EDUCATIONAL COURSES TO DEVELOP AND SUPPORT THE NUCLEAR WORKFORCE IN NIGERIA

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INTRODUCTION

1. The Nigerian Nuclear Energy Programme, as is the case with most newcomer countries, is characterized by lack of adequate number of nuclear professionals, an aging workforce and lack of interest in taking up career in the nuclear industry by the young generation.

2. However, critical to the successful implementation of the Nuclear Energy Programme is the availability of human resources, developed through education, training and research.

3. Nigeria recognises the development of a knowledgeable and skilled workforce as an essential element in the implementation of a nuclear power programme and safe operation of all nuclear facilities. In this respect education and training are key to the development of a competent workforce and hence sustainability of the nuclear industry which is truer today than at any point in the past.

4. The paper elucidates the efforts of NAEC to establish educational courses to develop and support the nuclear workforce in Nigeria.

OVERVIEW OF NATIONAL EDUCATIONAL POLICY

5. Nigeria has a well-established system of education with a 6-3-3-4 operational system. It usually starts with 6 years at primary school, 3 years at junior secondary school and 3 years at technical colleges/trade schools or senior secondary school levels.

6. The tertiary schools in Nigeria offer programmes that last for a minimum of 4 years. The country runs 5-year university programmes for bachelor degree in engineering and technology with the basic science programmes running for 4 years. Similar programmes in the polytechnics and monotechnics run for 4 years. The masters' academic programme runs for 2 years, while the PhD is for 3 years.

7. The tertiary institutions in Nigeria are regulated by two statutory bodies: the National University Commission (NUC) and the National Board for Technical Education (NBTE). While the NUC regulates the universities, the NBTE is for all technological, technical and vocational education (TVE) institutions in the country.

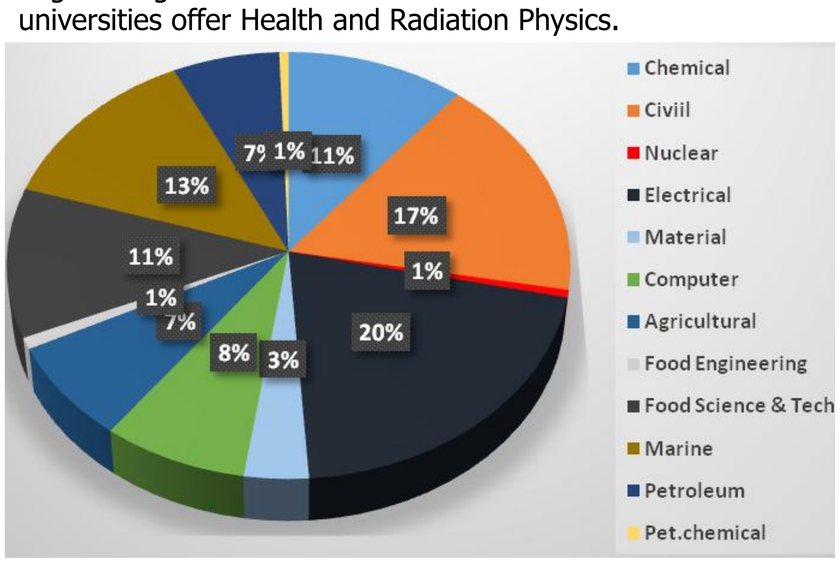
8. In addition to these, engineering programmes are accredited by the Council for the Regulation of Engineering in Nigeria (COREN).

EDUCATIONAL INSTITUTIONS

9. Nigeria has 162 approved universities out of which 41 are federal-owned, 47 are state-owned and 74 are private owned universities. It is important to note that, all Nigerian universities offer basic sciences (Physics, Chemistry and Biology).

10. Out of the 162 universities only 51 offer accredited engineering courses. On the other hand, there are 114 polytechnics operating in the country out of which 28 are federal-owned, 41 are state-owned, and 45 are private-owned polytechnics. Moreover, there are also 27 monotechnics in Nigeria.

11. The Pie chart in Figure 1 gives the distribution of engineering courses offered in the universities. Few of the universities offer Health and Radiation Physics.



12. Out of the 51 universities offering engineering, there are 25 Chemical, 39 Civil, 18 Computer, 47 Electrical/Electronic, 43 Mechanical, 8 Materials & Metallurgical, engineering departments while 1 Nuclear Engineering course is hosted in one Chemical department, 17 Agric , 30 Marine, 15 Petroleum, 1 Petro-chemical, 2 Food Engineering and 26 Food Science & Technology.

