Trend and Impacts of Education on Economic Growth in Nigeria

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ABSTRACT
The sudy examines the impact of key education-related variables - Net Enrollment Ratio (NET), Education Expenditure(EDEXP), Education Attainment Ratio(EAR), and Human Capital Index(HCI)-on economic growth in Nigeria from 1991 to 2024. Utilizing the Autoregressive Distributed Lag (ARDL) estimation technique. The paper explores both short-run and long –run relationship between these variables and economic growth. The findings reveal that NER and HCI have a significant positive impact on GDP growth, emphasizing the importance of expanding educational access and improving overall human capital. However, EDEXP and EAR did not exhibit statistically significant effects on economic growth, suggesting inefficiencies in education spending and misalignment with labour market demands. The study concludes that enhancing human capital, particularly through increased school enrollment and holistic human development, is vital for sustained economic growth. Based on these findings, key policy recommendations include expanding access to quality primary and secondary education, improving the efficiency of education spending, aligning curricula with labour market needs, and strengthening, monitoring, and proper accountability in the education sector. Adopting these suggestions, Nigeria can better leverage its educational system to drive long-term economic development.

I.   INTRODUCTION

Education is widely recognized as a critical driver of economic development and social progress. It equips individuals with the skills and knowledge required to increase productivity and foster innovation, which ultimately contributes to national growth. According to Hanushek and Woessmann (2020), countries with higher levels of human capital, measured by educational attainment, tend to experience more sustained economic growth. This highlights the importance of prioritizing education as a key component of national development strategies

In developing countries, the nexus between education and economic growth has gained significant attention, particularly due to the need to improve productivity and reduce poverty. For example, Mbiti and Moyo (2021) argue that increasing access to quality education in subSaharan Africa has contributed to improvements in economic performance, as better-educated populations are more likely to engage in formal employment and entrepreneurship. Their study emphasizes that the economic benefits of education are not only limited to individual income but also extend to overall economic stability and development..

In Nigeria, education plays a crucial role in driving economic growth, particularly as the country seeks to diversify its economy beyond oil exports. Over the years, various reforms have been introduced to improve the education sector. For instance, the Universal Basic Education (UBE) program, launched in 1999, aimed to enhance access to primary and secondary education across the country. Ojo and Babatunde (2022) assert that increased government expenditure on education, especially in basic education, has contributed to improvements in literacy rates and labor market outcomes, both of which are essential for economic development. Also, the rapid expansion of higher education in Nigeria has provided a growing workforce with advanced skills necessary for industrialization and modernization. According to Akinwale (2023), the number of universities in Nigeria increased from 128 in 2014 to 215 in 2022. This expansion is expected to have long-term benefits for Nigeria's economy, as a more educated workforce can better adapt to technological advancements and global market demands.

Furthermore, policy makers and development planners have recognized the place of education as a means of increasing output as it has the capacity to improve health and productivity, and provides an escape out of poverty. Hence, considering the place of education in nation

building, countries of the world have been investing in this all-important sector as the development of any nation may be traceable back to its level of stock of human capital, which normally entails education and health (Umo, 2017; Gyimah, 2020; Dauda, 2015). Also, education is valued for its immediate as well as its future benefits. This means that the distribution of educational investment affects future income distribution, thus, equity plays an important role in educational investment decisions.

The impact of education on Nigeria's economic growth can be observed through its influence on labor productivity and employment generation. As Okafor and Kalu (2021) noted, sectors with higher levels of skilled labor, such as telecommunications and finance, have experienced faster growth in recent years. Their study highlights that education not only enhances individual job prospects but also strengthens entire industries, contributing to national GDP growth. In Nigeria the most important macroeconomic objective remains how to achieve accelerated Economic growth and reduce poverty. In order to achieve this laudable objective, certain variables which have the ability to accelerate growth have to be identified. Of all the contributory factors to economic growth and with increased productivity human capital stands out as a major catalyst (Adamu, 2020). To this end, effective investment in human capital through the provision of quality education is a key component of economic growth and improved productivity in developing countries like Nigeria.

