Education and Economic Growth: The Nigerian Experience

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Abstract
The paper considers the relation that is established between education and economic growth in Nigeria. Education is seen here as representing one of the primary components of human capital formation, which is an important factor in modelling the endogenous growth. Human capital is essentially important in achieving a sustainable economic growth; however, the greatest contribution is accomplished through investment in the quality and quantity of education. Time series data were collected between 1980 and 2008, and ordinary least squares technique was used to estimate the model. It was discovered that education investments have direct and significant impact on economic growth in Nigeria. It was therefore recommended that government at all levels should increase their funding on different segments of education in the country.

Keywords: education, economic growth, human capital, investment, skilled workers.

INTRODUCTION
The main problem faced by governments is allocating scarce resources across competing activities and sectors. The choice between alternative investments such as investment in education versus investment in physical infrastructure depends on society's objectives, which are represented by governmental decisions, and on the analysis between costs of the investment versus the future benefit to be derived from that investment. Since, economists see education as an investment, therefore, it is important to estimate its contribution to economic growth and/or its rate of return. Education represents both consumption and investment items in an economy. 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. Different societies give different weight between the objectives of efficiency and equity in defining an educational investment. In general, centrally planned economies placed a higher weight on equity grounds in defining their educational policy investment than capitalist economies (Manuel Madrid-Aris, 2000).

The major focus of this paper is to determine the education's contributions to economic growth and the paper is organized as follows. The next section provides the link between education and economic growth and also considered education as a major factor in human capital. The third section considers the stylized facts on education and growth in Nigeria. The forth section contains a brief review of literature. The fifth focused on the estimation of education’s contribution to economic growth. The final section concludes the paper.

Education as a Major Factor in Human Capital and its Link to Economic Growth
Economists, since the time of Adam Smith and David Ricardo have been interested in the issue of economic growth and its causes. It was not until the 1950s and 1960s, however, that the first set of theories of economic growth were formalised. These early theories, known as the neoclassical approach to growth theory, had a number of weaknesses. One of the key ones was that they assumed that technological change (and hence productivity growth) was driven entirely by factors beyond our control1. Clearly, these models did not provide a good representation of the real world. Beginning in the 1980s, a series of more sophisticated models appeared based on so-called New Growth theories. These models are not uniform. One strand emphasises the stock of human capital as an important determinant of economic growth. A second strand places more emphasis on the incentives that firms have to generate new ideas.

Without going into technical detail, Kerr (2001) identified a couple of points worth noting up front:

• first, specifically recognised that the growth rate of the economy is not driven solely by outside factors; and

1 In economic jargon, technological change and productivity growth were assumed to be exogenously determined. The actions of consumers, firms and governments had no impact on the long-run growth rate of the economy.
• second, shown that government policies have an important role to play in determining the long-run growth rate of a country's economy. These models are clearly more realistic in their portrayal of the economy with consumers, firms and governments all having an impact. They also provide a much more useful benchmark for thinking about the role of education in economic growth and the design of education policies. In these recent models, unlike the earlier ones, education is seen as contributing to economic growth in two ways:
• it directly affects economic growth by making individual workers more productive; and
• it indirectly affects economic growth by leading to the creation of knowledge, ideas and technological innovation – either through the process of acquiring education itself or because education is a key input into the development of a research sector that produces new knowledge and ideas.

It needs to be stressed that, under this approach, education is important not only because educated people engage in university research. Education is also important because it generates new ideas in the private sector. Knowledge creation is not a monopoly of either the public or private sectors. A number of studies have confirmed the importance of education in explaining growth. The consensus view on the direct effects of education is that the private rate of return to an individual from an additional year of schooling is anywhere from 5 to 15 percent. This must, to some extent, reflect the fact that employers see educated workers as more productive. Similarly, studies find that increases in educational attainment account for around 20 percent of growth in output per worker. Education also has indirect effects and studies have shown that higher levels of human capital are associated with significantly larger physical investments, higher rates of technology transfer and longer life expectancy. However, remains to be done in measuring the exact impact of education on economic growth (Kerr, 2001).