13. Each of these departments produces on the average, about 40 graduates every year, a total of more than 7000 graduates in the different engineering disciplines every year nationwide.

CURRENT EDUCATIONAL PROGRAMMES WITH A NUCLEAR CONTENT

14. Both the secondary schools and tertiary institutions at undergraduate level offer physics and chemistry programmes which include some nuclear related courses. There are no nuclear engineering/technology programmes, however, only OAU offers a Bachelor's degree in Engineering Physics with options in nuclear engineering, material science and environmental physics.

15. University of Port Harcourt (UNIPORT) Senate has approved Bachelors degree programme in nuclear engineering, while University of Abuja (UNIABUJA) is expecting the Senate approvals for nuclear science and nuclear engineering courses.

16. At the post graduate level (MS and/or PhD) tertiary institutions in Nigeria offer:

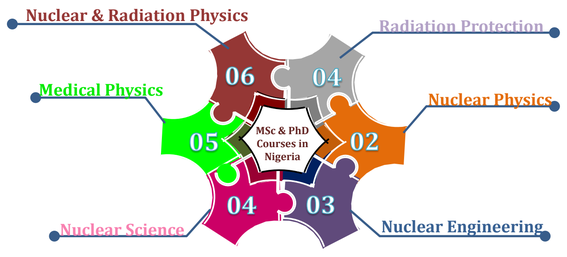


Figure 2: Post-Graduate Level Nuclear Programmes in Nigeria

DEVELOPMENT OF NUCLEAR EDUCATION PROGRAMMES

17. To address the issue of nuclear education, the Nigeria Atomic Energy Commission (NAEC), organized a number of workshops on education and training as well as set up various Technical Committees.

18. The major outputs from NAEC efforts are the development of detailed curricula for B.Sc. Programmes in the sciences (with nuclear bias); National Diploma/Higher National Diploma (ND/HND) in Nuclear Science Laboratory Technology; B. Eng. Nuclear Engineering; ND/HND Nuclear Engineering Technology; 3 month intensive Bridging Programme; as well as M.Sc. Nuclear Engineering/Nuclear Science.

19. Both the 3 month intensive bridging programme and the Masters programme have already commenced.

20. NAEC has identified nine (9) universities and two (2) polytechnics for the implementation of nuclear science and nuclear engineering programmes, and has signed MOUs with 6 universities.

21. The Universities are;

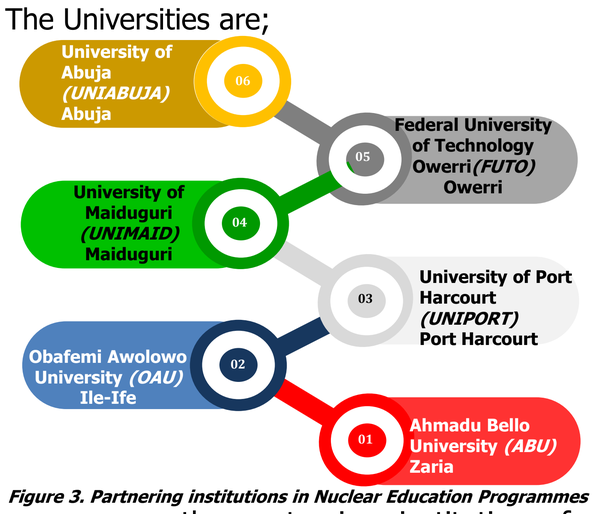


Figure 3. Partnering institutions in Nuclear Education Programmes

They serve as the partnering institutions for the nuclear education programme.

EXPERIENCE IN THE IMPLEMEMTATION OF FORMAL EDUCATION PRORAMMES

➢ *Three-Month Bridging Programme*

22. This involved the 'nuclearization' of top-flight fresh graduates in the physical sciences and engineering through an intensive 3-month bridging programme which exposes them to the fundamental core courses in nuclear science and engineering.

23. This programme prepared the successful graduates for admission into the Master's degree programmes, who now served as an available pool of qualified candidates for the implementation of the programmes.

➢ *Master's Programme in Nuclear Science (NS) and Nuclear Engineering (NE)*

24. The key decisions for the implementation of the Masters programmes were:

- Development of a common platform across the partnering institutions for the implementation of the Masters' Degree programmes in a harmonized and standardized fashion.