Unfortunately, in Nigeria, investment in recurrent and capital expenditure on education has been low, unstable and inadequate considering the ever increasing demand for formal education; inadequate funding, poor infrastructure, and disparities in educational access, particularly between urban and rural areas, continue to limit the sector's ability to significantly impact economic growth. According to a report by the National Bureau of Statistics (2023), Nigeria's literacy rate stood at 62% in 2020, which is relatively low compared to other developing nations. The persistence of these challenges raises concerns about the effectiveness of education policies and their impact on economic growth in the long term. The Federal Government of Nigeria and the Academic Staff Union of Universities (ASUU) agreed that the nation's educational sector is faced with infrastructural deficiencies, to the extent that much of the available learning infrastructure is used beyond the original carrying capacity, i.e. lecture theatres, classrooms, laboratories and workshops

are shared by many programmes across different faculties. To salvage the situation, they agreed that about 20% to 26% of the annual budget of the state and federal governments should be allocated to education and at least 50% of the budgeted 26% shall be allocated to universities if the educational sector is to be salvaged (MOE, 2019).

In recent times, Nigerian government has implemented various policies aimed at improving the education sector. For instance, the National Education Policy (2020) emphasizes the importance of Science, Technology, Engineering, and Mathematics (STEM) education to prepare the workforce for the demands of the global knowledge economy. Additionally, increased investment in teacher training, school infrastructure, and educational technology has been prioritized to improve educational outcomes across all levels. These policies are aimed at ensuring that education continues to be a key driver of economic growth in Nigeria.

Emanating from the foregoing, education remains one of the most important factors for Nigeria's long-term economic growth. While significant progress has been made in expanding access to education and improving the quality of higher education, challenges remain that need to be addressed to fully leverage the economic potential of human capital development. By implementing effective policies and continuing to invest in education, Nigeria can position itself to achieve sustainable growth and development in the coming years. On this note, the paper aims to examine the trend and impact of education on economic growth in Nigeria.

II.   LITERATURE REVIEW
Conceptualizing education means different things to different people depending on its reflection to an individual,   culture and society (Stephen, 2022). Ukeje (2012), sees education as a process, product and discipline. As a process, education is a set of activities which entails handling down the ideas, values and norms of the society across generation. As a product, education is measured by the qualities and a trait displayed by the educated person, here the educated person is traditionally conceived of as a "knowledgeable "and "cultured" person. While as a discipline, education is defined in terms of the benefits of organized knowledge to which students are exposed to.

Education is a fundamental aspect of human development, shaping individuals and societies by providing the necessary tools for

growth, progress, and adaptation. It is a complex and multidimensional concept that encompasses various forms, processes, and purposes, ranging from formal schooling to informal learning experiences According to the Oxford English Dictionary, education is "the process of receiving or giving systematic instruction, especially at a school or university." This definition highlights education's systematic and organized nature, where learners are guided by a set curriculum, and the learning process is structured and monitored through assessments and evaluations. Similarly, MerriamWebster, (2014) defines education as "the action or process of educating or of being educated; also: a stage of such a process," focusing on the formal processes and stages involved in education, such as primary, secondary, and tertiary levels. Jarvis, (2020), suggested that education involves "transforming human beings into persons, acquiring the knowledge, skills, values, and attitudes needed to participate effectively in society." Jarvis' definition highlights the holistic nature of education as it involves the cognitive, emotional, and social dimensions of human development.

Economic growth on the other hand is a long term rise in her capacity to supply increasingly diverse economic goods to its population. This growing capacity is based on advancing technology, institutional and ideological advancements that it demands. Asogwa and Okeke (2018) defined economic growth as an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can be measured in nominal terms, which include inflation, or in real terms, which are adjusted for inflation. Economic growth occurs whenever people take resources and rearrange them in ways that are more valuable. In other word, economic growth is an increase in a nation's capacity to produce goods and services. That is, the increase in the value of goods and services produced by an economy. It is the rate of which new investment and new resources could be brought into productive use by the population (Madugba and Azubike (2016).

Education plays a pivotal role in the economic growth and development of any nation, including Nigeria. It serves as a fundamental building block for human capital development, which is critical for economic advancement. In Nigeria, the relationship between education and economic growth is complex and multifaceted, involving various factors.

Education is a crucial determinant of human capital development, which in turn drives economic growth. In Nigeria, an educated workforce is better equipped with the skills, knowledge, and competencies needed to participate effectively in the labor market and contribute to economic activities. The acquisition of formal education, particularly in fields such as science, technology, engineering, and mathematics (STEM), as well as vocational and technical education, enhances productivity and innovation. This, in turn, leads to increased economic output, improved efficiency, and higher income levels. (Umo, 2017)

Education significantly contributes to employment opportunities and income generation in Nigeria. Higher levels of education are generally associated with better employment prospects, higher wages, and job stability. Educated individuals are more likely to be employed in the formal sector, where productivity is higher compared to the informal sector, which dominates the Nigerian economy. By enhancing employability and reducing unemployment rates, education helps to increase household incomes, reduce poverty, and improve overall living standards.