Education is the most important instrument to enhance human capabilities and to achieve the desired objectives of socio and economic development. Education enables individuals to make informed choices, broaden their horizons and opportunities and to have a voice in public decision-making. At the macro level, education means strong and sustainable economic growth due to productive and skilled labour force. At the micro level however, education is strongly correlated to higher income generating opportunities and a more informed and aware existence. Emerging globalisation offers immense opportunities and challenges in a competitive environment, and only those nations can benefit from it, which has acquired the required knowledge base and skills. (Akram, et al 2007). It is typically on this basis that governments expend substantial amount of money in the financing of education with or without considering the economic returns to such investment.

Human capital is a broad and multifaceted concept encompassing many different types of investment in people. Health and nutrition are certainly an important aspect of such investment, particularly in developing countries where deficiencies in these respects may severely limit the population's ability to engage in productive activities. In advanced countries, however, the key aspect of human capital has to do with the cognitive and non-cognitive abilities that are acquired at home, in the work place and in formal and informal training and are useful in the production of goods, services and further knowledge (Fuente, 2006).

Human resource development relates to the education, training and utilisation of human potentials for social and economic progress. Hallak, 1990 identified five energy boost of human resource development: education; health and nutrition; the environment; employment; and political and economic freedom. These energisers are interlinked and interdependent, but education is the basis of all the others, an essential factor in the improvement of health and nutrition, for maintaining a high-quality environment, for expanding and improving labour pools, and for sustaining political and economic responsibility.

For the attainment of economic growth and development in an economy, there is a serious need to develop human resources in that economy. Schultz (1961) as quoted in Adamu (2003) identified five ways of developing human resources, out of these, education of different form accounted for the highest number of ways of developing human resources,

- Investment in health facilities and services, broadly conceived to include all expenditures that affect the life expectancy, strength and stamina, and the vigour and vitality of the people,
- On-the-job training, old-type apprenticeships organized by firms,
- Formally organised education at the elementary, secondary and higher levels,
- Study programme for adults that are not organized by firms, including extension programmes notably in agriculture,
- Migration of individuals and families to adjust to changing job opportunities.

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There are good reasons to expect that human capital should be an important determinant of productivity, both at the individual and at the aggregate level, and that its role should be particularly crucial in today's globalized knowledge economy. Workers with greater problem-solving and communications abilities should perform better than their less skilled counterparts at any task that requires more than the routine application of physical labour and will also learn faster and adapt better to changing circumstances. Hence, skilled workers can be expected to be more productive than unskilled ones for any given production process, and should be able to operate more sophisticated technologies that place greater demands on their capacities. If skill does carry with it a greater ability to learn, produce new knowledge and adapt to change, moreover, a more educated labour force will also be able to achieve faster productivity growth, both through gradual improvements in existing production processes and through the adoption and development of more advanced technologies, and should be in a better position to respond flexibly to rising worldwide competition.

These considerations suggest that the importance of human capital as an input has grown over time as production processes have become increasingly knowledge intensive and footloose. Today, relatively few occupations involve only mechanical physical tasks, and a large and growing fraction of jobs either reduce to the processing of information or require the application of specialized knowledge and skills to the production of increasingly sophisticated goods and services. Education remains the most effective instrument through which the society can be transformed. The extent to which a country invests in education, among other sectors, will determine the level and rate of its transformation. Education does not only make use of physical materials but also human resources to make up for the resources needed for transformation. As a stringent and unique factor in transition programmes, education equips human resources with the needed knowledge, skills and competencies which would make them functional, and contribute to the all round development of the nation.

