

NEED FOR EDUCATIONAL RESEARCH IN ENGINEERING TECHNOLOGY STUDIES IN UNIVERSITIES

By

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ABSTRACT

This paper examined the need for educational research in engineering education for overall national development. Educational research has to do with an enquiry into the unknown. Most academics, engineers and lecturers in the field of engineering have found it difficult to embrace research because of the tediousness in scientific research findings. This paper x-rayed the importance of nations that realized the place of educational and scientific research and accorded it the necessary priority it deserves. Such nations are today reaping bountiful fruits of their foresight. Western countries that have embraced educational research in their engineering education are scientifically and technologically advanced and are steadily marching on to control the outer space. This paper tries to point out the constraints facing research in engineering. The paper recommended that academic institutions and students should endeavour to embrace research as a basis for improvement and development. The paper concluded that the development in human knowledge and research can exert profound influence on all spheres of human endeavour.

Keywords: Research, Education Engineering, Science, Knowledge.

INTRODUCTION

One urgent problem in engineering technology is how to make educational and scientific research a necessary priority for technological, economic, and educational advancement. An important key to this problem lies in curriculum delivery balance between practical research and theoretical knowledge so that our higher education system, can embrace the need for more enquiry into the unknown in order to find a long-lasting solution to the scientific and technological problems of the 21st century and beyond. Nwana (1981) defined educational research as those research activities from which the investigator derives or hopes to derive educational benefits or those research activities which are focused on the solution of educational problems. Nworgu (1991) defined educational research as a systematic approach to the solution of education

problems. It involves the application of scientific methods in finding solution of educational process.

Research can be defined as the process of finding out solution to a problem. The motivating force in all research is the existence of a problem and the urge to take care of, or solve it. Without a problem situation, there will be no research.

Research is broadly defined as any activities involving information gathering and analysis with a view to reaching a better understanding of, or solution to particular problem (UNESCO 1986).

Unfortunately, engineering education finds it cumbersome to carryout effective research. Let us reflect on the thoughts of Rev. Martin Luther King Junior that “the prosperity of a country depends not on the abundance of its revenue, nor on the strength of its revenue, nor on the strength of its fortifications but on the number of cultivated citizens, men of character, enlightenment and education”. In the developed nations of the world, educational research in engineering is seen as an indispensable tool in national development. Research is said to be the repository of knowledge and consequently an instrument of advancement in a country. Research is not just an activity designed to satisfy the individual researchers curiosity, it is infact, the engine of progress. This is because it leads to new discoveries in raw material for industries, in disease prevention, in solar options, in telecommunications, in language or literary reforms, in longevity technique or in better methods of teaching. Indeed, the success and survival of any nation depends on the dynamic qualities of continued and intensive research, without these, most industries and academic institutions will become obsolete, non-competitive and retrogressive (Eyibe,1990). Educational research in engineering studies will help remove under development and bring positive change in the school curriculum for a global excellence in the field of engineering.

This paper is therefore discussed under the following headings:

- Curriculum design in engineering education
- Improvement in engineering research
- Global engineers without borders
- Problems of education research in engineering

- The Role of educational research in engineering studies and.
- Importance of engineering education research

CURRICULUM DESIGN IN ENGINEERING TECHNOLOGY STUDIES

Engineering is defined as a disciplined activity of applying scientific knowledge to the design, building and control of machines, roads, bridges, electrical/electronic equipment.. There is need for engineering schools in developing countries to use a problem-solving method for the selection of content. In doing this, they should consider “process as content” as an important dimension of the learner’s experience. This requires providing the foundation instruction so that students and pupils will know the tool for solving problem and process instruction thus they can fully develop their capabilities for solving social, economic and engineering problems that abound in our developing economy (Eyibe, 1998). One way to understand the spirit of the value of the need for curriculum design in engineering education is to encourage teachers to provide students with experiences that promote adaptability, fabrication and transfer skills while preparing them for advanced education for entry into the work place. Wheeler (1967) defined curriculum as a planned experience offered to learners under the guidance of the teacher. In this regard, the specific goal and objective of engineering research in engineering education is to enable learners to gain an appropriate.

