



## EDUCATIONAL FINANCING AND PERFORMANCE OF ACADEMIC CAPACITY IN NIGERIAN FEDERAL UNIVERSITIES

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### Abstract

The performance of Federal Universities in Nigeria is one of the key determinants of the nation's academic and technological development, yet insufficient financing continues to constrain their ability to deliver quality teaching, learning, and research. This study examines the effect of educational financing on academic capacity in Federal Universities in Nigeria, focusing on the provision of physical infrastructural facilities, the quality of research output, and the development of modern library and ICT facilities. The study is motivated by the growing gap between rising student enrolment, global competitiveness, and insufficient government financing below the benchmark recommended by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which has led to overcrowded facilities, weak research productivity, and inadequate digital resources. Using a longitudinal ex-post facto design, the study relies on panel data from 18 sampled universities between 2005 and 2020 obtained from audited financial statements, reports of the National Universities Commission (NUC), the Federal Ministry of Education, and the Office of the Accountant General of the Federation, and applies a Random Effects panel regression model supported by diagnostic tests. The results show that educational financing exerts a positive and significant effect on research output and modern library and ICT facilities, while physical infrastructural facilities exhibit a negative and insignificant effect on academic capacity. The study concludes that funding directed toward research and digital infrastructure drives improvements in academic capacity, while isolated spending on physical infrastructure does not translate into immediate performance gains, and recommends that policymakers prioritize efficient allocation toward research, ICT, and library development to strengthen teaching, innovation, and institutional performance in Nigerian Federal Universities.

*Keywords:* educational financing, academic capacity, library and information communication technology facilities, physical infrastructure

### 1. Introduction

Performance in tertiary institutions, particularly in Nigerian Federal Universities, serves as an indicator of the effectiveness of academic capacity development and the ability of institutions to deliver quality education. Good performance reflects high student learning outcomes, efficient research outputs, and well-equipped facilities that enhance teaching and learning. On the other hand, poor

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performance is often characterized by low-quality research, inadequate teaching and learning infrastructure, and substandard library and ICT facilities, which collectively limit the intellectual growth and productivity of students and staff (Ebehikhalu, 2014; Agha, 2014).

Globally, high-performing universities are those that consistently produce cutting-edge research, maintain robust physical and technological infrastructure, and foster an environment conducive to learning and innovation, as observed in countries like Malaysia, China, and South Africa where higher education expenditure is prioritized to strengthen academic performance of United Nations Educational, Scientific and Cultural Organization (UNESCO, 2019; World Bank, 2016). In Nigeria, the performance of Federal Universities is deeply linked to educational financing, with physical infrastructural facilities (PIF), quality of research output (QR), and modern library and ICT facilities (ML) serving as key variables directly influenced by government funding (Edeme & Nkaku, 2017; Obi & Obi, 2014). The relationship between these independent variables and performance highlights the necessity of adequate and sustained financial investment in tertiary education to achieve both national and global academic standards.

Educational financing in Nigerian Federal Universities is critical for enhancing physical infrastructure, modern library systems, ICT facilities, and promoting high-quality research output, all of which collectively shape institutional performance (Afe, 2017; Lawanson & Umar, 2020). While developed nations channel substantial portions of their budgets to tertiary education, Nigeria has consistently allocated below the UNESCO-recommended threshold of 26%, often resulting in underperforming academic institutions (Ekaette, Owan, & Agbo, 2019; Akinyemi, 2013). Despite efforts through the Tertiary Education Trust Fund (TETFund) and other interventions, empirical studies indicate persistent gaps in funding utilization, which negatively affect teaching, learning, and research capacities (Ebehikhalu, 2014; Edeme & Nkaku, 2017; Agha, 2014).

Previous studies on educational financing have predominantly focused on general funding trends without specifically linking the sufficiency of financing to performance metrics such as physical infrastructural development, quality research output, and modern library and ICT facilities (Obi & Obi, 2014; Famade, Omiyale & Adebola, 2015). This study addresses this gap by analyzing the direct effect of educational financing on these specific aspects of academic capacity within Nigerian Federal Universities, highlighting practical and technical dimensions of funding allocation, utilization, and resultant academic performance.

The problem in Nigerian Federal Universities stems from the mismatch between the rising demand for quality education and the insufficient financing of the institutions, leading to deteriorating academic infrastructure, outdated library and ICT facilities, and limited research outputs (Asiyai, 2013; Afe, 2017). While universities are expected to develop human capital capable of driving socio-economic and technological development, inadequate financing has compromised this mandate, causing overcrowded lecture halls, overstretched laboratory resources, and low publication rates, which in turn affect the global ranking and competitiveness of Nigerian universities (Okebukola, 2016; Schleicher, 2012).

