and the method, which man employs for obtaining the knowledge of whatever the unknown, can be termed as research. Research is an academic activity and as such the term should be used in a technical sense. According to [9] research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusion; and at last carefully testing the conclusion to determine whether they fit the formulated hypotheses. [10] define research as the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art.

Research according to [11] is an original contribution to the existing stock of knowledge making for its advancement. It is the pursuit of truth with the help of study, observation, comparison and experiment. In short, the search for knowledge through objective and systematic method of finding solution to a problem is research. The systematic approach concerning generalization and the formulation of a theory is also research. As such, research refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solution(s) towards the concerned problem or in certain generalization for some theoretical formulation. In our reasoning process we are confronted with two separate worlds (the world of "reality" and the imaginary world; which is the world of theory or abstraction).

The world of reality is of great interest to scientists; *reality* in [8] means that phenomenon exists somewhere and can be verified empirically. The scientist conceives the existence of reality and often, through experience (empiricism) and logical reasoning, induction or deduction, attempts to get as close to reality as possible. When the scientist succeeds, we talk of a scientific breakthrough. He may develop proposition or argument that may subsequently lead to attainment of reality in which case he is said to have contributed to knowledge in that area of scientific endeavour. Whatever his orientations, the researcher-scientist's ultimate aim is to conceptualize reality and work towards its attainment. A research process can be scientific if and only if it followed the steps of scientific enquiry which according to [8], include inter alia:

(1) Identification of problems

(2) Problems definition and delimitation

(3) Analysis of the problems

(4) Deductions based on the analysis including recommendation of solutions to the problems and

(5) Implementation of recommended solutions.

These steps are perhaps more than what researchers actually do. Step five is very important to situations that require application of solutions, but not in theoretical research. The situation for application of research in education shall obviously require the application or implementation of recommendations (solutions) in the research report.

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III. Concept of Interdisciplinary Research

According to [12] Interdisciplinarity involves the combining of two or more academic disciplines into one activity (e.g., a research project). It is about creating something new by thinking across boundaries. It is related to an interdiscipline or an interdisciplinary field, which is an organizational unit that crosses traditional boundaries between academic disciplines or schools of thought, as new needs and professions emerge. The term interdisciplinary is applied within education and training pedagogies to describe studies that use methods and insights of several established disciplines or traditional fields of study. Interdisciplinarity involves researchers, students, and teachers in the goals of connecting and integrating several academic schools of thought, professions, or technologies—along with their specific perspectives—in the pursuit of a common task.

Interdisciplinary may be applied where the subject is felt to have been neglected or even misrepresented in the traditional disciplinary structure of research institutions. Interdisciplinarity can likewise be applied to complex subjects that can only be understood by combining the perspectives of two or more fields. The adjective interdisciplinary is most often used in educational circles when researchers from two or more disciplines pool their approaches and modify them so that they are better suited to the problem at hand, including the case of the team-taught course where students are required to understand a given subject in terms of multiple traditional disciplines. For example, the subject of land use may appear differently when examined by different disciplines, for instance, biology, chemistry, economics, geography, and politics.

Although interdisciplinary and Interdisciplinarity are frequently viewed as twentieth century terms, the concept has historical antecedents, most notably Greek philosophy. Julie Thompson Klein attests that the roots of the concepts lie in a number of ideas that resonate through modern discourse—the ideas of a unified science, general knowledge, synthesis and the integration of knowledge, while Giles Gunn says that Greek historians and dramatists took elements from other realms of knowledge (such as medicine or philosophy) to further understand their own material. Any broadminded humanist project involves Interdisciplinarity, and history shows a crowd of cases, as seventeenth-century Leibniz's task to create a system of universal justice, which required linguistics, economics, management, ethics, law philosophy, politics, and even sinology.