- Pooling the available national resources and facilities at all the nuclear energy research centres in a centralized manner, under the financial sponsorship and guidance of the NAEC.

- Working out technical details of the programme for approval by both the participating institutions and the National Universities Commission (NUC).

- Modular approach in teaching the students.

- The lecturers are drawn from within and outside Nigeria as well as from the industry.

- Each partnering university admits the graduates of the 3-month bridging programme and awards the degree in accordance with its statutes and regulations.

- The programme is for 15 months.

- A Joint Academic Board chaired by the Chief Executive Officer of NAEC, oversees the programme implementation to ensure maintenance of standards.

CONCRETE RESULTS

25. At present, the partnerships have produced thirty-seven (37) graduates in Nuclear Science (NS) and Engineering (NE). Through the national institutions, twelve (12) graduates have Masters in NS and thirteen (13) have Masters in NE while through the bilateral co-operations, 12 have graduated in both courses.

26. Fifteen (15) other members of staff of the Commission are currently undergoing Masters and PhD programmes in onshore and offshore institutions (through AFRA Fellowship, IAEA Fellowship, China, and Inter-Governmental Agreement (IGA) with Russian Federation (RF).

27. This modality is being employed for Medical Physics and Nuclear Medicine under support from the IAEA – Postgraduate Programmes in Nuclear Medicine and Radiation Oncology.

LESSONS LEARNED

28. The foregoing initiative has resulted in the followings:

- Effective and efficient utilisation of available national resources.

- Bridging of the current manpower limitations across all institutions and positioning NAEC to effectively build the needed capacity at the respective research centres while also meeting its manpower training obligations.

- Building of the critical educational infrastructure and capacity in the individual universities so as to enable the partnering universities to independently mount a quality programme of this genre.

CHALLENGES

29. Challenges identified with the implementation of the programme include:

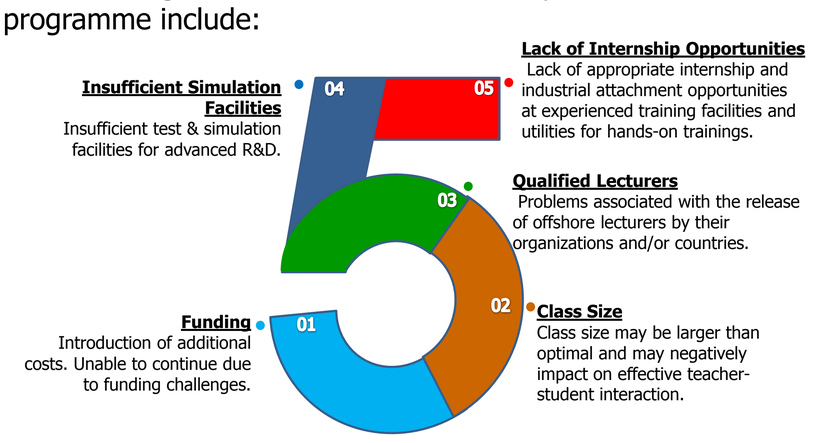


Figure 4: Five Major Challenges

CONCLUSION

30. The partnership between NAEC and the participating national institutions to meet the challenging manpower training requirements for the implementation of the national nuclear power programme is an effective mechanism.

31. In addition to developing the critical human resources, it would also lead to capacity building within the participating national institutions to effectively implement educational programmes in nuclear science and engineering on their own in the long term.

32. The partnership also affords the institutions to utilise available national education and research facilities in a pooled manner. Furthermore, this partnership offers a broad national platform for effective management of bilateral and multilateral cooperation in nuclear technology development.

33. It would also introduce some dose of improved standards in the content and quality of education and professional training delivered to students.

REFERENCES

[1] *Nuclear Energy Agency*, Nuclear Education and Training: From Concern to Capability, OECD, 2012.

[2] *B.J. Min et al*; The Role of Nuclear Education and Training in Korea, Korea Atomic Energy Research Institute (KAERI).

[3] *Working Group on Education, Training and Knowledge Management (ETKM);* Nuclear Education and Training – Key Elements of a Sustainable European Strategy, SNETP, December 2010.

[4] *NAEC/TECDOC/HRD*; Nigeria Atomic Energy Commission Human Resources Development Plan for Nigeria's Nuclear Energy Programme.

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