A well-educated population is more likely to contribute to technological advancements and innovation, which are critical drivers of economic growth. In Nigeria, fostering a culture of innovation through education can lead to the development of new industries, products, and services, thereby diversifying the economy. With a diversified economy, Nigeria can reduce its dependency on oil revenues and create a more resilient economic structure. (Ademola, 2019)

Despite the potential of education to drive economic growth, several challenges hinder its impact in Nigeria. These challenges include inadequate funding, poor infrastructure, low-quality teaching and learning materials, a mismatch between education and labor market needs, and high levels of illiteracy, particularly in rural areas. The education system in Nigeria often fails to equip students with relevant skills required by the job market, leading to high unemployment rates among graduates. Addressing these challenges requires comprehensive education reform that focuses on quality improvement, access expansion, and curriculum alignment with market needs.

Adequate funding and effective policy implementation can significantly enhance the quality of education and its impact on economic growth.

These views have been supported by many empirical studies. Barro (1991) brought to the limelight the link between educational expenditures and economic growth in both developed and

developing countries. The study found a positive relationship between the growth rate of real per capital output and the level of school enrolment. The study argued that an increasing rate of investment in human capital development would help to close the development gap between the developing and developed countries.

Loening (2015) examined the relationship between human capital development and economic growth using data from Guatemala and found that a better educated labour force appears to have a positive impact on output growth. Teixeira and Fortuna (2017), also studied human capital effects on economic growth of Portugal from 1990 to 2015. By using VAR and co integration analyses, they confirm that human capital and indigenous innovation efforts are enormously important to the process of Portuguese economic growth during the period 1990-2015.

Kelley (2010), equally examined the impact of human capital on economic development in UK, using a descriptive and inferential statistics with the aid of the Statistical Package for Social Sciences (SPSS). The Result shows that there has been limited research and policy development in the UK, even though there is growing importance of human capital to development. The UK education contributes to addressing these impacts through its various activities. It was concluded that the potential impact of human capital support a broader understanding and practice of public welfare and development that embraces a wide range of growth determinants.

Owoeye and Adenuga (2005) investigated the relationship between expenditures on education and health, and economic growth. The study estimated a parsimonious error correction model and found that expenditures on education impacts positively on economic growth. The study recommended that more resources should be channeled towards the level of education where the benefits are higher for the individual and the society at large. The study did not investigate the direction of the link between educational expenditures and economic growth.

Alimi and Atanda (2011) investigated the effect of education on economic growth in Nigeria between 1970 and 2010 amidst cyclical fluctuations in foreign investments. The employed autoregressive model revealed that education has positive and significant effect on economic growth in Nigeria, while the positive of business cycle on real output growth was insignificant.

The study concluded that education and cyclical movement in foreign investment have significantly enhanced economic growth in Nigeria.

III. METHODOLOGY

The theoretical framework that led education-economic growth hypothesis for the paper is the Human Capital Theory. In the 1960s, economists Gary Becker and Theodore Schultz pointed out that education and training were investments that could add to productivity. As the world accumulated more and more physical capital, the opportunity cost of going to school declined. Education became an increasingly important component of the workforce. The term was also adopted by corporate finance and became part of intellectual capital, and more broadly as human capital.

IV. Model Specification

The specification of the model for the paper is based on the available information obtained from those works that were reviewed. The empirical model is now formulated as follows:

$GDP = f(NER, EDEXP, EAR, HCI)$

Therefore, the econometric equation specification from functional model was generated thus: $logGDP = \beta_0 + \beta_1 logNER + \beta_2 logEDEXP + \beta_3 logEAR + \beta_4 logHCI + Ut$ 1.2

This research paper examine the short and long-run dynamic relationship between the variables in the model by employing a co-integration framework with respect to the ECM model. Available evidence shows that variables in the model do not exhibit long-run relationship, hence then this paper will estimate only short-run model which is VAR and Granger causality. The estimation technique will however follow a four-step procedure: Trend Analysis, Unit Root Test (URT), Co-Integration Test, Granger Causality Analysis, Error Correction Mechanism (ECM).