Interdisciplinary programs sometimes arise from a shared conviction that the traditional disciplines are unable or unwilling to address an important problem. For example, social science disciplines such as anthropology and sociology paid little attention to the social analysis of technology throughout most of the twentieth century. As a result, many social scientists with interests in technology have joined science and technology studies programs, which are typically staffed by scholars drawn from numerous disciplines. They may also arise from new research developments, such as nanotechnology, which cannot be addressed without combining the approaches of two or more disciplines. Examples include quantum information processing, an amalgamation of quantum physics and computer science, and bioinformatics, combining molecular biology with computer science.

Sustainable development as a research area deals with problems requiring analysis and synthesis across economic, social and environmental spheres; often an integration of multiple social and natural science disciplines. Interdisciplinary research is also key to the study of health sciences, for example in studying optimal solutions to diseases. Some institutions of higher education offer accredited degree programs in Interdisciplinary Studies. At another level, Interdisciplinarity is seen as a remedy to the harmful effects of excessive specialization. On some views, however, Interdisciplinarity is entirely indebted to those who specialize in one field of study—that is, without specialists, interdisciplinarians would have no information and no leading experts to consult. Others place the focus of Interdisciplinarity on the need to transcend disciplines, viewing excessive specialization as problematic both epistemologically and politically. When interdisciplinary collaboration or research results in new solutions to problems, much information is given back to the various disciplines involved.

Therefore, both disciplinarians and interdisciplinarians may be seen in complementary relation to one another. Because most participants in interdisciplinary ventures were trained in traditional disciplines, they must learn to

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appreciate differing of perspectives and methods. For example, a discipline that places more emphasis on quantitative rigor may produce practitioners who think of themselves (and their discipline) as more scientific than others; in turn, colleagues in softer disciplines may associate quantitative approaches with an inability to grasp the broader dimensions of a problem. An interdisciplinary program may not succeed if its members remain stuck in their disciplines (and in disciplinary attitudes). It is therefore expedient that every educator should cooperate and fight against anything that will constitute a barrier to interdisciplinary research.\

IV. Concept of Quality Assurance

Quality assurance (QA) according to [13] is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering solutions or services to customers. It is a part of quality management focused on providing confidence that quality requirements will be fulfilled. This defect prevention in quality assurance differs subtly from defect detection and rejection in quality control, and has been referred to as a shift left as it focuses on quality earlier in the process. The terms quality assurance and quality control are often used interchangeably to refer to ways of ensuring the quality of a service or product.

Quality assurance comprises administrative and procedural activities implemented in a quality system so that requirements and goals for a product, service or activity will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention. This can be contrasted with quality control, which is focused on process output. Quality assurance includes two principles: "Fit for purpose" (the product should be suitable for the intended purpose); and "right first time" (mistakes should be eliminated). QA includes management of the quality of raw materials, assemblies, products and components, services related to production, and management, production and inspection processes. Suitable quality is determined by product users, clients or customers, not by society in general. It is not related to cost, and adjectives or descriptors such as high and poor are not applicable. For example, a low priced product may be viewed as having high quality because it is disposable, whereas another may be viewed as having poor quality because it is not disposable.

According to [14] during the Middle Ages, guilds adopted responsibility for the quality of goods and services offered by their members, setting and maintaining certain standards for guild membership. Royal governments purchasing material were interested in quality control as customers. For this reason, King John of England appointed William Wrotham to report about the construction and repair of ships. Centuries later, Samuel Pepys, Secretary to the British Admiralty, appointed multiple such overseers, [14]. Prior to the extensive division of labor and mechanization resulting from the Industrial Revolution, it was possible for workers to control the quality of their own products. The Industrial Revolution led to a system in which large groups of people performing a specialized type of work were grouped together under the supervision of a foreman who was appointed to control the quality of work manufactured.

[15] added that during the time of the First World War, manufacturing processes typically became more complex with larger numbers of workers being supervised. This period saw the widespread introduction of mass production and piece work, which created problems as workmen could now earn more money by the production of extra products, which in turn occasionally led to poor quality workmanship being passed on to the assembly lines. To counter bad workmanship, full-time inspectors were introduced to identify, quarantine and ideally correct product quality failures. [15] added that quality control by inspection in the 1920s and 1930s led to the growth of quality inspection functions, separately organized from production and large enough to be headed by superintendents. The systematic approach to quality started in industrial manufacturing during the 1930s, mostly in the U.S., when some attention was given to the cost of scrap and rework. The impact of mass production required during the Second World War made it necessary to introduce an improved form of quality control known as Statistical Quality Control,

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or SQC. Some of the initial work for SQC is credited to Walter A. Shewhart of Bell Labs, starting with his famous one-page memorandum of 1924.