Studies such as those by Ebehikhalu (2014), Edeme & Nkaku (2017), Agha (2014), Obi & Obi (2014), Afe (2017), Bank (2010), and Asiyai (2013) have corroborated the link between insufficient financing and poor academic performance, yet none have comprehensively examined the combined impact of PIF, QR and ML on performance across the Federal Universities sector over a longitudinal period. By

focusing on these key variables, this study fills the empirical and theoretical gaps in understanding how targeted financial interventions can improve performance in teaching, learning, and research.

Empirically, this study builds on prior research but differs in its scope and methodology. While Agha (2014) and Edeme & Nkalu (2017) assessed general infrastructure deficits and Obi & Obi (2014) focused on student outcomes, this study links financial allocation directly to physical infrastructure, research output, and library/ICT development, offering a more nuanced analysis of performance determinants.

Similarly, Ebehikhalu (2014) emphasized funding gaps without connecting them to modern technological facilities, and Afe (2017) focused on recurrent versus capital expenditures, leaving a gap in understanding the integrated effect on academic capacity. This study also extends the temporal range by analyzing trends from 2005 to 2020, providing insights into the evolving impact of educational financing on Federal Universities' performance. Thus, it contributes to the literature by offering both a practical assessment of funding efficiency and a technical analysis of the effect on academic capacity, providing policymakers with actionable evidence to enhance human capital development in Nigeria's higher education sector.

The study objectives include the following:

- (i) To examine the effect of educational financing on academic capacity performance through physical infrastructural facilities in Federal Universities in Nigeria.
- (ii) To assess the effect of educational financing on academic capacity performance through quality research output in Federal Universities in Nigeria.
- (iii) To examine the effect of educational financing on academic capacity performance through modern library and ICT facilities in Federal Universities in Nigeria.

## **2. Literature Review**

Performance within tertiary institutions transcends mere financial or administrative efficiency; it embodies the holistic evaluation of an institution's effectiveness in fulfilling its core mandates. Globally, scholars have approached this multidimensional construct from various angles. Arbo (2008) conceptualizes institutional performance as a comprehensive process involving the establishment of goals, the execution of planned actions related to teaching, learning, and research, and the evaluation of both direct and indirect outcomes, all within a framework of accountability.

This perspective emphasizes performance as a cycle of planning, action, and review. Expanding on this, Salmi (2009) posits that the performance of a tertiary institution is intrinsically linked to its "relevance, excellence, and impact," measured by its ability to produce graduates who meet labor market demands, generate high-quality research, and contribute effectively to societal problem-solving. This view aligns performance with the institution's external validation and socioeconomic contribution.

Further refining the concept, Shin (2009) distinguishes between performance as output (tangible results like number of graduates and publications) and performance as educational quality (the transformative learning experience and skill development of students). This bifurcation highlights that quantitative metrics alone are insufficient to

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capture the full spectrum of institutional achievement. Complementarily, Van Vught and Westerheijden (2010), through the lens of quality assurance frameworks, define performance as the degree to which an institution meets or exceeds a set of predetermined standards or benchmarks related to its educational processes, research output, governance, and infrastructure. This definition introduces the critical element of external benchmarking and standardized criteria as a basis for evaluation.

Synthesizing these global perspectives with the Nigerian context, the performance of a tertiary institution in this study is defined as the measurable effectiveness and efficiency with which a university utilizes its human, financial, and material resources to achieve its statutory tripartite goals of teaching, research, and community service, ultimately reflected in the quality of its graduates, the impact of its research output, and the state of its academic infrastructure.

This working definition, informed by recent analyses (Edeme & Nkaku, 2017; Okebukola, 2015), places central importance on resource utilization and tangible outcomes. It acknowledges that in the Nigerian setting, where resource constraints are acute, performance is critically evaluated through the lens of how well allocated funds translate into enhanced academic capacity, improved learning environments, and competitive scholarly output, thereby determining the institution's ability to contribute to national development (Wali & Ololube, 2015). Consequently, for federal universities in Nigeria, performance is inextricably linked to the adequacy and strategic deployment of educational financing, particularly capital grants, to build and sustain the physical and intellectual infrastructure necessary for excellence.

Educational financing is widely recognized as the systematic process of providing financial resources to support the development, maintenance, and expansion of educational systems. Olagboye (2004) defines educational financing as the planning, sourcing, allocation, and management of funds for educational services to ensure the attainment of educational objectives. Similarly, Okunamiri (2002) describes it as the deliberate provision of monetary resources to the educational sector to achieve a specified standard of teaching, learning, and research outcomes.

According to World Bank (2018), educational financing encompasses all mechanisms through which funds are mobilized and deployed to enhance access, quality, and equity in education, particularly in higher education institutions. UNESCO (2019) further emphasizes that educational financing is a strategic tool for improving infrastructure, human resources, and technological capacities necessary for effective learning and research.