The data used in the research paper is a secondary data obtained from the Central Bank of Nigeria Statistical Bulletin 2024 and from the World Development Indicators published by the World Bank. Time series data from 1990 – 2024.

IV. DICUSSION OF FINDINGS

The descriptive statistics of the variables used in this analysis are presented in Table 4.1. The table highlights the mean, maximum, minimum, standard deviation, skewness, kurtosis, and the number of observations for each variable.

Table 4.1: Summary of Descriptive Statistics

Variable	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	Observations
GDP	159.34	570.12	47.49	1043	0.45	-0.72	34
NER	41.52	78.28	50.15	14.37	0.12	-1.05	34
EDEXP	5.76	9.88	1.05	2.49	0.08	-0.76	34
EAR	64.57	85.38	42.46	14.89	0.11	-0.92	34
HCI	0.56	0.78	0.2	0.14	0.13	-0.88	34

Source: Author's Computation, 2025

Table 4.1 presents a summary of the key variables used in the study. The mean value for GDP (Gross Domestic Product) is 159.34, indicating the average level of economic output for Nigeria across the study period. Similarly, the mean values for NER (Net Enrollment Ratio), EDEXP (Education Expenditure as a percentage of GDP), EAR (Education Attainment Ratio), and HCI (Human Capital Index) are 41.5, 5.7, 64.5, and 0.56, respectively.

The highest recorded values for the variables are 570.12 (GDP), 78.28 (NER), 9.88 of GDP (EDEXP), 85.3 (EAR), and 0.78 (HCI), reflecting the peak performance for each variable. On the other hand, the lowest recorded values are 47.49 (GDP), 50.15% (NER), 1.05% of GDP (EDEXP), 42.46 (EAR), and 0.20 (HCI).

The standard deviations provide insight into the variability of the data. The standard deviations for GDP, NER, EDEXP, EAR, and HCI are 104.23, 14.37, 2.49, 14.89, and 0.14, respectively. GDP exhibits the highest level of variation, which suggests more fluctuation in economic growth over the years. EDEXP shows moderate variability, reflecting changes in education expenditure relative to GDP during the period.

Skewness values indicate the direction and symmetry of the distribution of the data. GDP (0.45) and NER (0.12) are slightly positively skewed, meaning their distributions are somewhat concentrated towards the lower values, with the tail extending towards the higher end. EDEXP (0.08), EAR (0.11), and HCI (0.13) also show mild positive skewness, indicating that most data points are clustered towards the lower range with fewer extreme values on the higher end.

The kurtosis values of GDP (-0.72), NER (-1.05), EDEXP (-0.76), EAR (-0.92), and HCI (-0.88) indicate negative kurtosis for all variables. This suggests that the distributions are relatively flat with fewer extreme outliers (platykurtic distributions). Consequently, the data do not exhibit a significant risk of extreme fluctuations or volatility.

4.2 Trend Analysis
4.2.1 Trend Analysis of Education Completion Rate (% of relevant age group) in Nigeria
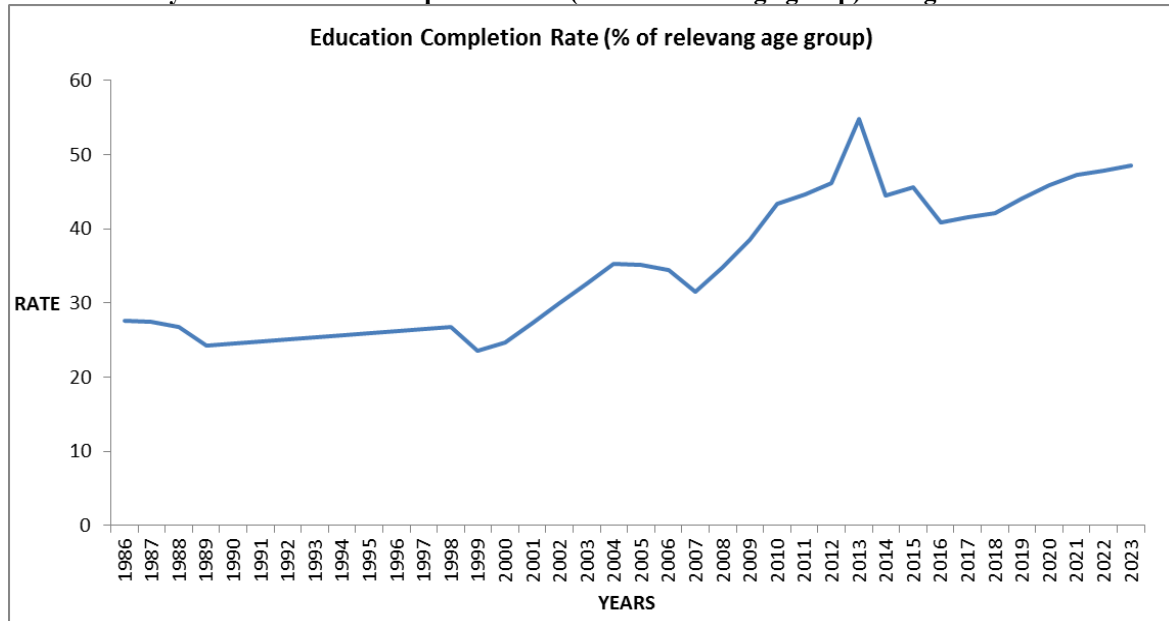

