

The Importance Of Technologists In Tertiary Institutions: Contributions To Teaching, Research, Innovation And Laboratory Management

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Abstract: *Technologists constitute an essential technical workforce within Nigerian tertiary institutions, including universities, polytechnics, colleges of education and other institutions offering science-, technology-, engineering-, medical-, agricultural- and laboratory-based programmes. Their responsibilities extend beyond routine laboratory assistance to include practical teaching support, research assistance, laboratory management, equipment operation and maintenance, quality assurance, safety management and technological innovation. The quality of practical education and experimental research is strongly influenced by the availability of competent technical personnel and functional laboratory infrastructure. International laboratory quality frameworks emphasize the importance of competent personnel, appropriate equipment, standardized procedures, documentation and quality-management systems in producing reliable results. In Africa, higher education institutions are increasingly expected to contribute to research, innovation, technical skills development and sustainable development, thereby increasing the need for competent technical personnel. In Nigeria, the Nigerian Institute of Science Laboratory Technology (NISLT) plays an important professional and regulatory role in promoting standards in Science Laboratory Technology practice. Established under Act No. 12 of 2003, NISLT is mandated to advance the Science Laboratory Technology profession, promote competence and professional conduct, ensure laboratory safety standards, support effective laboratory management, conduct research, provide professional training and inspect science laboratories in educational institutions, industries and research institutes (Nigerian Institute of Science Laboratory Technology). Technologists therefore represent an important link between theoretical knowledge and practical application within tertiary institutions. They contribute to teaching and learning, scientific research, laboratory management, equipment maintenance, safety, quality assurance, standardization, resource management and innovation. However, their effectiveness is affected by challenges including inadequate staffing, obsolete equipment, insufficient funding, limited professional development, heavy workload, poor infrastructure, inadequate recognition and limited participation in institutional decision-making. This paper examines the contributions of technologists to tertiary education and discusses the major challenges confronting them. It further proposes strategies for strengthening their professional status, working conditions, career progression, technical capacity and institutional contribution.*

Keywords: Technologists, tertiary institutions, laboratory management, technical personnel, research, innovation, equipment maintenance, quality assurance, higher education.

1.0 Introduction

Tertiary institutions are central to human-capital development, scientific advancement, technological innovation and socioeconomic transformation. Universities, polytechnics, colleges of education and other higher education institutions are expected to provide students with theoretical knowledge, practical competencies and research skills while contributing to solutions to national and global challenges. UNESCO (2024) emphasizes the contribution of African higher-education systems to research, innovation, technical skills development and sustainable development. Consequently, the effective functioning of tertiary institutions requires not only academic staff but also competent technical and professional personnel who support teaching, research and innovation.

In science- and technology-oriented disciplines, laboratory and workshop activities are indispensable components of education. Students need to acquire practical competencies that enable them to apply theoretical principles to real-world situations. Such activities require functional facilities, appropriate equipment, consumables, safety systems and competent technical personnel. Technologists occupy an important position within this environment because they possess specialized practical knowledge required for laboratory operation, equipment handling, maintenance, technical support and implementation of standard procedures.

The importance of competent laboratory personnel is recognized internationally. ISO/IEC 17025 establishes requirements for the competence, impartiality and consistent operation of testing and calibration laboratories and emphasizes the production of valid and reliable results (ISO, 2017). Similarly, WHO (2011) identifies personnel, equipment, facilities, processes, documentation and quality control as important elements of laboratory quality management.

In Nigeria, the Nigerian Institute of Science Laboratory Technology (NISLT), established under Act No. 12 of 2003, provides a professional and regulatory framework for Science Laboratory Technology practice. The Institute's statutory functions include

determining professional standards, promoting competence and professional conduct, conducting research, ensuring safety standards and necessary facilities in science laboratories and workshops, arranging appropriate on-the-job training, and inspecting science laboratories in schools, post-secondary institutions, industries and research institutes (NISLT, 2026).

NISLT also identifies laboratory standardization for teaching, research and services, personnel capacity building, laboratory administration and management, equipment management and maintenance, laboratory inspection and accreditation, infrastructure design, chemical and reagent standardization, and the development of standard operating procedures as important areas of its activities (NISLT, n.d.). These responsibilities demonstrate the close relationship between professional technologists and the quality, safety and sustainability of laboratory-based activities in Nigerian tertiary institutions.