There is the need for understanding and appreciation of engineering and technological skills for the development of the nation. This will help the nation solve problems involving advanced enterprises in technology, in graphics, manufacturing, textbooks writings and publication, fibre optics, welding and computer aided design (Eyibe, 1995). The need for educational research in engineering education cannot be over accentuated because it serves as the fulcrum of advancement in economic and technology development of a nation. All educational institutions should support the trend towards setting a reform in curriculum design of engineering education for a successful economic and societal development as well as training the future engineers of the 21st century

IMPROVEMENT IN ENGINEERING EDUCATION RESEARCH

In these challenging times, there is need for engineering teachers in our various educational institutions to embark on research to attain a viable educational system. It should be noted that a viable technological system is one built on research and

innovation. One major problem facing our academics, engineers, technologists and Nigerian elites is how to conduct research and publish research findings to improve in our economic and societal development. Regrettably research is lacking in our school system. The obsession of certificates at the expense of practical and skill acquisition such as creative writing and research have become the bane of engineering studies in recent years. Most educational institutions are occupied by dormant academics and engineers. Again, dormant workers, technologists, scientists, or academics, are sterile engineers. There are more certificate holders in our educational institutions than people with useful and usable skills to do the productive work needed for the welfare of a nation. The introduction of educational research in engineering studies should be seen as a profitable investment for the benefit of all. The solution does not lie in politics, arm-chair criticisms, but it should be seen as a way of proving ourselves as binding researchers and helping in economic and technological advancement of the nation. Okigbo (1992) in his lecture titled crises in the temple echoes stated that:

“Our university administrators seem to have forgotten that the primary tool for the transfer of knowledge is the written word and laboratory. Physical structures do not make a university; rather, it is the teachers, laboratories, books and journals.... It is tragic to see our teachers recite only from what they have read little or nothing new ever since. The libraries are functionally empty because in the absence of current literature, what they contain is only of antiquarian interest.”

There can hardly be current literature without current research. There can hardly be societal development without current literature and dynamic research. It should be noted that if the wings of the research of any nation are chipped with economic, social and administrative problems, then the nation runs a great risk of intellectual extinction and stagnated development. Such barbaric occurrence should be avoided if we can ever hit the goals of national development. Unless we establish standards aimed at improvement in educational research in engineering technology, we may not achieve excellence in spectacular areas or disciplines. There is need for educational institutions, academics, engineers, and technologists to produce men and women with useful and usable bold ideas to do the productive work necessary for socio-economic, political and developmental agenda of a nation so as to achieve profitable investment in engineering education.

GLOBAL ENGINEERS WITHOUT BOARDERS

The engineering field is venturing into micro world such as bio, nano, info technology where things become smaller, faster and more complex. A global engineer is an engineer who can be called upon to wrestle with macro challenges of great societal importance: energy, sustainability, healthcare and or in an era of globalization where solutions are required from engineers to reach a cross disciplinary boundaries into social sciences, business, public policy and more. The body of knowledge, skills, abilities and attitudes demanded of engineers are expanding significantly. Engineers are expected today to understand complex systems, new materials, and new emerging technologies.

Developing global engineering competence in engineering technology will be beneficial to all. Engineering studies has seldomly advanced using well established learning theories and proven pedagogical practices gained through scholarly education research. There is need for global engineers to improve in engineering technology. It should be noted that globalization influences industrial needs. A global engineer must cut across national and cultural boundaries. This in turn affects engineering education. A common code for communication is required, and educational Institutions' must meet the language requirement for new millennium. Engineers can relate the same theories of mathematics of mechanics and technology but modern engineers must communicate effectively in a shared language. It should be noted that engineering projects are now planned and implemented across national and cultural borders. A man with many languages can go places and he is a safe man.