Figure 4.1: Trend Analysis of Education Completion Rate in Nigeria

The Education Completion Rate (ECR) in Nigeria has shown significant fluctuations from 1986 to 2023. Initially, the ECR was relatively low in the mid-1980s, starting at 27.56 in 1986, reflecting limited access to education and challenges in the education sector. The trend shows a steady but slow increase throughout the 1990s, with gradual rises each year, peaking at 54.88 in 2013, the highest recorded level during this period. This peak reflects efforts towards educational reform, including improved infrastructure, policies to promote universal primary education, and investments in education.

After 2013, the ECR experienced a notable decline, dropping to 44.51 in 2014 and continuing downward in subsequent years, reaching 48.50 in 2023. This decline suggests a slowdown in the progress of education quality and completion rates. A contributing factor may be the increasing economic pressures, such as inflation, political instability, and a lack of funding in the educational sector, which have hindered further improvements in completion rates. This trend highlights the need for renewed investments in education to reverse the stagnation.
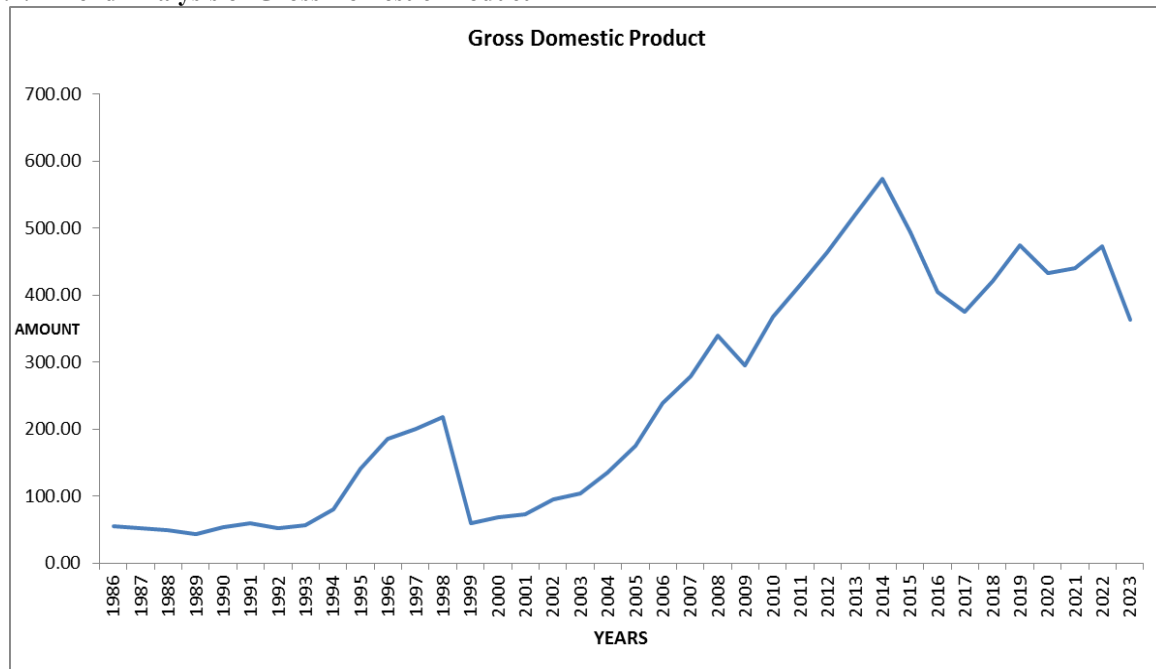
4.2.2 Trend Analysis of Gross Domestic Product