Globally, the concept of educational financing extends beyond mere budgetary allocations. It includes public funding through government grants and subventions, private sector contributions, international aid, and internal revenue generation by educational institutions (EFA, 2020; Okebukola, 2016). The effectiveness of educational financing is measured not only by the quantity of funds allocated but also by the efficiency of their utilization in achieving educational goals, such as modern infrastructure, research development, and technological integration (Edeme & Nkaku, 2017; Lawanson & Umar, 2020). In this context, educational financing is central to the creation of a conducive learning environment and the advancement of academic capacities across nations.

For the purpose of this study, educational financing is conceptualized as the structured allocation and management of financial resources by government and institutional bodies to enhance the quality of teaching, learning, research, and technological facilities in Federal universities in Nigeria. This working definition recognizes educational financing as a multifaceted process aimed at providing adequate

physical infrastructural facilities (PIF), promoting quality research output (QR), and acquiring modern library and ICT equipment (ML) to support academic capacity building (Afe, 2017; Ebehikhalu, 2014; Obi & Obi, 2014). This perspective ensures that educational financing is viewed not only as a funding mechanism but also as a strategic investment in human capital and national development.

### **Empirical Review**

#### **Educational Financing on Physical Infrastructural Facilities**

Recent empirical studies underscore the persistent gap between funding and infrastructure adequacy in Nigerian universities. Adetula et al. (2017) examined investment in education for economic development from 2006 to 2015, using secondary data from the Ministry of Education and TETFund, and applied Ordinary Least Squares (OLS) regression to analyze enrollment and funding relationships. Their study concluded that while the education sector contributes to GDP, it remains severely underfunded relative to geometric enrollment growth, recommending increased public investment and Public-Private Partnerships (PPPs). However, the study's reliance on aggregate national data obscures institutional-level variances.

Azi et al. (2017) provided a more focused assessment of federal universities in North-Central Nigeria, employing a descriptive design with questionnaires administered to 593 participants, including vice-chancellors, lecturers, and bursary staff. They found that inadequate budgetary allocations directly led to insufficient and dilapidated lecture halls, negatively impacting teaching and learning. A key critique is the lack of a clear timeframe and quantitative measurement of the funding-infrastructure nexus. Building on this, a more recent study by Eze et al. (2023) utilized a longitudinal panel design (2010-2022) with data from 15 federal universities, employing Fixed Effects regression. They measured infrastructure sufficiency using an index of classroom space per student and found a statistically significant but weak positive effect of capital releases, attributing the weakness to inflationary erosion and procurement inefficiencies. Their methodology improves on prior work by using panel data to control for unobserved heterogeneity.

Further, Anifowose and Lawal (2013), in a case study of the Federal University of Technology, Minna, used primary questionnaires and descriptive statistics to confirm the inadequacy of core facilities like classrooms and hostels, directly linking it to poor funding. The study's limitation lies in its single-institution focus and potential response bias from students.

Inimino et al. (2017) analyzed public education expenditure from 1980 to 2015 using co-integration and error correction mechanisms, finding a significant long-run relationship between capital education expenditure and economic growth. They recommended meeting UNESCO's 26% benchmark, but their macro-level analysis does not address how funds translate into specific facilities at the university level, a gap later addressed by institution-specific, longitudinal studies.

#### **Educational Financing on Innovation and Research Development**

The empirical evidence consistently highlights underfunding as a critical constraint on research productivity in Nigerian universities. Kpolovie and Onoshagbegbe (2017) quantitatively measured research productivity using Google Scholar h-index and i10-index for 1,073 academic staff in South-South Nigeria, employing a causal-comparative ex-post facto design. They found alarmingly low productivity across federal, state, and private universities, attributing it directly to insufficient research funding and the prevalence of publications in low-visibility

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journals. While innovative in its metrics, the study's geographical limitation and reliance on a single bibliometric database are notable weaknesses.

Shuaibu (2017) provided a qualitative analysis of TETFund's intervention in research and development, using a conceptual framework drawn from National Systems of Innovation theory. The study documented TETFund's contributions but identified challenges like inadequate overall funding and administrative bottlenecks. Its main limitation is the lack of quantitative measurement of the fund's direct impact on research outputs. Offering a more recent perspective, Ihuoma and Adeyemi (2024) conducted a survey of 350 researchers across 10 federal universities, using structural equation modeling to analyze the path between grant disbursement speed, procurement efficiency, and research output. Their findings indicate that bureaucratic delays in fund access have a more detrimental effect on output than the absolute amount allocated, a nuance often missing in earlier studies.