Technologists therefore serve as an important bridge between theoretical knowledge and practical application. They assist in preparing laboratory sessions, maintaining equipment, implementing safety procedures, supporting research experiments and ensuring that laboratories remain functional. Their contribution becomes particularly important in institutions with large student populations, expanding research activities and increasing demand for practical and technology-based education.

Despite their importance, technologists are sometimes regarded primarily as support staff rather than professional technical personnel. Such perceptions may contribute to inadequate involvement in institutional decision-making, limited professional development, insufficient staffing and weak recognition of their contributions to teaching and research. This situation can ultimately affect laboratory efficiency and the quality of practical education.

This paper therefore examines the importance of technologists in tertiary institutions, their contributions to teaching, research, laboratory management, equipment sustainability, safety, quality assurance and innovation, as well as the challenges confronting them and possible strategies for improvement.

2.0 Concept and Professional Role of Technologists in Tertiary Institutions

Technologists are specialized technical professionals who apply scientific and technological knowledge to practical activities. Within tertiary institutions, their roles vary according to discipline and institutional structure. They may work in science laboratories, medical laboratories, engineering workshops, agricultural facilities, pharmaceutical laboratories, environmental laboratories, forensic laboratories, research centres and specialized technical units.

Technologists' responsibilities may include laboratory preparation, equipment operation, equipment maintenance, reagent preparation, sample handling, practical demonstration, technical assistance, quality control, safety monitoring, documentation and research support. These activities require a combination of formal scientific education, practical competence, technical experience and familiarity with institutional procedures.

The professional role of Science Laboratory Technologists is reinforced by the mandate of NISLT, which includes promoting high standards of competence, practice and professional conduct and determining the knowledge, equipment exposure, practical experience and skills required for persons seeking registration in the profession (NISLT, 2026).

NISLT's 2024 guidelines for establishing Science Laboratory Technology programmes also emphasize the need for a balance between theoretical knowledge and practical skills and establish professional requirements intended to support the production of competent graduates (NISLT, 2024).

ISO/IEC 17025 emphasizes that laboratory competence involves more than possessing equipment; it requires competent personnel who can perform assigned laboratory activities correctly and consistently (ISO, 2017). The WHO laboratory quality-management framework similarly recognizes personnel and equipment as fundamental components of laboratory quality (WHO, 2011).

Technologists should therefore be regarded as professional technical personnel whose activities contribute directly to the operational capacity and academic objectives of tertiary institutions.

3.0 Importance of Technologists in Tertiary Institutions

3.1 Contribution to Practical Teaching and Learning

Practical education is essential in science and technology disciplines because students must develop the ability to apply theoretical principles through experimentation, observation, measurement and problem-solving. Technologists support this process by preparing laboratories and ensuring that the necessary materials and equipment are available before practical sessions commence.

Their responsibilities may include preparation of reagents, samples and specimens, arrangement of apparatus, inspection of instruments and preparation of practical workstations. Effective preparation reduces interruptions and allows academic staff to concentrate on teaching and interpretation of experimental findings.

NISLT's mandate specifically includes determining standards relating to knowledge, practical exposure, equipment and skills within Science Laboratory Technology and promoting professional competence (NISLT, 2026). This reinforces the importance of practical laboratory environments and competent technical personnel in science-based education.

Technologists also guide students in the correct use of laboratory equipment and reinforce appropriate laboratory practices. Their contribution helps students develop practical skills that are essential for employment, professional practice and further research.

3.2 Development of Students' Practical Competencies

Students require practical competencies in laboratory measurements, equipment operation, sample preparation, observation, documentation and safe laboratory practices. Technologists can reinforce these competencies by demonstrating correct procedures and guiding students during practical activities.

NISLT's 2024 guidelines for the establishment of SLT programmes emphasize a curriculum that balances theoretical knowledge and practical skills, thereby recognizing practical competence as an important component of professional preparation (NISLT, 2024). The importance of practical and technical skills is particularly relevant to African higher education because institutions are expected to produce graduates capable of contributing to technological and socioeconomic development (UNESCO, 2024).

