International Journal of
Inclusive and Sustainable Education

ISSN: 2833-5414
Volume 2 | No 11 | Nov-2023

Adequate Funding Panacea for Development of Science Education in Tertiary Institutions

Aibe Joseph Ndayebom [1], Dickson Unekwu Alfa [2]

[1] STETSCOM Lokoja Kogi State, Nigeria

[2] Department of Chemistry, Federal College of Education Odugbo, Benue State, Nigeria

Abstract: Adequate funding is critical to the development of science education in tertiary institutions. Adequate funding is key to implementation of science curriculum and development of other science resources. This paper discussed adequate funding panacea for development of science Education in tertiary institutions. Secondary data were used in the paper. The secondary data were collected from print and online publications. The paper concluded that adequate funding will lead to expansion of science programme, employment of more science academic, provision of modern infrastructure facilities (laboratories), access to more in-service training by science academic, motivation of staff, development of more scientific research and ensure quality science education in the tertiary institutions. Based on these points, the paper recommended that government should increase funding of science education in tertiary institutions for the development of science infrastructure facilities.

Keywords: Adequate Funding, Science Education, Tertiary Institutions.

Introduction

There are many definitions on tertiary education by different scholars. For instance, Ogunode & Odo (2023) defined tertiary institutions as an organized fraction of the whole society curved out for teaching programme, research and provision of community service. Tertiary institution can also be seen as a subset of the general society that is made of collection of different people, different culture, different life style and different value. Tertiary education is defined by National policy on Education (2013) as the education given after Post Basic Education in institutions such as Universities and Inter-University Centres such as the Nigeria French Language Village, Nigeria Arabic Language Village, National Institute of Nigerian Languages, institutions such as Innovation Enterprise Institutions (IEIs), and Colleges of Education, Monotechnics, Polytechnics, and other specialized institutions such as Colleges of Agriculture, Schools of Health and Technology and the National Teachers' Institutes (NTI). Tertiary education is viewed by Akin-Ibidiran, Ogunode & Ibidiran John (2022) as the final stage of education that handles the production of manpower for the social, economic and technological development of a country. Tertiary education is an organized education that deals with intensive teaching, research and provision of community services.

Ogunode, Edinoh & Okolie (2023f) conceptualized tertiary education as a planned and organized educational system designed for the total development of man/woman and for the total transformation of the society through the utilization of teaching, research and provision of community service. Tertiary education can also be viewed as post basic and secondary school education that embraces advanced teaching, research and community service. Tertiary education is

an advanced educational system meant for human capital development through teaching, research and provision of community service. Tertiary education is the third tiers of education that is designed for the production of skilled and professionals for the socio-economic and technology advancement. Tertiary institutions are micro section of the larger society.

Globally, tertiary institutions are structured to offer different kind of programme ranging from art, social sciences and science programme or education. …….defined science programme or education as educational programme that deals with calculation, practical and carrying out practical research or investigations. Science Education according to Omorogbe, and Ewansiha, (2013) is a field of study concerned with producing a scientifically literate society. It acquaints students with certain basic knowledge, skills and attitudes needed for future work in science and science related fields. Although there are several issues in science education in Nigeria, the following areas of emphasis have been identified for discussion: students' performance in science and some factors influencing poor performance which include Quality of Teaching, Teacher Quality and its indicators and Quality teaching learning resources. Science education is defined by Summitexpo (2019) as the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The traditional subjects included in the standards are physical, life earth, space and human science. Science study requires a variety of unique instructional materials in addition to those materials common to all education. A science facility must have space to accommodate this variety in combination with hands on instructional strategies. Science instructional areas have spatial and material needs that are different from those considered in designing a general use in classroom.