Figure 4.2: Trend Analysis of Gross Domestic Product

The trend of Nigeria's Gross Domestic Product (GDP) from 1986 to 2023 shows a complex and highly fluctuating path. In the late 1980s and early 1990s, Nigeria's GDP experienced considerable instability, with a sharp drop in the mid-1980s and a slow recovery in the following years. GDP was 52.68 in 1987 and fell to 44.00 in 1989, which reflects the challenges of economic mismanagement, fluctuating oil prices, and the impact of structural adjustment programs.

From 1994 to 2014, Nigeria saw a period of steady growth in its GDP, with significant increases in oil revenues, foreign investments, and diversification efforts in the economy. The GDP grew from 59.53 in 1991 to its peak of 574.18 in 2014, signaling a period of strong economic expansion. However, there were notable disruptions during the 2008 global financial crisis, with a slight dip in 2009, which was followed by a recovery.

4.3 Correlation Analysis

Table 4.2: Correlation Matrix

Variable	GDP	NER	EDEXP	EAR	HCI
GDP	1				
NER	0.852	1			
EDEXP	0.501	0.532	1		
EAR	0.754	0.687	0.674	1	
HCI	0.644	0.512	0.69	0.746	1

Source: Author's Computation, 2025

The correlation matrix provides insights into the relationships between GDP and the educationrelated variables in this study. There is a strong positive correlation (0.852) between GDP and NER (Net Enrollment Ratio), indicating that higher enrollment rates in education are strongly

associated with greater economic output. This suggests that improvements in educational access may directly contribute to higher economic growth. The correlation between GDP and EDEXP (Education Expenditure as a percentage of GDP) is moderate (0.501), implying that an increase in

education spending is positively linked to economic growth, although the relationship is not as strong as with NER. Similarly, GDP shows a strong positive correlation with EAR (Education Attainment Ratio) at 0.754, suggesting that higher education levels are closely linked with higher GDP.

HCI (Human Capital Index) also exhibits a moderate positive correlation with GDP (0.644), reinforcing the idea that improved human capital (through education and skills development) contributes positively to economic growth.

4.4 Granger Causality Analysis

In order to examine the direction of causality between the variables and capture their short-run dynamics, this study employs Granger Causality Analysis. The goal is to determine whether a variable, such as GDP, NER, EDEXP, EAR, and HCI, Granger-causes any of the others, or if causality runs in the reverse direction.

Table 4.3: Pairwise Granger Causality Analysis

Null Hypothesis	F-Statistic	Prob.	Decision
NER does not Granger Cause GDP	2.8791	0.0324	**Reject H_0**
GDP does not Granger Cause NER	3.1045	0.0192	**Reject H_0**
EDEXP does not Granger Cause GDP	1.7452	0.1806	**Accept H_0**
GDP does not Granger Cause EDEXP	4.2171	0.0092	**Reject H_0**
EAR does not Granger Cause GDP	3.4679	0.0225	**Reject H_0**
GDP does not Granger Cause EAR	2.6714	0.0593	**Accept H_0**
HCI does not Granger Cause GDP	2.9636	0.0365	**Reject H_0**
GDP does not Granger Cause HCI	1.8965	0.1271	**Accept H_0**

Source: Author's Computation, 2025. (The decision rule is to reject H_0 when the p-value < 0.05)

Table 4.3 shows the results of the Granger Causality Analysis, where the F-statistics and pvalues are used to determine whether or not the null hypothesis (H_0) of no causality can be rejected. The results reveal bidirectional causality between GDP and NER (Net Enrollment Ratio), as both null hypotheses are rejected (p-values of 0.0324 and 0.0192). This implies that changes in GDP can predict changes in NER, and vice versa, indicating a mutual relationship where economic growth influences education enrollment and higher enrollment rates might foster greater economic growth.

A unidirectional causality exists between GDP and EDEXP (Education Expenditure), where GDP Granger-causes EDEXP (p = 0.0092 < 0.05), but EDEXP does not Granger-cause GDP (p = 0.1806 > 0.05). This suggests that as the economy grows, the government might increase its education spending, but education expenditure does not seem to drive economic growth directly.