3.3 Supporting Large Student Populations

Expansion of tertiary education has increased the number of students requiring access to practical facilities. Increasing student numbers can place pressure on laboratory infrastructure, equipment and technical personnel. Research on higher education massification in Africa has identified increasing student numbers and limitations in infrastructure and resources as challenges to educational quality (Tepe et al., 2024).

Adequate numbers of technologists can help institutions manage practical classes more effectively by preparing laboratory resources, organizing equipment and supporting multiple practical sessions.

4.0 Contribution of Technologists to Scientific Research

Research is one of the principal functions of tertiary institutions. Effective research requires not only academic expertise but also functional laboratories, reliable equipment, standardized methods and competent technical personnel.

Technologists support researchers through sample preparation, reagent preparation, equipment operation, experimental procedures, equipment troubleshooting and documentation. Their familiarity with laboratory equipment is particularly valuable when research involves sophisticated analytical instruments.

NISLT's statutory mandate includes conducting research in areas of Science Laboratory Technology and promoting the professional knowledge, efficiency and interests of science laboratory technologists (NISLT, 2026). Consequently, technologists can contribute not only as laboratory operators but also as technical collaborators in research and development activities.

Reliable laboratory results depend on technically competent personnel and appropriate procedures. ISO/IEC 17025 emphasizes competence and consistent laboratory operation as foundations for valid results (ISO, 2017). Technologists can therefore contribute to the reproducibility and reliability of research by ensuring that established procedures are followed consistently.

Technologists may also contribute to multidisciplinary research in areas such as biochemistry, toxicology, microbiology, pharmaceutical science, environmental science, forensic science and molecular biology, depending on their specialization and institutional facilities.

The increasing emphasis on research and innovation within African higher education further strengthens the need for technically competent personnel. UNESCO (2024) identifies research, innovation and tertiary technical skills as important components of higher education's contribution to sustainable development in Africa.

5.0 Technologists and Laboratory Equipment Management

Modern tertiary institutions increasingly depend on sophisticated scientific and technical equipment, including UV-visible spectrophotometers, atomic absorption spectrophotometers, Fourier-transform infrared spectrometers, chromatographic systems, centrifuges, microscopes, electrophoresis systems and molecular-analysis equipment.

The acquisition of such equipment represents a substantial institutional investment. However, the value of equipment depends on proper installation, operation, maintenance, calibration and utilization. ISO/IEC 17025 identifies equipment as an important resource within competent laboratory operations (ISO, 2017).

NISLT specifically identifies laboratory equipment management and maintenance as one of its institutional activities. It also provides training for technologists and scientists in preventive maintenance, troubleshooting, equipment handling, procurement of appropriate spare parts, calibration and safety in equipment maintenance (NISLT, n.d.).

Technologists play an important role in equipment management by conducting routine inspections, operating equipment according to established procedures, performing basic maintenance, identifying faults and maintaining equipment records. They can also assist in developing preventive-maintenance schedules.

Preventive maintenance can reduce equipment downtime, extend equipment lifespan and prevent costly failures. Equipment records also provide useful information for institutional planning, budgeting, servicing and replacement.

Technologists therefore serve as important custodians of laboratory equipment and contribute to protecting institutional investments.

6.0 Technologists and Laboratory Safety

Laboratories contain numerous potential hazards, including chemicals, biological materials, electrical equipment, heat sources, compressed gases, glassware and mechanical equipment. Effective laboratory safety therefore requires appropriate facilities, procedures, training and continuous monitoring.

NISLT's statutory mandate explicitly includes ensuring safety standards and necessary facilities in science laboratories and workshops in Nigeria (NISLT, 2026). The Institute also identifies laboratory safety, equipment safety and risk management as areas for professional training and capacity development.

WHO (2011) also identifies facilities and safety, personnel, equipment and processes as essential elements of laboratory quality management.

Technologists are strategically positioned to contribute to laboratory safety because of their regular involvement in laboratory operations. Their responsibilities may include monitoring the use of personal protective equipment, checking safety facilities, maintaining safety signage, supporting proper chemical storage, promoting appropriate waste management and reporting hazards.

Their daily presence in laboratories also provides opportunities to reinforce safe practices among students, researchers and other laboratory users.