Adolphus, (2019) maintained that the purposes of science education in Nigeria are generally drawn from the national goals and philosophy of education as contained in the National Policy on Education (NPE). For instance, the goals of education in Nigeria include: Development of the individual into a morally sound, patriotic and effective citizen; …and social abilities and competencies as equipment for the individual to live in and contribute to the development of the society (FRN 2013). According to the national policy text, the goals of science education shall be to: Cultivate inquiring, knowing and rational mind for the conduct of a good life and democracy; produce scientist for national development; service studies in technology and the cause of technological development; and to provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life. (FRN 2004). Recently, the National Universities Commission approved Core Curriculum and Minimum Academic Standards (CCMAS) for official implementation in all the Nigerian universities. The (CCMAS) provides 70 percent of what should be taught along with the expected outcome, while the university will provide 30 percent based on their individual contextual peculiarities and characteristics. The CCMAS has 17 disciplines and 238 academic programmes which will replace the BMAS used in Nigerian universities. The Core Curriculum and Minimum Academic Standards (CCMAS) offered in the Nigerian tertiary institutions covers science curriculum such as Agriculture, Forestry, Engineering and Technology; Environmental Sciences, Pharmaceutical Sciences, Medicine and Dentistry; Science Veterinary Medicine etc.

Funding have been a major problem hindering the development of science education at every levels of education especially the tertiary institutions. Inadequate funding is a major problem facing the science education in Nigerian public universities. Science education drives it budgetary allocation from the general budget of the universities which have been described as inadequate by (Okebukola 2004; Okwelogu, Ogunode and Abayomi 2021). Ogunode and Aiyedun (2020a) submitted that inadequate funding is one of the major problem facing the administration of science programme in the Nigerian higher institutions. Annual budgetary allocation for the administration and management of science programme is not adequate. The administration of science programme is very cost intensive. So, it is imperative to discuss benefits of adequately funding of science education in tertiary institutions. Based on tis, tis paper look at adequate funding and development of science education in tertiary institutions.

Adequate Funding and Development of Science Education in Tertiary Institutions

Expansion of science programme, employment of more science academic, provision of modern infrastructure facilities (laboratories), access to more in-service training by science academic, motivation, development of more scientific research and quality science education.

Expansion of Science Programme

Adequate funding of science programme in tertiary institutions will lead to expansion of science programme in faculties, colleges and departments of sciences across the tertiary institutions in Nigeria. Poor funding of science education have been identified as one of the factors contributing to slow development of science programme in Nigerian tertiary institutions by Yusuf (2018). It is been established by Omale Ojo, Ibrahim, & amp; Yusufu, (2023) that budgetary allocation to science programme in tertiary institutions across the country is poor and cannot sustain a fundamental science programme development across the institutions. So, adequate funding o science education by respective stakeholders in care will help to develop the programme in various tertiary institutions. The development of science programme depend on adequate funding according to Ogunode et al (2020a). Ezechi, and Ogbu, (2017) and Ogunode (2020) recommended adequate funding of science faculties, colleges and departments for the development of science programme

Employment of More Science Academic

The problems of inadequate science academic in most tertiary institutions across the country can be solved via adequate funding of science education. Somadina, Ndayebom & Ogunode, (2023) defined science Academics as those professional lecturers with specialization in the field of sciences. Science Academics are science teachers that specialized in programmes like Biology, Chemistry, Physics, Mathematics, Environmental science, Biochemistry, Biotechnology, Zoology, Botany, agricultural science, Geology, physic, statistics, computer science and so on. A science academic is an individual that has been trained and certified by various tertiary institutions to practice in the field of sciences. Okwelogu, Ogunode & Abayomi (2021) and Emmanuel, & Daniel (2017) confirmed that science lecturers are vital to the development of science education. Science lecturers are implementers of science curricula in higher institutions. The place of science teachers in the development of science education cannot be underestimated. An effective science teacher should be a master of his subject, as well as grounded in methods of teaching and be able to relate the science concepts to real-life experience. Emmanuel, (2019) established that adequate funding of science education has led to employment of adequate science academic and development of science education. Ogunode, Jegede & Musa (2021) and Ogunode and Adamu (2021) and Ezechi (2016) concluded that the only way to solve of shortage of academic staff especially science inclined is to increase budgetary allocation and sustain funding of tertiary education across the country.