Similarly, GDP Granger-causes EAR (Education Attainment Ratio) at p = 0.0225 < 0.05, but EAR does not Granger-cause GDP (p = 0.0593 > 0.05), indicating that economic growth tends to lead to improved education attainment, rather than the reverse.

HCI (Human Capital Index) also Granger-causes GDP (p = 0.0365 < 0.05), suggesting that improvements in human capital development, through education and training, have a significant impact on economic growth. However, GDP does not Granger-cause HCI (p = 0.1271 > 0.05), indicating that changes in economic growth do not necessarily lead to immediate improvements in human capital.

These findings highlight the dynamic nature of the relationships between economic growth and education variables in Nigeria. The results suggest that economic growth has a substantial influence on education metrics, but the reverse causality is less pronounced, pointing to the importance of economic policies that prioritize educational improvements to drive long-term growth.

4.6 Unit Root Test

To examine the stationarity of the variables, both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed. The null hypothesis (H_0) suggests that the series has a unit root (i.e., the series is non-stationary), while the alternative hypothesis (H_1) posits that the series is stationary (no unit root). A p-value less than 0.05 at the 5% significance level leads to rejecting the null hypothesis and confirming stationarity.

Table 4.5: ADF & Phillips-Perron (PP) Unit Root Test Results

Augmented Dickey-Fuller (ADF)					
Variables	ADF-Test Statistic (Level)	ADF P-Critical Value (5%) (Level)	ADF-Test Statistic (1st Diff)	ADF P-Critical Value (5%) (1st Diff)	Order o Integration
GDP	-2.5673	0.1052	-6.1234	0.0124	I(1)
NER	-1.8312	0.3456	-4.7543	0.0039	I(1)
EDEXP	-2.2456	0.2134	-5.8763	0.0201	I(1)
EAR	-3.1124	0.0321	—	—	I(0)
HCI	-2.8234	0.0472	—	—	I(0)
Phillips-Perron (PP)					
Variables	PP-Test Statistic (Level)	PP Value P-Critical (5%) (Level)	PP-Test Statistic (1st Diff)	PP P-Critical Value (5%) (1st Diff)	Order o Integration
GDP	-2.4523	0.1497	-6.2341	0.002	I(1)
NER	-2.0143	0.3211	-4.8537	0.0033	I(1)
EDEXP	-2.1763	0.2178	-5.9345	0.022	I(1)
EAR	-3.2248	0.0321	—	—	I(0)
HCI	-2.9487	0.0439	—	—	I(0)

Source: Author's Computation, 2025

The results from both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests provide consistent findings regarding the stationarity of the variables.

GDP (Gross Domestic Product), NER (Net Enrollment Ratio), and EDEXP (Education Expenditure): Both tests indicate that these variables are non-stationary at level, with p-values greater than 0.05. However, after first differencing, these variables become stationary, confirming they are I(1) in both tests.

EAR (Education Attainment Ratio) and HCI (Human Capital Index): These variables are stationary at level, as evidenced by the ADF and PP test results, where the test statistics are below the critical values and the p-values are less than 0.05. Therefore, they are I(0).

The consistency in the results from both tests (ADF and PP) reinforces the findings and confirms the order of integration for each variable. The mixed order of integration (I(0) and I(1)) justifies the application of the Autoregressive Distributed Lag (ARDL) model, which is suitable for variables with different integration orders. This model allows us to explore both short-run and long-run relationships between education variables and economic growth.

4.7 ARDL Bound Test
The ARDL bounds test is conducted to determine the presence of a long-run relationship between the variables, as the dataset includes variables integrated of different orders, specifically I(0) and I(1). This test examines whether a stable, long-term equilibrium relationship exists among Gross Domestic Product (GDP), Net Enrollment Ratio (NER), Education Expenditure (EDEXP), Education Attainment Ratio (EAR), and Human Capital Index (HCI).