**Stylized Facts On Education An And Growth In Nigeria**

The structure of the formal education consists of six years primary education, three years of junior secondary, three years of senior secondary education and four years at the tertiary school (the 6-3-3-4 system). This replaced the old system of 6-5-2-4 system inherited from the colonial masters in 1984. The attendance of primary and junior secondary schools, which is also called basic education, is compulsory and free. However, in practice, basic education is not truly free because all schools collect obligatory contributions from students to supplement the government subsidies. The collection of fees is mainly feasible in secondary and post secondary levels. At the secondary level, it came as a disguise of Parents Teachers Association (PTA) fees, Development fees, Computer fees to mention but a few. At the post secondary levels however, it is broadly called school fees. Although both the local and state governments mainly finance basic education, there are also a significant number of private schools, especially at the primary and JSS levels. However, higher education is composed of three levels namely collegiate from colleges of educations, diplomas from Polytechnics and degrees from Universities in various disciplines. In addition, the University degrees are in three phases, they are bachelors, masters and doctorate degrees in various areas.

The National Policy on Education assured nine years of free and compulsory basic education for all Nigerian children. The scheme failed for inadequate planning and lack of resources, but resulted in doubling primary education enrolment in a decade. The new democratic Government responded to the crisis in the education sector with the launch of Universal Basic Education (UBE) in 1999, but it was not passed into law until 2003. Not unlike the defunct UPE, emerging statistics show evidence of an increase in enrolment. Some tiers of government capitalize on the aspect of the UBE law that gives a grace period of five years before the full implementation of the bill, to charge fees. Also interestingly, since Nigeria operates a federal system of government, the state government owned the UBE and Child Rights Act, passed in the federal legislative house, do not bind schools. As a signatory to the 2000 World Education Conference, and the 6 Dakar Goals towards achieving Education for All (EFA), Government has also established a National EFA Coordination unit under the Federal Ministry of Education mandated to prepare a National Action Plan for the delivery of EFA in Nigeria. Perhaps the greatest challenge facing government is the inadequate spending on education. The Federal Government also established the Education Trust Fund (ETF) with the aim of assisting the education sector. However, as at April 2009 about N22.6 billion Education Trust Fund money lies unutilized in the Central Bank of Nigeria¹. The scenario is dismay in the face of glaring financial inadequacies due to serious under funding, poor or/and dilapidated facilities and other degrading features in education sector. Nonetheless, the ETF still assist largely in rebuilding the already dilapidated education sector. The table below shows the summary of ETF allocation of funds to different institutions between 2003 and 2007.
The statement made by the then Minister of Education in Nigeria Sam Egwu - Daily Independence 6th April, 2009

Where SSES = State Ministries of Education
SPEBS = State Primary Education Boards

Source: Annual Abstract of Statistics, 2008

Table 2 above shows the analysis of expenditure on education between 2002 and 2007. This analysis separated the recurrent from capital and eventually summed them. It also highlighted the percentage of total expenditure on education on the total expenditure. The trend shown that, it ranges between 5 percent in 2004 and 10 percent in 2002. None of the year march up with the international standard of 26 percent as recommended by the United Nations. The table also indicated that the recurrent expenditure dominates the expenditure pattern throughout the period of analysis. This is an indication that no development can be witnessed during this period in education sector.

The total expenditure on education as shown above was high from 109.44 billion naira in 2002 compared with the preceding years of 79.5 billion naira and 85.6 billion naira for 2003 and 2004 respectively when it fell considerably. It picked up again in 2005 to 114.7 billion naira. This trend continues until 2007 when the expenditure increases as high as 204.2 billion naira. It is interesting to note that literacy rate increases with increasing total federal expenditure on education throughout the period.

**REVIEW OF LITERATURE**

In reviewing the literature, Deniz and Dugruel (2008) traced the interaction between economic growth and education to the pioneering work of Becker (1962), Schultz (1960), Nelson and Phelps (1966). Later, following neoclassical growth theory introduced by Solow (1956), several growth models were developed to explain the interaction between economic growth and education. The models developed by Romer (1986) and (1990), and Lucas (1988) on the effects of the technology on the economic growth stimulated a new wave of discussions on the role of education on economic growth. Solow-Swan model anticipate that the aggregate output depends on the quantities of physical capital and the labour. However, empirical research shows that the primary source of the economic growth is the level of technology. The mechanisms that produce new technology and enhance human capital formation are widely discussed by the studies on economic growth. Both theoretical models and empirical research show that, in addition to learning-by-doing, education is one of the main instruments to improve the human capital.