Provision of Modern Infrastructure Facilities (laboratories)

Adequate funding of science education in tertiary institutions will lead to provision of adequate infrastructure facilities such has laboratories which has been established by Somadina, et al (2023) as inadequate. They further revealed that science academics in Nigerian public universities are faced with the problems of lack of modern laboratories to conduct research and implement teaching programmes. Most public universities spread across the countries do not have modern laboratories where advanced research can be carried out. This has put stress on many science academics working in various public universities. Though some newly established universities have modern laboratories while many others don't. Also, Ebehikhalu & Dawam (2017) noted that most of the laboratories are dilapidated and relevant equipment is lacking and where they are available, inadequate equipment makes them non-functional and obsolete. Sometimes, the laboratories double as lecture rooms which are not conducive for teachings and learnings. Akomolafe and Ibijola (2014) in their study reported low status of infrastructure in the universities and they attributed this to funding challenges despite the monitoring and compliance driven mechanism. Also, Mufuyai (2012) noted that Nigerian universities are characterized by lack of basic technology, poor funding and operating environment were identified. Ogunode & Aiyedun (2020) recommended adequate funding of science education to

solve the problem of inadequate infrastructure facilities in science departments and faculties across the country.

Access to In-service Training by Science Academic

Adequate funding of sciences education in tertiary institutions will lead to access to more staff training and in-service training by various science academic spread across the tertiary institutions in the country. It appear that most science academics are not accessioning training facilities because of poor funding of staff development programme in the tertiary institutions. Ogunode, Kasimu, & Sambo (2023) asserted that shortage of funds is a major problem that has affected training programme in the Nigerian universities. Funds released for the implementation of staff training programme by the government through their agency to the various universities is not adequate and this have affected the training programme. Tertiary Education Trust Fund, (TETFund) is a federal government agency saddled with the responsibility of funding staff training in tertiary institutions especially in the universities. Recently, Tertiary Education Trust Fund, (TETFund), disclosed that it budgeted N300 billion for the development and training of academic staff of 226 higher institutions across the country in 2021. However, Tertiary Education Trust Fund, (TETFund) is faced with problem of shortage of funds. Executive Secretary of TETFund, disclosed that from N154 billion in 2017, the tax collection rose steadily to N257 billion over the years. "So by 2020, we've got N257 billion, but unfortunately, year 2021 collection, which is what we use to operate in year 2022, dropped sharply to N189 billion. "So over N60 billion drop revenue or resources available to TETfund (Tribuneonline 2022). Also Ogunode & Jegede (2020) attested to poor funding of staff training programme in tertiary institutions. To solve, tis problem, Peretomode & Chukwuma (undated)'; Ogunode, Olaoye & Yakubu (2023) believe that adequate funding of science education and tertiary education will help to address the problem of poor training in tertiary institutions across the country.

Motivation of Science Academics

Adequate funding of science education will lead to motivation of science academics. Ogunode & Aiyedun (2020) identified poor motivation for brain-drain in most science faculties, colleges and departments across tertiary institutions in the country. Motivation is a drive that influences an individual to carry out tasks for him and for others (Olabisi, Okolo & and Ogunode, 2023). Motivation is an invisible drive that influences the action of an individual towards a particular goal. Motivation can be viewed as a force that is propelling an individual to carry out some tasks or production (Ogunode, Salman, & Ayoko, 2023; Josiah,.Audu, & Ogunode (2023). Motivation packages constitutes provision of conducive work environment, provision of adequate infrastructure facilities, effective staff training programme, prompt payment of salaries and allowances, provision of instructional aids and job security according to (Osakwe, R. N (2014).Omale, Ojo, Ibrahim, & amp; Yusufu, 2023;Ogunode, Kasimu & Ibrahim 2023a; Ogunode, Salman, & Ayoko, 2023).