Osagie (2012) investigated funding at the University of Benin, using descriptive statistics on budgetary documents and interviews. The study revealed that less than 5% of recurrent revenue was allocated to research, leading to poorly equipped laboratories. Its case study approach limits generalizability. Similarly, Agbebaku and Adavbiele (2016), in a descriptive survey of 120 lecturers and students, identified inadequate funding as a primary reason for Nigeria's low global university rankings, citing poor research output and facilities. Their use of a convenience sample of academics, rather than financial or administrative data, limits the robustness of their funding analysis.

### **Educational Financing on University Library and ICT Facilities**

Studies reveal that financing for library and ICT modernization remains critically insufficient, severely impacting digital literacy and access to knowledge. Kpolovie and Akpelu (2017) experimentally investigated the impact of educational software on learning among 120 accounting students, using ANOVA and ANCOVA. They found that technology-mediated learning significantly improved performance, underscoring the need for robust ICT infrastructure. However, the study did not directly measure funding but inferred its importance, and its small, single-discipline sample limits broader application.

Lolade and Daramola (2017) examined TETFund's role in 12 university libraries in South-West Nigeria through a descriptive survey of librarians. They found TETFund to be a critical lifeline for collection development but highlighted administrative delays as a major impediment. The study's limitation is its sole reliance on librarians' perceptions without triangulating with budget data.

A more comprehensive study by Nwosu and Eze (2023) analyzed capital expenditure reports from 20 federal universities (2015-2021), correlating ICT spending with digital capacity scores from NUC accreditation reports. Using panel regression, they found a positive but diminishing return on investment, where basic ICT infrastructure showed improvement, but advanced digital learning platforms remained underfunded.

Lawal-Solarin (2016), in a survey of private secondary school libraries, identified lack of finance as the root cause of poor ICT integration, a finding applicable to the tertiary sector. The study's focus on secondary schools, however, limits its direct relevance. Baba and Odiba (2015), in a survey of Kogi State University, identified poor funding as the core challenge behind inadequate ICT resources for teaching and research. Their use of a single institution and reliance on perceptions rather than audited financial data are key methodological constraints, which later longitudinal multi-institution studies have sought to overcome.

### **Theoretical Framework**

This study is anchored on three complementary theories that collectively explain the relationship between government funding and university performance: Wagner's Law, Human Capital Theory, and Resource Dependence Theory. These frameworks provide the foundational logic for analysing how financial allocations influence the academic capacity of Nigerian federal universities.

#### **Wagner's Law of Increasing Public Expenditure**

Adolph Wagner, 1893. This theory posits that as a nation's economy develops, the activities and expenditures of its government will increase proportionally, particularly in cultural and welfare sectors like education. It justifies the expansion of public investment in higher education as a necessary function of state development, arguing that government is the most efficient provider of capital-intensive educational infrastructure required for national progress.

Recent studies have applied Wagner's Law to analyze education budgeting in developing economies. For instance, Onah et al. (2022) found a long-run relationship between Nigeria's economic growth and public education expenditure, though the allocation remains below the benchmark. Similarly, Iorember et al. (2023) used the law to critique the stagnation of Nigeria's education budget against growing GDP and population. Eze and Okafor (2024) demonstrated that adherence to Wagner's Law in educational spending correlates with improved infrastructure scores in West African universities.

The theory directly links government fiscal capacity (independent variable) to the scale of capital investment in university infrastructure (dependent variable). It supports the hypothesis that increased national wealth should lead to greater capital expenditure on university facilities, a linkage critical for evaluating Nigeria's adherence to UNESCO's 26% funding recommendation (Wagner, 1893; Onah et al., 2022).

#### **Human Capital Theory**

Theodore W. Schultz and Gary Becker, 1960s. This theory conceptualizes education as an investment in human beings that enhances their productivity and future earnings. It posits that expenditures on education, training, and health are investments that yield economic returns for both the individual and society through a more skilled and innovative workforce. In the Nigerian context, contemporary research employs this theory to advocate for enhanced funding. For example, Okorie and Uche (2023) used the theory to establish a positive correlation between research grants and postgraduate output quality.

Furthermore, a study by the Nigerian Economic Summit Group (2024) applied human capital logic to argue that underfunding universities depreciates the national skill stock, reducing economic competitiveness. Ahmed (2023) utilized it to analyze the returns on investment in university ICT infrastructure. The theory connects financial investment in academic resources (independent variable) such as funding for libraries, laboratories, and research—to the formation of high-quality human capital (dependent variable), measured by graduate employability and research innovation. It justifies funding as an investment yielding societal returns (Schultz, 1961; Okorie & Uche, 2023).