Furthermore, for the developing economies, Barro and Lee (2000) quoted by Deniz and Dugruel (2008), stressed that the well-educated human resources can also help facilitate the absorption of advanced technology. The studies on education can be classified into two groups: They are known as micro labour literature and macro growth literature. Micro labour literature mainly concentrates on the rate of return on education for individuals, whereas macro literature underlines the effect of education on macroeconomic growth. Although the theoretical discussions outlined above focus on the role of education on economic growth, the studies on the return to education have also some important consequences on economic growth through externalities created by the education.

Considering both social and private returns, for instance, with higher education level it is possible to reduce the probability that an individual will engage in activities which generate negative externalities. Increase in education levels may lead to more healthy parents and children and healthier individuals may be more productive. In line with the above, Otu and Adenuga (2006) examine the relationship between economic growth and human capital development using Nigerian data from 1970 to 2003. They applied cointegration theory incorporating the error
correction mechanism and found that investment in human capital, through the availability of infrastructural requirements in the education sector accelerates economic growth. The paper then concludes that there can be no significant economic growth in any economy without adequate human capital development. However, in Nigeria, focus was on accumulation of physical capital for growth and development without adequate attention to the important role played by human capital in the development process.

According to Levine and Zervos (1993), countries that have more students enrolled in secondary schools grow faster than countries with lower secondary school enrollment rates. However, Gallup et al. (1998) draw their variables from Barro and Lee (1993), and using the average total years of education of the adult population as their main measure of education, they are unable to find a statistically significant relationship between initial levels of education and subsequent economic growth in their sample of countries. Some empirical papers produced rather disappointing results on the effects of schooling on aggregate productivity. Unlike most previous studies (which relied on cross section data to analyze the determinants of growth over long periods), most of these papers used pooled data at relatively short frequencies and relied on either panel techniques or on the use of differenced specifications to control for unobserved country heterogeneity. In this setting, educational variables are often found to be insignificant or even enter with the "wrong" sign in growth regressions. (See Fuente, 2006 for further discussion). According to Fuente, 2006 the research carried out over the last few years strongly suggests that the negative results found in the previous literature can indeed be largely attributed to deficiencies in the human capital data used in earlier studies. Papers that make use of improved data sets on attainment or allow for measurement error find that increases in schooling do indeed have a substantial impact on productivity growth. Results are generally even stronger and sharper when direct measures of skill levels are used to proxy for human capital, suggesting that improvements in the quality of schooling can have an even larger effect on aggregate output than increases in its quantity. Another interesting development is the use of direct measures of skills, which are likely to be better proxies for human capital than years of schooling. While such data are still rather scarce, some recent papers suggest that this is likely to be a rather fruitful line of research. Hanushek and Kimko as quoted in Fuente, 2006 construct an indicator of labour force quality using mean country scores in a number of international student achievement tests in mathematics and science. Coulombe et al as quoted in Fuente, 2006 use data drawn from IALS, an international study on the skill level of the adult population conducted by the OECD and Statistics Canada. In both cases, the results of growth regressions point to even larger output effects than those obtained using even revised attainment data. These estimates imply that the return to improvements in schooling quality could be extraordinarily high, for not only are their expected benefits large, but the relevant costs will generally be much lower than those of increasing attainment for they do not involve a further sacrifice of student time and output.

FRAMEWORK OF ANALYSIS, METHODOLOGY AND RESULTS

The Model

In an effort to promote growth, factors of production, such as capital and labour, are used in different proportion. But the efficient utilization of these resources for greater productivity requires that workers are well trained. Training and acquisition of skills are mainly accumulated through education. Thus, the framework for this study assumes a stable production function in which changes in output are due to changes in the quantity and quality of inputs, economies of scale and advances in knowledge.