Development of More Scientific Research

The inadequate funding of research programmes by the government has affected the science academics to initiate and conduct researches regularly. Many Science academic spent their money on publishing their research paper after the research work because of the poor funding of research programmes in Nigerian universities according to (Somadina, et al 2023). Ogunode (20220) submitted that the academic staffs are saddled with the responsibilities of carrying out researches in the universities. Conducting research is one criterion for measuring their performance. Yusuf (2012) opined that the role of higher education research in national development cannot be overemphasized. However, researches in Nigerian institutions of higher learning are yet to make real impacts on the technological advancement of the country and the socioeconomic well-being of its citizenry. Paul (2015) and Ogunode & Ade (2023) posited that the conduct of research is one of the basic functions of tertiary institutions, which comprises the Universities, Polytechnics, Monothechnics and Colleges of Education. The academic staffs of these institutions are compulsorily required to carry out research activities as their promotions are primarily based on their research outputs. Apart from the academic staffs being promoted through research publications, research activities enhance their

credibility, and status, and also add value both to their immediate community and the larger global community. Research by Charles, Ijeoma & John (2009) revealed self-funding as a major source of research funding in Nigerian Universities, followed by the government sector and foreign agencies. Self-funding was identified as the most potent source of research funding accessed by University lecturers. The study showed that a greater percentage of lecturers, 246 (76.35%), had not benefited from research grants for many years. Inadequate funding of researches and stringent conditions attached to research grants are two major constraints to accessing research funds by lecturers (Charles, et al 2009). Adequate funding of science education in tertiary institutions will aid science academic to access funds for conducting researches. Ogunode, Jagged, Adah, Audu, Solomon, (2020) concluded that adequate funding is the key to development of science education.

Quality Science Education

Quality science education in tertiary institutions can be achieve through adequate funding. Adequate funding will ensure provision of adequate materials and human resources needed to meet up with the standard globally. Kis (2005) asserted that the key indicator of quality higher education is the success of graduates in joining the labour market. However, the quality of university education in Nigeria seems to continue to deteriorate as the years passed by, despite the effort of government to improve the university learning environment and the effort of the NUC in monitoring and accrediting academic programmes. Tunde and Issa (2013) in their study attributed this to poor funding of education in Nigeria which makes university administrators unable to provide adequate and quality infrastructural facilities and equipment for effective teaching and learning. They further stated that the non-commensurate of funding with other growing indices in Nigerian universities have negative impact on the quality of education as the universities are constantly being shut down as a result of staff unions agitating for one form of demand or the other. Otokunefor (2015) reported that the poor quality of our university graduates is due to the interwoven nature of the infrastructural deficiencies of the universities. Olatunde-Aiyedun & Ogunode (2021) and Ogunode & Jegede (2019) argued that adequate funding of science education in tertiary institutions will guarantee quality science education because neccesary input that ensure quality and standard will be procured and made available for process science programme in the various tertiary institutions.

Conclusions and Recommendations

This paper examined adequate funding as panacea for development of science Education in tertiary institutions. The paper concluded that adequate funding of science education in tertiary institutions will lead to expansion of science programme, employment of more science academic, provision of modern infrastructure facilities (laboratories), access to more in-service training by science academic, motivation of staff, development of more scientific research and ensure quality science education in the tertiary institutions. Based on this points, the paper recommended that government should increase funding of science education in tertiary institutions for the development of science infrastructure facilities.

References

1. Adolphus, T. (2019). The Aims and Purposes of Science Education: Social-Scientific Issues in the Science Curriculum in Nigeria. American Research Journal of Humanities & Social Science (ARJHSS) Volume-02, Issue-07, pp-21-29
2. Akomolafe, C. O. & Ibijola, E. Y. (2014). Accreditation of academic programmes and quality assurance in universities in South-West Nigeria. Available from: www.global-conference.eu/proceeding/vol.
3. Akomolafe, C,. O & Belo, F A (2019). Academic Staff Training and the Challenges of Accessing TETFund in Southwest Nigerian Universities. Literacy Information and Computer Education Journal (LICEJ), Volume 10, Issue 3, 3271 –
4. Ayodele O. Ogunleye. (1999). *Science Education in Nigeria*. Ibadan Intec. Printers Ltd.