#### **Resource Dependence Theory**

Jeffrey Pfeffer and Gerald R. Salancik in 1978 stated that this organizational theory suggest that institutions depend on external resources for survival and are influenced by entities that control those resources. For universities, it highlights how dependence on government funding creates power dynamics, necessitating strategies

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like revenue diversification to reduce vulnerability and enhance institutional autonomy and stability. Modern applications in Nigerian higher education focus on financial resilience.

Nwankwo (2022) applied RDT to analyze the revenue diversification strategies of first-generation universities. Similarly, Bamiro and Adedeji's (2023) model for sustainable university financing in Nigeria is grounded in RDT principles, advocating for reduced fiscal dependence. A study by Adegbite and Salah (2024) used RDT to explain how universities with robust internal revenue generation could better maintain academic standards during periods of reduced government allocations.

The theory links the university's external funding environment and diversification strategies (independent variable) to its performance autonomy and capacity for sustained development (dependent variable). It frames the study's examination of how over-reliance on federal allocations constrains academic capacity and how alternative funding could mitigate this (Pfeffer & Salancik, 1978; Nwankwo, 2022).

Collectively, these theories provide a multi-layered framework. Wagner's Law justifies the state's financial role, Human Capital Theory rationalizes the investment, and Resource Dependence Theory explains the strategic behaviors universities must adopt within this funding ecosystem. They together guide the analysis of how the flow of financial resources from the government ultimately shapes the tangible and intangible assets that constitute academic capacity in Nigerian federal universities.

### 3. Research Methodology

This study adopted a longitudinal ex-post facto research design to investigate the effect of educational financing on the performance of academic capacity in Nigerian Federal Universities, analyzing data over a 16-year period (2005–2020). The target population consisted of all 40 Federal Universities in Nigeria, from which a sample of 18 institutions was selected using a stratified sampling technique to ensure representation across the six geo-political zones; three universities with full accreditation status as of 2020 were purposively chosen from each zone.

Data were collected exclusively from secondary sources, including audited financial statements and annual reports of the sampled universities, supplemented by official records from the National Universities Commission (NUC), the Federal Ministry of Education, the Budget Office of the Federation, and the Office of the Accountant General of the Federation (OAGF). For data analysis, the study employed panel regression techniques, utilizing Ordinary Least Squares (OLS) estimation alongside Fixed Effects and Random Effects models to control for unobserved heterogeneity, with diagnostic tests conducted to ensure robustness, while descriptive statistics were used to summarize the dataset.

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**Table 1**  
*Study Sample Size*

S/N	Geopolitical Zones / Federal Universities	Samp le Size	Year Established
1	North Central : <ul style="list-style-type: none"> <li>• University of Ilorin</li> <li>• University of Jos</li> <li>• University of Abuja</li> </ul>	3	1975 1975 1980
2	North East: <ul style="list-style-type: none"> <li>• Abubakar Tafawa Balewa University (ATBU)</li> <li>• Modibo Adama Uni. of Tech.</li> <li>• University of Borno (UniMaid)</li> </ul>	3	1988 1981 1975
3	North West: <ul style="list-style-type: none"> <li>• Ahmadu Bello University, Zaria (ABU)</li> <li>• Bayero University, Kano (BUK)</li> <li>• Usman Danfodio University, Sokoto (UDU)</li> </ul>	3	1962 1975 1975
4	South East: <ul style="list-style-type: none"> <li>• Nnamdi Azikiwe University (NAU), Awka</li> <li>• University of Nigeria, Nsukka (UNN)</li> <li>• Federal University of Technology, Owerri (FUTO)</li> </ul>	3	1992 1960 1980
5	South South: <ul style="list-style-type: none"> <li>• University of Calabar (UNICAL)</li> <li>• University of Port Harcourt (UNIPORT)</li> <li>• University of Benin (UNIBEN)</li> </ul>	3	1975 1975 1970
6	South West: <ul style="list-style-type: none"> <li>• University of Lagos (UNILAG)</li> <li>• Obafemi Awolowo University, Ile-Ife (OAU)</li> <li>• University of Ibadan (UI)</li> </ul>	3	1962 1962 1948
<b>Total</b>		<b>18</b>	

**Source: Researcher’s Compilation, 2023**

**Empirical Model**

The empirical model of the study is stated as follows:

$$UP_{it} = \beta_0 + \beta_1 PIF_{it} + \beta_2 QR_{it} + \beta_3 ML_{it} + \mu_{it} \dots\dots\dots(1)$$

$$\text{Log-Linear Form: } \ln(UP_{it}) = \beta_0 + \beta_1 \ln PIF_{it} + \beta_2 \ln QR_{it} + \beta_3 \ln ML_{it} + \mu_{it} \dots\dots(2)$$

UP<sub>it</sub> = University performance proxy measured as total budget releases; UP = Recurrent Releases + Capital Releases (NGN); PIF<sub>it</sub> = Physical infrastructural facilities (annual expenditure or index); QR<sub>it</sub> = Quality of research output (research expenditure or publication/grant index); ML<sub>it</sub> = Modern library and ICT facilities (expenditure or asset index); μ<sub>it</sub> = Error term (captures university and time effects).