[1] also said that SQC includes the concept that every production piece cannot be fully inspected into acceptable and non-acceptable batches. By extending the inspection phase and making inspection organizations more efficient, it provides inspectors with control tools such as sampling and control charts, even where 100 percent inspection is not practicable. Standard statistical techniques allow the producer to sample and test a certain proportion of the products for quality to achieve the desired level of confidence in the quality of the entire batch or production run. In the period following World War II, many countries' manufacturing capabilities that had been destroyed during the war were rebuilt. General Douglas MacArthur oversaw the re-building of Japan.

During this time, General MacArthur involved two key individuals in the development of modern quality concepts: W. Edwards Deming and Joseph Juran. Both individuals promoted the collaborative concepts of quality to Japanese business and technical groups, and these groups utilized these concepts in the redevelopment of the Japanese economy. Although there were many individuals trying to lead United States industries towards a more comprehensive approach to quality, the U.S. continued to apply the Quality Control (QC) concepts of inspection and sampling to remove defective product from production lines, essentially ignoring advances in QA for decades.

A valuable process to perform on a whole consumer product is failure testing or stress testing. In mechanical terms this is the operation of a product until it fails, often under stresses such as increasing vibration, temperature, and humidity. This exposes many unanticipated weaknesses in a product, and the data use approaches to drive engineering and manufacturing process improvements. Often quite simple changes can dramatically improve product service, such as changing to mold-resistant paint or adding lock-washer placement to the training for new assembly personnel.

According to [16] statistical control is based on analyses of objective and subjective data. Many organizations use statistical process control as a tool in any quality improvement effort to track quality data. Any product can be statistically charted as long as they have a common cause variance or special cause variance to track. Walter Shewart of Bell Telephone Laboratories recognized that when a product is made, data can be taken from scrutinized areas of a sample lot of the part and statistical variances are then analyzed and charted. Control can then be implemented on the part in the form of rework or scrap, or control can be implemented on the process that made the part, ideally eliminating the defect before more parts can be made like it.

[16] asserted that the quality of products is dependent upon that of the participating constituents, some of which are sustainable and effectively controlled while others are not. The processes (s) which are managed with QA pertain to Total Quality Management. If the specification does not reflect the true quality requirements, the product's quality cannot be guaranteed. For instance, the parameters for a pressure vessel should cover not only the material and dimensions but operating, environmental, safety, reliability and maintainability requirements. From the above it is obvious that efficient and effective quality assurance involves interdisciplinarity. This is so because when experts view a concept from the eyes of their individual disciplines, their contributions are likely to be more qualitative. More so, it may be very faulty to consider quality in isolation, that is, without reference to other important factors, indices or variables as the case may be.

V. Role of Interdisciplinary Research in Attaining Quality Assurance in Nigerian Educational System

All process is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention. Increased amounts of interdisciplinary research make progress possible. Interdisciplinary research inculcates scientific and inductive thinking and it promotes the development of logic habits of thinking and organization. The role of interdisciplinary research in several fields of applied economics, whether related to

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business or to the economy as a whole, has greatly increased in modern times. The increasingly complex nature of business and government has focused attention on the use of interdisciplinary research in solving operational problems. Interdisciplinary Research, as an aid to economic policy, has gained added importance, both for government and business. Interdisciplinary Research provides the basis for nearly all government policies in our economic and educational systems. For instance, government's budgets rest in part on an analysis of the needs and desires of the people and on the availability of revenues to meet these needs. The cost of needs has to be equated to probable revenues and this is a field where interdisciplinary research is most needed.