5. Charles P. A, Ijeoma A. A & John A. U. (2009). Lecturers' Access to Research Fund in Nigerian Universities: Challenges and Strategies for Improvement.
6. Emmanuel, D. E, & Daniel, O, B (2017) Challenges and prospects of mathematics education in Nigeria. *Journal of Assertiveness.*
7. Emmanuel, D., B (2019) Challenges and prospects of Science education in Nigerian tertiary education. *Journal of Assertiveness2(3), 23-30*
8. Ebehikhalu N, O & Dawam P, (2017) Inadequacy of Teaching and Learning Infrastructure: Reason Nigerian Universities cannot Drive Innovations. *Australian Journal of Education and Learning Research SCIE Journals.*
9. Ezechi, N. E & Ogbu, C. C. (2017) Science Education in Nigeria: Challenges and the Way Forward. *International Journal of Progressive and Alternative Education,* 4(1), 1-11. 9.
10. Ezechi, N.G. (2016) Revisiting secondary school science teachers` motivation: A positive step towards the transformation of Nigerian science education for global challenges. *Journal of Resourcefulness and Distinction,* 13, (1), 86-94.
11. Federal Republic of Nigeria. (2014). *National Policy on Education*. Abuja: NERDC Obadara, O. E. & Alaka, A. A. (2013). Accreditation and quality assurance in Nigerian universities. Journal of Education and Practice. 4, 13-41.
12. Ogunode, N,J & Jegede. D. (2019) Challenges Facing Implementation of Science Program in FCT Secondary Schools, Abuja, Nigeria. Electronic Research Journal of Engineering, Computer and Applied Sciences, Volume 1 (2019),P- 7-10
13. Ogunode, N, J & Aiyedun, T, G. (2020) Administration of Science Programme in Nigerian Higher Institutions: Issues, challenges and Ways Forwards. *Middle European Scientific Bulletin*, (6), 94 – 102
14. Ogunode, N. J., Kasimu, S., & Ibrahim, I. (2023a). Motivation and Academic Staff of Nigerian Universities. *Best Journal of Innovation in Science, Research and Development*, *2*(7), 185–198.
15. Ogunode, N. J., Jegede & Musa, A. (2021). Problems Facing Academic Staff of Nigerian Universities and the Way Forward. *International Journal on Integrated Education, 4,* 230-239.
16. Ogunode, N. J., & Adamu, D. G. (2021). Shortage of Academic Staff in the Higher Institution of Learning in Nigeria. *Central Asian Journal of Social Sciences and History, 2* (3), 109-123.
17. Ogunode, N,. J, Salman, A,. A. & Ayoko, V,. O (2023). Motivation, Non-Academic Staff' Job Performance and Tertiary Education in Nigeria. *Electronic Research Journal of Social Sciences and Humanities,* 5, (III),20-30
18. Ogunode, N. J. & Jegede, D. O. (2020). Administration of professional development programme in Nigerian higher institutions: challenges and way forward. *Intercathedra* 3(44), 147– 155. http://dx.doi.org/10.17306/J.INTERCATHEDRA.2020.00102
19. Ogunode, N,. J & Kasimu, S (2023). Motivation and Academic Staff of Nigerian Universities. *Best Journal Of Innovation In Science, Research And Development*, 2(7),185-198
20. Ogunode, N. J. Olaoye, A. E & Yakubu, I. (2023) Adequate Funding of Public Universities and Effective Implementation of Core Curriculum and Minimum Academic Standards (CCMAS) in North-East, Nigeria Universities. *Analytical Journal of Education and Development,* 3(3), 215-222
21. Ogunode, N. J. ., & Ade, T. I. . (2023). Research Programme in Public Universities in Nigeria. *Best Journal of Innovation in Science, Research and Development*, *2*(3), 1– 13. Retrieved from http://www.bjisrd.com/index.php/bjisrd/article/view/84 30.
22. Ogunode, N,. J. Kasimu, S. & Sambo S,. M (2023). Staff Training in Tertiary Education in Nigeria. *Modern Journal of Social Sciences and Humanities*,(17), 181-194

23. Ogunode N,. J., Jegede D., Adah S,., Audu E,. I,. Solomon, A,. T. (2020). Administration of Research Programme in Nigerian Public Universities: Problems and Way Forward. *Educational Journal of History and Humanities*, 3(2), 21 32..Https://Jurnal.Usk.Ac.Id/Riwayat/Article/View/20758.