PROBLEMS OF EDUCATIONAL RESEARCH IN ENGINEERING

Many believed that teachers reward should be in heaven. In most developing countries, the funding of research project has been a constraint. Poor remuneration has besotted engineering educational research. In most developing nations, lack of commitment and appreciation from leaders and governments has been a problem facing research. Most people in the government accidentally do not understand nor appreciate the need for research for overall economic and national development. Research activities in most universities and higher institutions have almost halted because of lack of fund, arm-chair criticisms, university politics or segregation, nepotism, away and jealousy in many academic institutions research grants are almost non-existent. Many academic staff have spent more than a decade and never had a single research grant. Many

researchers in our higher institutions use their salaries to fund their research work. (Eyibe, 2011).

Cleanliness, they say, is next to Godliness. Another factor militating against research work is unhealthy environment. Most developing nations and their universities are at a pitiable state. Engineering students do not have basic laboratories. Some do not understand how to solder, let alone, identify major electrical, electronics and mechanical components. How can educational research improve? Research workers are not always paid. How can a developing nation solve the problems of solar system without research? In most universities and developing countries, the equipment, facilities and materials needed for meaningful research are lacking. Laboratories are faced with obsolete and antiquated equipment. How can mediatronics, robotics, solar systems, pure and applied sciences and new emerging technologies evolve current journals? Periodicals and textbooks are extremely cumbersome to find in our libraries. Most students and lecturers do not have access to internet in their classrooms and offices in the 21st century. The strength of a nation lies in the number of robust and intellectual minds.

Educational research in engineering education will enhance overall development and progress in the field of engineering and in a nation. It should be noted that research is an inquiry into the unknown. Research and innovation will help conquer the era of primitivity and timidity. Automation, telecommunication, mechanization and solar systems would have been impossible if not for the role of research. Moreso, a developed nation is one that is technologically advanced.

Through educational researches, the frontiers of knowledge in engineering discipline are extended. The new emerging technologies today in the field of engineering are derived from findings of education investigation accumulated over the years. The rate at which innovation is expanding is as result of research. Moreso, educational research will aid in solving engineering problems. Most developing countries are in dire need of stable electricity. A research will aid in solving constraints facing both developed and developing nations.

IMPORTANCE OF ENGINEERING EDUCATION RESEARCH

1. Engineering education research represents a unique component of engineering.
2. It helps in the ability to apply knowledge of mathematics and engineering.

3. Engineering education research helps to design and conduct experiments, as well as to analyze and interpret data.
4. Research in engineering education does not only emphasizes on research and discovery but also reform and implementation.
5. Engineering research involves the ability to design a system, component, or process to meet desired needs with realistic approach.
6. Engineering educational research helps to bring about innovations.
7. It enhances understanding of professional and ethical responsibility
8. Encourages the ability to use techniques, skills and modern engineering tools necessary for solving engineering problems.
9. Engineering research is a broad education necessary to understand the impact of engineering solution in a global economic, environmental, and social content.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

1. There is need for curriculum design in engineering education to inculcate and emphasize problem solving methods.
2. Academics, lecturers, engineers, technologists and students should embrace research to promote engineering and technological advancement.
3. Government should provide loan and research grants for researchers in order to encourage research findings.
4. We need to shun the obsession of certificate at the expense of practical and skills acquisition.
5. Governments and university administrators should equip our research centers, laboratories, and libraries with current journals, books and laboratories in order to encourage research, reading culture and research writing.
6. We need to shun all forms of arm chair criticisms, segregation, nepotism, and university politics in order to encourage academics in educational institutions

7. Academics, engineers, technologists should embark on research because it helps improve teaching methods and innovations.
8. Academic “dead-woods” who remain in the system for decades without self-improvement must be forced to work hard

CONCLUSION

If the field of engineering wants to achieve a global engineering excellence there is need for educational research in engineering technology. We need a new vision for engineering based on solid foundations of educational research and right links to educational practice. There is also need for curriculum design in engineering technology in order to emphasize on problem solving methods. We need to develop plan to build infrastructure to create and sustain global community of engineering education research. In these challenging times, it is no longer in doubt whether we can use educational research to push forwards the aggressive frontiers of developmental and economic plans. There is need for loans and grants for research, adequate facilities with remuneration and encouragement. With these possible measures there will be a new face and new outlook in the field of engineering technology research.

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