Through interdisciplinary research we can devise alternative polices and can as well examine the consequences of each of these alternatives. Decision-making may not be a part of interdisciplinary research, but interdisciplinary research certainly facilitates the decisions of the policy maker. Government has also to chalk out programs for dealing with all facets of the country's cultivators, the problems of big and small business and industry, working conditions, trade union activities, the problems of distribution, even the size and nature of defence services are matters requiring interdisciplinary research. Thus, interdisciplinary research is considered necessary with regard to the allocation of nation's resources. Another area in government, where interdisciplinary research is necessary, is collecting information on the economy and social structure of the nation. Such information indicates what is happening in the economy and what changes are taking place. Collecting such statistical information is by no means a routine task, but it involves a variety of interdisciplinary research experts to carry on this work. Thus, in the context of government interdisciplinary research as a tool to economic policy has three distinct phases of operation, viz, (i) investigation of economic structure through continual compilation of facts; (ii) diagnosis of events that are taking place and the analysis of the forces underlying them; and (iii) the prognosis, i.e. the prediction of future developments.

Interdisciplinary research has its special significance in solving various operational and planning problems in education, business and industry. Operations interdisciplinary research and market interdisciplinary research, along with motivational interdisciplinary research are considered crucial and their results assist, in more than one way, in taking educational and business decisions. Market interdisciplinary research is the investigation of the structure and development of a market for the purpose of formulating efficient polices for purchasing, production and scales. Operations interdisciplinary research refers to the application of mathematical, logical and analytical techniques to the solution of business problems of cost minimization or of profit maximization or what can be termed as optimization problems. Motivational interdisciplinary research of determining why people behave as they do is mainly concerned with market characteristics.

In other words, it concerned with the determination of motivations underlying the consumer (market) behaviour. All these are of great help to people in education, businesses and industries who are responsible for taking decisions. Interdisciplinary research with regard to demand and market factors has great utility in business. Given knowledge of future demand, it is generally not difficult for a firm, or for an industry to adjust its supply schedule within the limits of its projected capacity. Market analysis has become an integral tool of business policy these days. Business budgeting, which ultimately results in a projected profit and loss account, is based mainly on sales estimates which in turn depends on business interdisciplinary research. Once sales forecasting is done efficiently, production and investment programs can be set up around which are grouped the purchasing and financing plans. Interdisciplinary research, thus, replaces intuitive decisions with more logical and scientific decisions.

Interdisciplinary research is very important to educators in studying social relationships and in seeking answers to various educational problems. It provides the intellectual satisfaction of knowing a few things just for the sake of being able to do something better or in a more efficient manner. Interdisciplinary research in education is concerned both with knowledge for its own sake and with knowledge for what it can contribute to practical concerns. On the

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one hand, its responsibility as a science is to develop a body of principles that make possible the understanding and prediction of the whole range of human interactions.

VI. Conclusion

Interdisciplinarity research involves researchers, students, and teachers in the goals of connecting and integrating several academic schools of thought, professions, or technologies—along with their specific perspectives—in the pursuit of a common task. Evidently, this laudable approach to research is a sure way of attaining quality assurance in the educational system of any developing country such as Nigeria. Because of its social orientation, interdisciplinary research is interestingly being looked to for practical guidance in solving immediate problems of human relations.

The significance of interdisciplinary research can also be understood keeping in view the following points:

a) To students, interdisciplinary research may mean a careerism or a way to attain in high position in the social structure;
b) To professionals in research methodology, interdisciplinary research may mean a source of livelihood;
c) To philosophers and thinkers, interdisciplinary research may mean the outlet for new ideas and insight;
d) To literary men and women, interdisciplinary research may mean the development of new styles and creative work;
e) To analysts and intellectuals, interdisciplinary research may mean the generalizations of new theories.

Thus, interdisciplinary research is the fountain of knowledge for the sake of knowledge and an important source of providing guidelines for solving different educational, business, governmental and social problems. It is a sort of formal training which enables one to understand the new developments in one's field in a better way. It is therefore highly recommended for all educators.

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