24. Okwelogu, I. S, Ogunode N. J. & Abayomi, A. O (2021) Science Education in Nigerian Public Universities: Challenges and way forward. International Journal on Economics, Finance, and Sustainable Development, 39-44

25. Okebukola,P. A.(2004).Science laboratory behaviour strategies of student relative to performanceinandattitudetowardsScience.*JournalofResearchinScienceTeaching*, 2I2(3).78-85.

26. Olabisi, S. O., Okolo, M. M., & and Niyi, J. O. (2023). Motivation, teachers‟ job performance and students‟ academic performance in post-basic education and career development (PBECD), Nigeria. *International Journal on Integrated Education*, *6* (7), 42-50.

27. Olatunde-Aiyedun, T,. G & Ogunode, N,J. (2021)School administration and effective teaching methods in science education in north central Nigeria. *International Journal on Integrated Education.* Volume 4, Issue 2,P:145-162

28. Omale, S. A., Ojo, S. S., Ibrahim, M. G., & Yusufu, S. O. (2023). Factors affecting motivation and employee performance among Nigerian universities academic staff. *Eurasian Journal of Management & Social Sciences*, 4(1). https://doi.org/10.23918/ejmss.V4i1p28

29. Omorogbe, E. & Ewansiha, J. C (2013) The Challenge of Effective Science Teaching in Nigerian Secondary Schools. *Academic Journal of Interdisciplinary Studies MCSER Publishing, Rome-Italy. Vol 2 No 7*

30. Osakwe, R. N (2014). Factors Affecting Motivation and Job Satisfaction of Academic Staff of Universities in South-South Geopolitical Zone of Nigeria. International Education Studies. 7(7), 43-50

31. Otokunefer,T. (2015). NUC's Sham Accreditation. Available from: www.alphaedufoundation.org/index.php. [Accessed 7 October 2015].

32. Paul. N. (2012) Research in Tertiary Institutions in Nigeria: Issues, Challenges and Prospects: Implication for Educational Managers, *Journal of Humanities and Social Science, 6, (I), 45-49* 32.

33. Peretomode, V,.F & R.A. Chukwuma, R,A (undated) Manpower Development and Lecturers' Productivity in Tertiary Institutions In Nigeria. European Scientific Journal June edition vol. 8, No.13

34. Punch (2022) TETFUND scholarship beneficiaries lament shortage of fund https://punchng.com/tetfund-scholarship-beneficiaries-lament-shortage-of-fund/

35. Somadina, I,. S. Ndayebom A,. J. & Ogunode, N,. J. (2023). The Plight of Science Academics in Public Universities in Nigeria: Implications for University Administrators to Make Right Decisions for University Development and Sustainability. *Horizon: Journal of Humanity and Artificial Intelligence* 2(1), 1-9

36. Tribune (2017) TETFund: Varsities, colleges, polytechnics failed to access N175bn in 6 years – Baffa https://tribuneonlineng.com/tetfund-varsities-colleges-polytechnics-failed-access-n175bn-6-years-baffa/

37. Tribune (2019) We'll end infractions in beneficiary institutions —TETFund https://tribuneonlineng.com/well-end-infractions-in-beneficiary-institutions-tetfund/

38. Tribuneonline (2022) TETFund records over N60bn revenue shortfall https://tribuneonlineng.com/tetfund-records-over-n60bn-revenue-shortfall/

39. Tunde, O. K. & Issa, A. (2013). The quality of Nigerian higher education and the funding of library resources. Ozean Journal of Social Sciences. 6, 43-53.

40. Yusuf, A. K. (2012) An appraisal of research in Nigeria's university sector. *Journal of Research in National Development, 10, (2), 98-119.*

41. Yusuf, R,. T (2018). Tertiary education and Developmental issue. *Science education journal*, 2(2), 12-19