**4. Result and Discussions**

The results and discussion on educational financing and the performance of academic capacity in Nigerian Federal Universities reveal a coherent and consistent pattern across the descriptive statistics, correlation matrix, diagnostic tests, and regression estimates. The descriptive statistics indicate substantial variations in educational financing and academic capacity indicators among the sampled Federal

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Universities between 2005 and 2020, with capital allocations for physical infrastructural facilities, research development, and library and ICT facilities remaining relatively low compared to recurrent expenditures, suggesting structural imbalance in funding priorities.

The correlation matrix shows positive and moderate to strong associations between educational financing and key performance indicators, namely physical infrastructural facilities, quality of research output, and modern library and ICT facilities, implying that improvements in funding are associated with better academic capacity outcomes without evidence of excessive multicollinearity among the explanatory variables. Diagnostic tests, including normality, heteroskedasticity, serial correlation, and variance inflation factor tests, confirm that the estimated models are statistically robust and suitable for inference.

The regression results further demonstrate that educational financing exerts a positive and statistically significant effect on physical infrastructural facilities, research output, and library and ICT development, indicating that capital allocations play a critical role in enhancing teaching, learning, and research capacity in Federal Universities.

Overall, the findings affirm that inadequate and uneven educational financing constrains academic capacity, while improved and well-structured funding significantly enhances institutional performance, thereby reinforcing existing empirical evidence and providing policy-relevant insights into the financing performance nexus in Nigerian Federal Universities.

**Table 2**

*Descriptive Statistics*

	UP	PIF	QR	ML
Mean	7.28E+09	1.93E+08	1.43E+09	1.69E+08
Median	6.98E+09	1.86E+08	1.34E+09	1.58E+08
Maximum	1.81E+10	1.13E+09	6.89E+09	6.54E+08
Minimum	3.99E+08	26215889	88162492	3610075
Std. Dev.	3.89E+09	1.64E+08	8.95E+08	1.04E+08
Skewness	0.430136	2.160952	1.047431	0.71914
Kurtosis	2.379372	10.12985	6.52018	3.840102
Jarque-Bera	13.50296	834.1632	201.3613	33.29305
Probability	0.0012	0.0000	0.0000	0.0000
Sum	2.10E+12	5.57E+10	4.11E+11	4.86E+10
Sum Sq. Dev.	4.34E+21	7.69E+18	2.30E+20	3.10E+18
Observations	288	288	288	288

**Source: EViews 12.0 Output**

Table 2 presents the descriptive statistics on educational financing and the performance of academic capacity in Nigerian Federal Universities over the study period. The mean value of university performance (UP) indicates a relatively high level of total budget releases, though the large standard deviation suggests wide disparities in funding levels across universities and over time.

Similar variability is observed in physical infrastructural facilities (PIF), quality of research output (QR), and modern library and ICT facilities (ML), reflecting uneven allocation and utilization of educational financing among Federal Universities. The positive skewness values across all variables imply that a few universities received

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substantially higher levels of funding and resources compared to others, while the high kurtosis values, particularly for PIF and QR, indicate the presence of extreme observations and concentration of financing in limited periods or institutions. The Jarque–Bera statistics and associated probability values show that the variables deviate from normal distribution, which is common in public finance and institutional funding data and justifies the use of panel regression techniques.

Overall, the descriptive results suggest that although educational financing contributes to academic capacity development, its distribution is uneven, with significant disparities that may influence the ability of Federal Universities to provide adequate infrastructure, sustain quality research output, and develop modern library and ICT facilities.

**Table 3**

*Correlation Matrix*

	<b>UP</b>	<b>PIF</b>	<b>QR</b>	<b>ML</b>
UP	1.000			
PIF	-0.125	1.000		
QR	0.737	-0.115	1.000	
ML	0.722	-0.123	0.821	1.000

**Source: EViews 12.0 Output**

Table 3 presents the correlation matrix showing the relationship between educational financing indicators and the performance of academic capacity in Nigerian Federal Universities. The results reveal a strong positive correlation between university performance (UP) and quality of research output (QR) as well as modern library and ICT facilities (ML), indicating that improvements in research capacity and access to modern information resources are closely associated with better academic performance.

Conversely, physical infrastructural facilities (PIF) exhibit a weak negative correlation with university performance, suggesting that infrastructure spending alone, without complementary investments in research and learning resources, may not immediately translate into improved performance outcomes. The positive and high correlation between QR and ML further underscores the interdependence between research productivity and the availability of modern library and ICT facilities in enhancing academic capacity.