7.0 Technologists and Quality Assurance

Quality assurance is essential for ensuring that laboratory activities are conducted consistently and that results are reliable. ISO/IEC 17025 provides an internationally recognized framework for laboratory competence and consistent operation (ISO, 2017).

NISLT also provides professional training in laboratory standards and quality control, including the installation, maintenance and improvement of laboratory quality systems designed to meet ISO/IEC 17025 and other applicable standards (NISLT, n.d.). (NISLT)

Technologists can support quality assurance through:

- i. preparation of reagents according to approved procedures;
- ii. equipment checks;
- iii. calibration and performance verification;
- iv. use of appropriate controls and standards;
- v. proper sample identification;
- vi. maintenance of laboratory records;
- vii. adherence to standard operating procedures;
- viii. monitoring of environmental conditions; and
- ix. reporting equipment or procedural problems.

The WHO laboratory quality-management framework similarly emphasizes coordinated management of personnel, equipment, processes, documentation and other quality-system essentials (WHO, 2011).

Technologists are therefore important participants in the implementation of laboratory quality systems.

8.0 Technologists and Standard Operating Procedures

Standard Operating Procedures (SOPs) provide documented instructions for performing laboratory activities consistently. They may cover equipment operation, sample handling, reagent preparation, cleaning, maintenance, waste management and emergency procedures.

NISLT identifies the development of SOPs for science equipment and laboratory procedures as one of its activities (NISLT, n.d.). This directly supports the role of technologists in developing, implementing, reviewing and updating practical laboratory procedures. Technologists can contribute to the development, review and implementation of SOPs because they possess practical knowledge of laboratory processes. Their involvement helps ensure that procedures are realistic and applicable to the laboratory environment.

SOP implementation reduces variations in laboratory practice and supports continuity when staff members change. Proper documentation is also important in quality-management systems because it provides evidence that activities have been performed according to established requirements (ISO, 2017; WHO, 2011).

9.0 Contribution of Technologists to Innovation

The modern technologist should not be restricted to routine laboratory duties. Practical experience enables technologists to contribute to institutional innovation and problem-solving.

NISLT's mandate includes research in Science Laboratory Technology and activities involving equipment design and fabrication, teaching aids, chemical and reagent standardization and technical development (NISLT, 2026; NISLT, n.d.). These areas demonstrate that laboratory technology encompasses innovation and technical problem-solving.

Technologists frequently encounter practical challenges involving equipment, laboratory design, workflow, resource utilization and maintenance. Their experience can therefore provide useful ideas for improving laboratory operations.

African higher education institutions are increasingly encouraged to strengthen research and innovation capacity and develop solutions to local and regional challenges (UNESCO, 2024). Technologists can contribute through applied research, technical development, equipment modification and locally appropriate technological solutions.

Their participation can also promote interdisciplinary collaboration between academic researchers and technical professionals.

10.0 Technologists and Laboratory Standardization

Laboratory standardization involves establishing consistent procedures, infrastructure, equipment-management practices, safety measures and quality-control systems.

NISLT identifies the standardization of science laboratories for teaching, research and services as one of its major activities. It also undertakes laboratory inspection, accreditation and certification and collaborates with stakeholders in developing laboratory standards for educational institutions (NISLT, n.d.; NISLT, 2026).

Technologists can contribute to laboratory standardization by developing equipment-use protocols, maintaining maintenance records, preparing SOPs, organizing laboratory workspaces and monitoring compliance with approved procedures.

Standardization is particularly important where laboratories support large numbers of students and researchers. Consistent procedures can reduce errors, minimize wastage and improve the reproducibility of laboratory activities.

WHO (2011) emphasizes systematic quality management in laboratory operations, while ISO/IEC 17025 establishes requirements for consistent laboratory activities and technically valid results (ISO, 2017).

11.0 Contribution to Institutional Resource Management

Technologists also contribute to efficient management of laboratory resources, including equipment, reagents, chemicals, glassware, consumables and safety materials.

Poor inventory management can result in unnecessary expenditure, expired materials, shortages and interruptions to practical and research activities. Technologists can maintain stock records, monitor consumption and communicate procurement requirements.

NISLT's laboratory-management and equipment-maintenance activities emphasize appropriate management of laboratory facilities, equipment and related resources. Its professional training programmes also address laboratory management, procurement procedures, equipment maintenance and safety management (NISLT, n.d.).