Considering such aggregate production function in which technical changes resulting from the inputs quantities are explicitly expressed, Solow (1956) argues that disembodied technical change is input augmenting, in which existing capital and labour are by one means or another, made more production. Solow states the aggregate production function for such technical change as:

\[ Y = A(t) K + L \]  

Where: 
- \( Y \) = Output 
- \( K \) = Capital 
- \( L \) = Labour 
- \( t \) = technical change

Taking Hinks’ neutral technical change as the basis, Solow postulates the production function in a special form as :

\[ Y = A_0 f(K, L) \]  

Where \( A_0 \) is an index of technical change representing total factor production (TFP). This indicates that even after physical and human capital accumulation are accounted for, something else, that is total factor production also accounts for the growth of gross domestic product (GDP) per capita.

Recently, efforts are on to quantify the contribution of each of these factors. Differentiating equation (2) totally and dividing through by \( Y \), we have:

\[ \frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \frac{\Delta f}{f} \left( \frac{K}{Y} \right) + \frac{\Delta f}{f} \left( \frac{L}{Y} \right) \]  

\[ \frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \frac{\Delta f}{f} \left( \frac{\partial f}{\partial K} \right) + \frac{\Delta f}{f} \left( \frac{\partial f}{\partial L} \right) \]  

Following Pritchett (2001), we extended the Solow aggregate production framework to introduce educational capital as the technical change factor. The weights in the aggregate production function represent the factor share of national output, the coefficient of educational capital in a growth model
ought to be equal to the share of educational capital in gross domestic product (GDP), which is estimable. Under the assumption of constant returns to scale, the share of physical capital, labour and technical change adds up to 1, that is, if \( \alpha_{(0)} \) is the capital share \( \beta_{(0)} \) is the labour share, then the share of educational capital is given as:

\[
Y_{(0)} = 1 - \alpha_{(0)} - \beta_{(0)} \quad (4)
\]

It is clear that the residual \( \Delta A/ A \) can be measured by subtracting from the rate of change of output that part of the growth rate which is accounted for by a weighted sum of the rates of change of physical capital and labour factor inputs.

By substituting equation (4) into (3) and manipulating further, we have an augmented Solow's equation:

\[
\Delta Y = Y_{(0)} \Delta A + \alpha_{(0)} \Delta K + \beta_{(0)} \Delta L / Y \quad (5)
\]

Equation (5) says that the growth rate of output \( \Delta Y / Y \) is equal to the rate of change of the growth rate of physical capital \( \Delta K / K \) and the growth rate of labour \( \Delta L / L \) plus the growth rate of total factor productivity \( \Delta A / A \). This is attributed in this study to changes in capital formation and improvement in human capital resulting from education. It is expected from the model that the more the number of labourers, physical capital and educational capital that is employed, the higher the level of national productivity.

Taking natural logs to produce a linear equation in levels, we can normalise equation (5) as follows:

\[
\ln Y = \ln A + \alpha \ln K + \beta \ln L \quad (6)
\]

given the following discussion and taking a clue from previous studies like Mankiw, Romer and Weil (1992), Grammy and Assane (1996), and Odusola (1998), the following model is specified in an attempt to determine the impact of educational capital on economic growth in Nigeria.

\[
\text{RGDP} = f(\text{FCF}, \text{LABF}, \text{EDUC}) \quad (7)
\]

Where:

- RGDP = Real growth rate of the gross domestic product
- FCF = Fixed Capital Formation
- LABF = Labour Force proxied by the enrolment figures
- EDUC = budget allocation to education.