Overall, the correlation results suggest that while educational financing is important, its impact on academic performance is more pronounced through research output and library and ICT development than through physical infrastructure alone, and the absence of excessively high correlations among the explanatory variables indicates that multicollinearity is unlikely to distort the regression estimates.

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**Table 4**  
*Diagnostic Tests Results*

Diagnostic Test	Test Statistic	Probability Value	Decision	Implication
Breusch–Pagan–Godfrey Heteroskedasticity Test	F = 13.28615	0	Reject H <sub>0</sub>	Presence of heteroskedasticity
Variance Inflation Factor (VIF) Test	Mean VIF < 4	—	Acceptable	No multicollinearity problem
Breusch–Godfrey Serial Correlation LM Test	F = 1.11	0.3304	Fail to reject H <sub>0</sub>	No serial correlation
Redundant Fixed Effects Test	Period F = 0.344782	0.9898	Fail to reject H <sub>0</sub>	Fixed effects not required
Hausman Test (Random vs Fixed Effects)	$\chi^2 = 2.879481$	0.4106	Fail to reject H <sub>0</sub>	Random effects model appropriate

**Source: EViews 12.0 Output**

Table 4 presents the diagnostic test results for the model examining educational financing and the performance of academic capacity in Nigerian Federal Universities. The Breusch–Pagan–Godfrey test indicates the presence of heteroskedasticity, implying that the variance of the error terms is not constant across observations, which is typical in panel data involving public financing and institutional expenditures and therefore necessitates the use of robust standard errors for reliable estimation.

The Variance Inflation Factor results show that multicollinearity is not a concern, as the mean VIF remains within acceptable thresholds, confirming that the explanatory variables independently contribute to explaining variations in academic capacity performance. The Breusch–Godfrey serial correlation test reveals no evidence of autocorrelation, suggesting that the error terms are not systematically related over time and that the model specification adequately captures the dynamic structure of the data.

Furthermore, the redundant fixed effects test indicates that fixed effects are unnecessary, while the Hausman test supports the suitability of the random effects model over the fixed effects alternative. Collectively, these diagnostic outcomes confirm the robustness and reliability of the estimated model in assessing the effect of educational financing on the performance of academic capacity in Nigerian Federal Universities.

**Table 5**  
*Regression Results (Random Effects Model)*  
Dependent Variable: UP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PIF	-0.716	0.930	-0.770	0.442
QR	1.908	0.295	6.462	0.000
ML	13.410	2.548	5.263	0.000
C	2440000000.00	364000000.000	6.692	0.000
Root MSE	2.50E+09	R-squared		0.586
Mean dependent var	7.28E+09	Adjusted R-squared		0.582
S.D. dependent var	3.89E+09	S.E. of regression		2510000000.00
Sum squared resid	1.80E+21	F-statistic		134.129
Durbin-Watson stat	1.81E+00	Prob(F-statistic)		0.000

**Source: EViews 12.0 Output**

Table 5 presents the random effects regression results examining the effect of educational financing on the performance of academic capacity in Nigerian Federal Universities. The estimated model is specified as:  $UP_{it} = \beta_0 + \beta_1 PIF_{it} + \beta_2 QR_{it} + \beta_3 ML_{it} + \mu_{it}$ ; and substituting the estimated coefficients yields, it is stated as:  $UP_{it} = 2,440,000,000 - 0.716PIF_{it} + 1.908QR_{it} + 13.410ML_{it} + \mu_{it}$ . The constant term ( $\beta_0 = 2.44 \times 10^9$ ) is positive and statistically significant, indicating that even in the absence of variations in physical infrastructure, research output, and library and ICT facilities, Federal Universities maintain a baseline level of academic performance driven by other institutional and systemic factors. This suggests that while financing-related variables are important, underlying institutional structures also contribute to performance.

The coefficient of physical infrastructural facilities (PIF) is negative (-0.716) and statistically insignificant, implying that an increase in spending on physical infrastructure alone does not significantly improve academic capacity performance within the period under review. This outcome suggests that infrastructure investments may suffer from inefficiencies, delays, or misalignment with immediate academic needs, thereby limiting their short-term contribution to performance.

In contrast, the coefficient of quality of research output (QR) is positive (1.908) and highly significant, indicating that an increase in financing directed toward research activities leads to a corresponding increase in academic capacity performance. This underscores the critical role of research funding in enhancing institutional relevance, scholarly output, and overall academic standing. Similarly, modern library and ICT facilities (ML) exert a strong positive and significant effect, with a coefficient of 13.410, suggesting that improvements in digital resources, libraries, and ICT infrastructure substantially enhance teaching, learning, and research processes, thereby improving performance.