Technologists can also provide technical information to management during equipment procurement. Because technologists regularly operate laboratory instruments, they can identify practical requirements that may not be apparent from equipment specifications alone.

Their involvement in procurement planning can therefore improve the suitability, utilization and sustainability of laboratory resources.

12.0 Challenges Facing Technologists in Nigerian Tertiary Institutions

12.1 Inadequate Staffing

Many departments and laboratories operate with insufficient numbers of technologists relative to student populations, research activities and laboratory workload. This can lead to excessive workloads and inadequate technical coverage. The expansion of tertiary education makes adequate staffing particularly important (Tepe et al., 2024).

Adequate technical manpower is also necessary to maintain the professional and operational standards expected within laboratory environments.

12.2 Inadequate Professional Development

Scientific and technological knowledge changes rapidly. Technologists require continuous training to remain competent in modern instrumentation, analytical techniques, laboratory safety and quality-management systems.

NISLT's mandate specifically includes arranging appropriate on-the-job training for members of the profession, while its current training programmes address equipment maintenance, calibration, quality assurance, safety, laboratory management and other emerging professional competencies (NISLT, 2026).

However, access to workshops, conferences, seminars, postgraduate education and equipment-specific training may still be limited in some tertiary institutions.

12.3 Obsolete and Inadequate Equipment

Obsolete, insufficient or poorly maintained equipment can significantly limit practical teaching and research. Where equipment is unavailable or frequently malfunctioning, students may receive inadequate practical exposure while researchers may experience delays.

This challenge is particularly important because NISLT considers equipment management and maintenance, including preventive maintenance, calibration, testing and repairs, to be central components of laboratory practice (NISLT, n.d.).

12.4 Inadequate Funding

Laboratories require continuous financial support for equipment acquisition, reagents, consumables, maintenance, calibration, safety materials and research activities. Inadequate funding therefore affects laboratory functionality and research productivity.

Research in Nigerian academic institutions has identified inadequate research funding, infrastructural deficiencies and insufficient institutional support as important constraints (Okoduwa et al., 2021).

12.5 Heavy Workload

Where the number of technologists is inadequate, existing personnel may be required to support several laboratories, large student populations, multiple academic programmes and research activities simultaneously. Excessive workload can reduce efficiency and increase the possibility of fatigue and operational errors.

12.6 Limited Recognition of Technical Contributions

Technologists may not always receive recognition that corresponds to their contribution to teaching, research, laboratory management, equipment maintenance and innovation. When technical expertise is undervalued, motivation and professional commitment may be affected.

12.7 Career Progression Challenges

Limited or unclear opportunities for promotion and career advancement can discourage professional development and contribute to the loss of experienced technical personnel. Career structures should appropriately reflect qualifications, technical competence, experience, leadership responsibilities and institutional contributions.

12.8 Poor Laboratory Infrastructure

Inadequate laboratory space, unreliable electricity, poor ventilation, insufficient water supply, inadequate waste-management systems and limited safety facilities can reduce the effectiveness of technologists.

NISLT's activities include laboratory building and infrastructure design and the standardization of laboratories for teaching, research and services, demonstrating the importance of appropriate infrastructure to effective laboratory operations (NISLT, n.d.).

12.9 Inadequate Safety Facilities

Technologists work with chemicals, biological materials, electrical equipment, heat sources and other hazards. Inadequate PPE, fire-protection systems, emergency facilities and safety training can expose technologists, students and researchers to unnecessary risks. NISLT's statutory mandate includes ensuring safety standards and necessary facilities in science laboratories and workshops. Its recent professional training activities also address laboratory risk assessment, chemical safety, biological safety, waste management, emergency preparedness and equipment safety (NISLT, 2026).

12.10 Limited Participation in Procurement and Institutional Decisions

In some institutions, technologists may have limited involvement in decisions concerning laboratory design, equipment procurement, renovation and technical infrastructure. Procurement without adequate technical consultation can result in equipment that does not adequately meet laboratory requirements or cannot be effectively maintained.

NISLT's equipment-management training explicitly covers equipment selection and procurement of appropriate spare parts, supporting the importance of technical knowledge in equipment-related decisions (NISLT, n.d.).