Linearising equation (7) gives,

\[
\text{RGDP} = \alpha_0 + \alpha_1 \text{FCF} + \alpha_2 \text{LABF} + \alpha_3 \text{EDUC} + e \quad (8)
\]

The a priori expectations are \( \alpha_1, \alpha_2, \alpha_3 > 0 \)

The coverage for each of the variable spanned 1980 to 2008. This is to ensure enough data points for the econometric analysis. With the aid of Econometric Views (E-Views, Version 4.1), the model is estimated using annual data from 1980 to 2008. The data were compiled from various issues of Central Bank of Nigeria (CBN) – Annual Reports, Statistical Bulletin, Annual Abstracts of statistics of National Bureau of Statistics (NBS) formerly Federal Office of Statistics (FOS). The estimate procedure follows the adoption of Ordinary Least Squares (OLS). The variables were examined in logarithmic forms to help in achieving linearity. Equation (8) above is therefore re-specified as follow:

\[
\text{LOG}(\text{RGDP}) = \alpha_0 + \alpha_1 \text{LOG(CE)} + \alpha_2 \text{LOG(REE)} + \alpha_3 \text{LOG(GCF)} + \alpha_4 \text{LOG(PPE)} + \alpha_5 \text{LOG(PRYE)} + \alpha_6 \text{LOG(TE)} + \alpha_7 \text{LOG(TERE)} + e \quad (9)
\]

Where:

- CE = Capital Expenditure on Education
- REE = Recurrent Expenditure on Education
- PRYE = Primary Education Enrolment
- GCF = Gross Capital Formation
- TE = Total Expenditure on Education
- PPE = Post-primary Education Enrolment
- TERE = Tertiary Education Enrolment
- e = error term.

Other variables are defined earlier and \( \alpha_1, \ldots, \alpha_7 \) are to be estimated. The enrolment figures are segmented into three to afford the opportunity to examine their individual impact on the economic growth process. As highlighted earlier, the ‘a priori’ expectations are the coefficients that are directly related to economic growth.

**RESULTS**

Equation (9) was estimated using e-views computer package (version 4.1) to obtain equation (10). The result (table 3) indicates an adjusted R– square of 0.99. This shows that the overall model is capable of explaining about 99 per cent variation in gross domestic product. The implication of this is that, the variables identified collectively influence the direction of the economic growth. Moreover, primary education enrolment (prye) and the total expenditure on education (te) depicted a contrary ‘a priori’ expectation in term of sign while others conform with the expected sign.

<table>
<thead>
<tr>
<th>Table 3: The result indicating an adjusted R– square</th>
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<tr>
<td>Co-efficient</td>
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<td>LOG(CE)</td>
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<td>LOG(GCF)</td>
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<td>R-Square</td>
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<td>Adjusted R-Square</td>
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The conformity with the expected sign indicates that, all things being equal, there is a direct relationship between the each of the variables and economic growth. The non-conformity of primary education enrolment according to Ogundipe and Lawal (2008) may be because the enrolment at this level of education has not fully attained the level where it can positively influence the economic growth. The total investment on education did not influence economic growth but individually (Capital and Recurrent expenditure to education), they influenced it. Using the ‘t statistic’ the fixed capital formation proxied by
gross capital formation and primary education enrolment are both statistically significant at 1 per cent while tertiary education enrolment is significant at 5 per cent. Post-primary education enrolment, Capital expenditure and recurrent expenditure on education are all statistically significant at 10 per cent. The overall model is statistically significant at 1 per cent. At 1.59, the Durbin-Watson statistic does not suggest any evidence of autocorrelation in the model.

POLICY ISSUES, RECOMMENDATIONS AND CONCLUSION
The achievement of rapid economic growth through boosting and rapid investment in education is a decision in a right direction as much as it would not affect the average cost of education or reducing the quality of education. Nigerian economy would benefit greatly from an increase in the level of education even if it comes at the expense of a reduction in other types of investment. Other things being equal, returns to improvement in the quality of education are likely to be significantly higher for they do not involve increases in the opportunity cost of schooling (Fuente, 2006). This has shown empirically that investment in education is a vital ingredient and an important one to the economic growth of the Nigerian economy.

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