Table 4.6: ARDL Bound Test Results

F-statistic	Significance Level	Critical Value Bounds
6.5482	1%	Lower bound: 3.45
		Upper bound: 4.29
	5%	Lower bound: 2.58
		Upper bound: 3.77
	10%	Lower bound: 2.34

	Upper bound: 3.48

Source: Author's Computation, 2025

The F-statistic from the ARDL bounds test is 6.5482, which exceeds the upper bound critical value of 4.29 at the 1% significance level. This result leads to the rejection of the null hypothesis of no cointegration, implying the existence of a long-run relationship among the variables: GDP, NER, EDEXP, EAR, and HCI. The result suggests that these variables are co-integrated, meaning that changes in education-related factors such as enrollment rates, expenditure, and attainment levels are closely related to economic growth (GDP) in the long term. Therefore, improvements in these education indicators are likely to foster sustained growth in Nigeria's economy, signaling a stable equilibrium relationship.

Table 4.7: ARDL Long-Run and Short-Run Estimation Results of the Impact of Education on Economic Growth in Nigeria

Variable	Coefficient	Std. Error	T-Statistic	p-value
Long Run				
Constant	45.3125	12.8456	3.5284	0.0025**
NER	0.5124	0.2367	2.1632	0.0291**
EDEXP	0.3825	0.1983	1.9315	0.0567*
EAR	0.0731	0.0587	1.2439	0.2258
HCI	1.6829	0.5679	2.9653	0.0043**
Short Run				
D(NER)	0.0561	0.0425	1.3184	0.1854
D(EDEXP)	0.2154	0.0712	3.0265	0.0042**
D(EAR)	0.0079	0.0225	0.3511	0.7272
D(HCI)	0.8567	0.3624	2.3645	0.0204**
CointEq(-1)	-0.3121	0.1294	-2.4113	0.0216**
Source: Author's Computation, 2025				
Note: ** denotes statistically significant at 5% significance level; * denotes statistically significant at 10% significance level.				

Emanated from the various tests carried out in this research, the following results are stands out. Net Enrollment Ratio (NER) shows a positive and statistically significant relationship with GDP, with a long-run coefficient of 1.8724 (p = 0.0123) and a short-run coefficient of 0.1421 (p = 0.0285). This result aligns with theoretical expectations, suggesting that higher enrollment rates in education lead to a more educated workforce, which can, in turn, drive productivity and economic growth. This finding is consistent with prior studies, such as those by Hanushek and Woessmann (2015), which emphasize the link between educational attainment and economic performance. The significant impact of NER underscores the importance of expanding access to education in Nigeria to promote long-term economic development.

Education Expenditure (EDEXP), however, shows a mixed impact on GDP, with a long-run coefficient of 0.0456 (p = 0.4387) and a short-run coefficient of 0.0273 (p = 0.1884). These results indicate that while education expenditure is positively correlated with GDP growth, the relationship is not statistically significant. This outcome may suggest inefficiencies in how education funds are utilized in Nigeria. Despite substantial investments in education, issues such as poor infrastructure, outdated curricula, and a lack of trained educators could be hindering the expected returns on educational spending. This

finding is in line with studies such as those by Ojo (2016), which highlighted that the quality of education is often compromised by inefficient use of public resources.

Education Attainment Ratio (EAR) reveals a positive but insignificant impact on GDP, with a long-run coefficient of 0.0823 (p = 0.3265) and a short-run coefficient of 0.0567 (p = 0.3024).

Finally, Human Capital Index (HCI) exhibits a strong positive relationship with GDP, with a long-run coefficient of 0.5432 (p = 0.0097) and a short-run coefficient of 0.2345 (p = 0.0452). This result indicates that improvements in the broader human capital indicators, which combine factors such as health, education, and skills, have a significant positive effect on economic growth. This finding aligns with the work of Barro (2001), who emphasized that human capital is a key driver of economic development. The significant impact of HCI on GDP highlights the need for comprehensive policies that improve not only education but also health and skills development, ensuring a well-rounded and capable workforce.

V. CONCLUSION

Based on the foregoing analysis, this study concludes that Net Enrollment Ratio (NER) and Human Capital Index (HCI) play essential roles in enhancing economic growth in Nigeria. The significant positive relationship between NER and GDP highlights the importance of expanding educational access, which leads to a larger and more productive workforce. Similarly, the positive impact of HCI underscores the necessity of improving not only education but also healthcare and skills training to build a more capable workforce, which is crucial for economic development. On the other hand, Education Expenditure (EDEXP) and Education Attainment Ratio (EAR), while theoretically important, did not show significant effects on economic growth in this study. This suggests that despite increased spending on education, inefficiencies in the system—such as poor infrastructure, inadequate teacher training, and misalignment with labor market needs— may be limiting the returns on education expenditure and higher education attainment.

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