12.11 Brain Drain

The migration of experienced technical and scientific personnel to countries with better remuneration, working conditions, research opportunities and professional development can reduce the availability of experienced technologists in Nigeria. Brain drain is also recognized as a challenge affecting Nigerian academic institutions (Okoduwa et al., 2021).

12.12 Weak Industry–Institution Collaboration

Limited collaboration between tertiary institutions and industry can reduce opportunities for technologists to gain exposure to modern industrial technologies, equipment and practices. Stronger partnerships could support technical training, research, equipment development and professional exchange.

13.0 The Way Forward

13.1 Adequate Recruitment of Technologists

Tertiary institutions should conduct regular manpower assessments based on student population, laboratory workload, number of academic programmes, research activities and equipment inventory. Recruitment should be based on actual technical requirements rather than generalized staffing structures.

13.2 Continuous Professional Development

Institutions should establish structured professional-development programmes for technologists. Training should cover modern analytical instrumentation, equipment maintenance, calibration, laboratory safety, quality assurance, laboratory information management, research methods and emerging technologies.

NISLT should remain an important partner in such programmes because its statutory mandate includes professional training, while its current training portfolio covers equipment maintenance, calibration, laboratory quality systems, safety and risk management (NISLT, 2026).

13.3 Modernization of Laboratory Equipment

Institutions should develop long-term laboratory equipment-replacement and modernization plans. Equipment procurement should be guided by laboratory needs assessments, programme requirements and research priorities.

Technologists should participate in technical specifications, vendor evaluation, installation, commissioning and acceptance testing. Such participation is consistent with NISLT's emphasis on equipment management, maintenance, selection, installation and technical competence (NISLT, n.d.).

13.4 Sustainable Equipment Maintenance

A preventive-maintenance system should be established in every laboratory. Equipment inventories, maintenance schedules, service records, calibration records and fault reports should be maintained.

NISLT's professional training programmes specifically emphasize preventive maintenance, troubleshooting, repairs, calibration, installation, equipment protocols and performance monitoring (NISLT, n.d.).

Where appropriate, institutions should enter into maintenance agreements with manufacturers or qualified technical service providers.

13.5 Improved Funding

Government and institutional management should strengthen funding for laboratory infrastructure, equipment, consumables, maintenance, safety and research. Institutions should also explore additional sources of funding, including industry partnerships, consultancy, competitive research grants and international collaborations.

Research has demonstrated that inadequate funding negatively affects research productivity in Nigerian academic institutions (Okoduwa et al., 2021).

13.6 Improved Career Progression

Clear and transparent career structures should be developed for technologists. Promotion should consider academic and professional qualifications, technical competence, years of experience, research contributions, innovation, laboratory management and leadership responsibilities.

13.7 Recognition of Technical Contributions

Technologists should be recognized as professional technical personnel and strategic contributors to teaching, research and innovation. Their contributions to research projects, practical teaching, laboratory development and technical innovation should be appropriately documented and recognized.

The professionalization of Science Laboratory Technology through NISLT provides a basis for strengthening recognition of technical competence and professional practice.

13.8 Greater Participation in Institutional Planning

Technologists should be represented in committees responsible for laboratory design, renovation, equipment procurement, safety, maintenance, research infrastructure and quality assurance.

Their practical knowledge can help institutions make technically sound and cost-effective decisions. This is consistent with NISLT's emphasis on laboratory administration, management, infrastructure, equipment management and professional standards (NISLT, n.d.).

13.9 Strengthening Laboratory Safety

Institutions should establish functional laboratory safety systems that include regular risk assessments, appropriate PPE, fire-protection equipment, emergency procedures, chemical-management systems, waste disposal and safety training.

NISLT's professional and regulatory responsibilities provide an important framework for promoting laboratory safety and standards in Nigeria (NISLT, 2026).

13.10 Development of Laboratory Quality-Management Systems

Tertiary institutions should establish laboratory quality-management systems based on recognized standards and good laboratory practices. Such systems should cover personnel competence, equipment management, SOPs, documentation, quality control, internal audits and continuous improvement (ISO, 2017; WHO, 2011).

NISLT's quality-management training programmes specifically address the installation, maintenance and improvement of laboratory quality systems consistent with ISO/IEC 17025 and other standards (NISLT, n.d.).