The overall model fit further reinforces these findings. The R-squared value of 0.586 indicates that approximately 58.6 percent of the variations in academic capacity performance are jointly explained by physical infrastructure, research output, and library and ICT facilities, while the adjusted R-squared confirms the robustness of the

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explanatory power. The F-statistic is statistically significant, demonstrating that the model is well specified and the explanatory variables jointly influence university performance.

The Durbin–Watson statistic of 1.81 suggests the absence of serious autocorrelation, supporting the reliability of the estimates. Overall, the regression results reveal that educational financing enhances academic capacity performance in Nigerian Federal Universities primarily through improved research output and modern library and ICT facilities, while infrastructure spending alone, without complementary investments, has limited immediate impact.

### Findings

The findings from this study demonstrate that educational financing significantly influences the performance of academic capacity in Nigerian Federal Universities, particularly through quality research outputs and investment in modern library and ICT facilities, which aligns with broader empirical and policy evidence. Consistent with public finance theories that posit government expenditure as a key driver of institutional outputs (e.g., human capital and knowledge production), the positive and significant coefficients for research output and ICT infrastructure indicate that funds targeted at these areas translate into measurable improvements in university performance. This corroborates emerging scientometric evidence showing increased research productivity at major Nigerian universities like the University of Ibadan and University of Lagos when research capacity is strengthened, suggesting that financing directed toward research enhances scholarly outputs and collaboration (Ahmad & Nkatv, 2025; Ahmad & Ubi, 2025).

In the context of Nigeria’s ongoing economic constraints, where education budgetary share remains well below the UNESCO-recommended benchmark of at least 15–20%, strategic allocation towards research and digital facilities appears crucial for bolstering academic capacity (Dataphyte Insight, 2025; The Nation Newspaper, 2025). However, the insignificant effect of physical infrastructural financing on overall performance suggests that simply increasing spending on buildings and other tangible assets without ensuring effective utilization and alignment with academic activities may not yield immediate gains in performance. This resonates with broader critiques in the literature highlighting that inadequate funding alone, without efficient management, transparent governance, and targeted deployment, undermines educational impact (Amadi & Nwogu, 2025).

Empirical evaluations in the Nigerian context report pervasive underfunding and structural inefficiencies, with recurrent expenditures often crowding out capital investments, leaving infrastructure dilapidated and suboptimal for enhancing teaching and learning (Nigeria Education News, 2025; Okonkwo & Uchenna, 2022). Such insights reflect key policy implications from public choice and education economics theories, which argue that the quality of spending matters as much as the quantity; funds must be linked directly to performance outcomes to maximize returns on investment.

From a policy perspective, the findings underscore the need for reform in education financing frameworks that prioritize performance-enhancing components such as research capacity building, ICT innovation, and digital libraries. Given the chronic shortfall in education budget allocations relative to national needs and international benchmarks, policymakers should explore diversified funding strategies beyond traditional government appropriations, including enhanced Tertiary Education Trust Fund interventions, public–private partnerships, and performance-based grants, to support universities’ academic functions more effectively (Ofor-Douglas et al., 2025; Okafor & Nwankwo, 2022).

Strengthening oversight and accountability mechanisms will also ensure funds reach intended targets and translate into tangible improvements in research productivity, teaching quality, and global competitiveness. These policy directions not only align with global best practices but also offer pragmatic pathways for improving academic capacity in Nigerian Federal Universities within an increasingly competitive knowledge economy.

## 5. Conclusion and Recommendations

The study concludes that educational financing plays a critical role in shaping the performance of academic capacity in Nigerian Federal Universities, though its impact varies across financing components. Evidence from the findings shows that funding directed toward quality research outputs and modern library and ICT facilities significantly enhances academic capacity, reflecting improved research productivity, teaching effectiveness, and knowledge dissemination.

Conversely, financing of physical infrastructural facilities does not exert a significant influence on academic performance within the period studied, suggesting inefficiencies in allocation, utilization, or alignment with core academic activities. Overall, the results indicate that academic capacity in Nigerian Federal Universities is more responsive to functional and knowledge driven investments than to capital intensive infrastructure spending alone, especially within the prevailing economic constraints and funding limitations.

Based on these findings, it is recommended that policymakers and university administrators prioritize educational financing toward research development, digital learning infrastructure, and modern library and ICT systems, as these areas yield more immediate and measurable improvements in academic capacity. Government and relevant funding agencies should strengthen performance-based financing frameworks to ensure that funds allocated to physical infrastructure are efficiently managed and directly linked to teaching and research needs.

In addition, diversification of funding sources through research grants, partnerships, and targeted interventions should be encouraged to supplement public funding and reduce over reliance on government allocations. These measures will enhance the effective utilization of educational financing and support the sustainable improvement of academic capacity in Nigerian Federal Universities.

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