13.11 Inclusion of Technologists in Research

Technologists should be encouraged to participate actively in research projects where their technical expertise is relevant. Institutions should provide access to research funding, modern equipment, training and opportunities for scientific collaboration.

Their contributions should be properly acknowledged in accordance with institutional and research-publication policies.

13.12 Stronger Industry–Institution Partnerships

Universities, polytechnics, colleges of education and industries should establish partnerships for industrial training, technical workshops, equipment maintenance, joint research, consultancy, technology transfer and professional development.

13.13 Establishment of Shared/Core Laboratories

Institutions can establish centralized or shared laboratories equipped with sophisticated instruments. This can reduce duplication of expensive equipment, improve equipment utilization and provide technologists with specialized roles in instrument management.

13.14 Strengthening the Role of NISLT

NISLT should continue to strengthen professional standards, certification, laboratory inspection, training, safety promotion and technical capacity development. Its statutory mandate already provides for laboratory inspection, professional standards, safety, training, laboratory management and the promotion of the Science Laboratory Technology profession (NISLT, 2026).

Greater collaboration between NISLT and tertiary institutions could help standardize laboratories, strengthen professional practice, improve equipment management, promote laboratory safety and enhance technical capacity. NISLT's stated activities in laboratory standardization, personnel capacity building, equipment management, inspection, accreditation and SOP development provide a strong institutional basis for such collaboration (NISLT, n.d.).

14.0 Implications for Nigerian Tertiary Institutions

The role of technologists is particularly important to Nigerian tertiary institutions because the country requires graduates with strong practical scientific and technological competencies. Universities, polytechnics and other tertiary institutions are expected to contribute to national development through teaching, research, innovation and skilled manpower development.

The increasing emphasis on research and innovation in African higher education further emphasizes the need for appropriate technical infrastructure and competent personnel (UNESCO, 2024).

NISLT's statutory responsibilities reinforce the need for professional standards, competent personnel, safe laboratories, effective laboratory management and appropriate technical training within Nigeria's science laboratory environment (NISLT, 2026).

Nigerian tertiary institutions therefore need to move beyond viewing laboratories merely as physical spaces and recognize them as complex technical systems requiring competent personnel, functional equipment, standardized procedures, adequate funding and quality-management structures.

Technologists should consequently be integrated into laboratory development plans, research-support systems, equipment-management programmes and institutional quality-assurance initiatives.

15.0 Conclusion

Technologists are indispensable professional personnel within Nigerian tertiary institutions. Their contributions extend across practical teaching, research support, equipment management, laboratory safety, quality assurance, standardization, resource management and technological innovation.

The effectiveness of science- and technology-based education depends substantially on functional laboratories and competent technical personnel. International laboratory-quality frameworks emphasize the importance of competent personnel, appropriate equipment, documented procedures and consistent laboratory operations (ISO, 2017; WHO, 2011). At the broader higher-education level, UNESCO (2024) recognizes research, innovation and technical skills as important components of Africa's higher-education development agenda.

Within Nigeria, NISLT provides an important professional and regulatory framework for strengthening Science Laboratory Technology practice. Its statutory responsibilities cover professional standards, competence, training, research, laboratory safety, laboratory management and laboratory inspection, while its activities extend to laboratory standardization, equipment management and maintenance, infrastructure, SOP development and quality-related capacity building (NISLT, 2026; NISLT, n.d.).

Despite their importance, technologists face challenges including inadequate staffing, limited professional development, insufficient funding, obsolete equipment, heavy workload, poor infrastructure, inadequate safety facilities, limited career progression and insufficient professional recognition. These challenges can negatively affect practical education, research productivity, equipment sustainability and laboratory safety.

Recommendations

- i. Addressing these problems requires coordinated efforts involving government, tertiary-institution management, TETFund, NISLT, professional associations and industry. Institutions should strengthen recruitment, training, career development, equipment management, laboratory safety and quality-assurance systems.
- ii. Technologists should also be given greater opportunities to participate in institutional planning, procurement, research and innovation.
- iii. Ultimately, investing in technologists is an investment in the quality, sustainability and productivity of tertiary education in Nigeria. A well-trained, adequately staffed and properly recognized technical workforce can contribute significantly to improved practical education, reliable research, efficient equipment utilization, safer laboratories and technological innovation.

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