

Education as a Catalyst for Economic Growth: Revisiting Economic Growth Theories

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Abstract

This study offers a theoretical examination of the connection between government investment in education and economic growth. It unites the major theories of public finance with classical and modern expansion theories. It adopts the comprehensive review methods to examine the relation between education and economic growth from a theoretical perspective. Therefore, it reviews general expenditure models, such as the Law of Wagner and the Peacock-Wiseman Hypothesis of structural and crisis-related patterns in education expenditure, as well as fiscal sustainability models such as the Critical Limit Hypothesis and the Cost Disease proposed by Baumol. Normative models of fair distribution exist in pure theories like the Ability-to-Pay principle and the Benefit Principle of Pigou. These theories of spending are connected to the concepts of economic growth (classical and neoclassical models, endogenous growth, and human capital theory) in the discussion. Moreover, it also takes into account other concepts such as signaling theory and the capability approach. In this synthesis, government investment in education is directly productive and innovative and indirectly a source of social stability, equity, and good governance. The review notes that inclusive and resilient economic growth requires sustained long-term, carefully planned, public investment in education. The policy implications underscore the need to match investments in education to innovation systems, labour markets, and equal access to achieve the potential and sustainable economic growth.

Keywords: Public expenditure, education, economic growth, human capital, growth theory

Introduction

Education has been regarded as a foundation of economic development. Nevertheless, the association between education and economic growth is significantly different in various

situations. On a global scale, the increase in the knowledge economy and the digital revolution has heightened the need to have skilled human capital, and as such, education has become a strategic priority of industrialised countries (Mazur et al., 2025; Shao et al., 2025). In this context, education has frequently been viewed as a way to escape poverty in developing countries and a means to transform the structure, but weak institutions, underinvested education, and labour market misalignments often lead to its destruction (World Bank, 2026).

The relationship between education expenditure and sustainable development is a poorly understood area of research in Nepal, where years of political transition have led to high levels of youth outmigration and vast regional differences in the quality of schooling. Empirical studies indicate that although human capital development is crucial to the long-run economic growth, secondary school enrolment in Nepal has only increased in size and not in quality, knowledge or skills, thus failing to address the labour market requirements (Lamichhane et al. 2025). Furthermore, a Nepalese child born today is only projected to achieve 51% of their full productive potential by the age of 18 because of a lack of access to education and healthcare services and even greater disparities between urban and rural areas (World Bank, 2025). This article, thus, takes a stratified contextual emphasis, shifting towards the global trends, to challenges facing the developing countries, and finally to Nepal-specific realities.

Classical and neoclassical economists recognized that a more skilled workforce would increase productivity, but in many of their models, improvements in human capital were assumed to be second-order to other factors stimulating growth. An example of this is the Solow-Swan model, where technological change was exogenous, and education was implicit in labour quality but not explicitly represented (Solow, 1956; Swan, 1956). This shortcoming motivated the construction of endogenous growth theory that incorporated human capital as the centre of growth models. As part of encouraging innovation and knowledge diffusion, as well as maintenance of productivity increases, Romer (1986, 1990) and Lucas (1988) placed education as a central tool. Human capital theory, developed by Schultz (1961) and Becker (1964), repositioned education as an investment that provides returns, similar to physical capital. To avoid doubling up, these theoretical strands, endogenous growth, and human capital theory, are incorporated into one coherent argument in the present article, which is concerned with the collective explanation of the catalytic role of education and how they can be discussed as independent, repetitive accounts.

One of the policy instruments in this process is public spending on education. Infrastructure, teacher training, curriculum development, and equity of access are some of the areas that governments invest in to increase the stock of human capital. Similarly, the endogenous growth models are based on predicting that such investments also have positive spillovers because a more educated workforce will not only raise the productivity of the individuals but also of the whole economy (Barro, 2001). However, the empirical association of education spending and growth is delicate. Even in certain contexts, higher spending in education has been linked to positive and significant long-term economic growth. As an illustration, an OECD panel study, which included 2015-2019 results, reported that secondary and tertiary education expenditure was highly correlated with growth in GDP per capita, but secondary education produced the greatest marginal benefits (Najaf-zada, 2024). On the same note, Diakodimitriou et al. (2025) found that education spending stimulates economic growth indirectly through research and development that leads to innovation. Elsewhere, there have been mixed or even negative results. An analysis of countries in Central and Eastern Europe has revealed that education expenditure has a positive impact on long-term growth in certain countries but does not have a significant impact, or even a negative short-term impact, in others, often due to inefficient allocation (Coman et al., 2023). In this regard, Suwandaru et al. (2021) observed in Indonesia that long-term education spending positively but insignificantly correlated with growth, but short-term effects were negative, and reflected systemic difficulties in converting investment into productivity returns.

Quality and efficiency become important mediating variables. Lesuisse (2024) discovered that spending on primary education in high-performing systems substantially increased growth when scaled to performance, whereas the low performance of spending in poorly-targeted spending had insignificant or even negative impacts. These results are consistent with the claim of Hanushek and Woessmann (2015) that economic returns to education depend on the quality of learning, rather than the number of years of schooling. Further, there is growing evidence that cognitive development, in non-school settings, can also be an economic driver. As an illustration, a massive intervention in Germany indicated that training working memory led to better academic track placement, which may have long-term consequences on the level of skills and productivity (Berger et al., 2024). This corroborates the argument that the specific improvement

of cognitive skills can be used to supplement conventional education in achieving economic growth.

Despite this substantial body of theory and evidence, a research problem remains evident: policymakers are under conflicting evidence on whether, when, and how education spending is transformed into long-term economic growth, and on what conditions education is a catalyst, and not just a correlate, remains underspecified. In the case of lower-middle-income nations such as Nepal, this is particularly acute since budgets for education are limited and have to compete with other pressing development priorities. In this regard, this paper aims to theoretically analyse the relationships between the government investment in education and economic growth to understand the fiscal and macroeconomic factors in which education is a direct and indirect contributor to equity, resilience, and good governance.

The study is informed by three research questions to attain this purpose:

1. Which are the conceptualizations of endogenous growth theory and human capital theory about the role of education in long-run economic growth?
2. What is the nature of variation in the empirical evidence on education spending and growth across contexts, and what are the contributions to this variation that can be made by efficiency, quality, and institutional factors?
3. In what particular fiscal and macroeconomic circumstances, especially in developing economies like Nepal, is education a credible driver of long-run economic growth?

Theories and evidence suggest that education can be a driver of economic growth, provided that it is efficient in terms of investments, responsive to labour market demands, and institutionalised in enabling institutional settings. The catalytic role of education is not a matter of the level of funding, but rather a matter of whether the educational systems provide the necessary skills, imagination, and flexibility to learners to help them cope with a fast-evolving global economy.

Methodology

In this study, the research type is qualitative and review type, to discuss the theoretical relationship between government investment in education and economic growth. It is organized in the form of a narrative review, which is suitable to integrate various threads of economic theory and depict them in a consistent thematic context. The study does not generate primary empirical data; it only uses secondary data from the literature, a mix of classical and recent

theoretical approaches, providing a comprehensive view of the conception of expenditure on education in the context of the models of public finance and economic growth. This approach enables a critical examination of the theories and concepts on which conversations about investment in education and the macro-economic impacts of education investments are based.

The review was prepared based on a systematic literature review that sought to identify both the theoretical works of the past and the current. Wagner Law, the Peacock-Wiseman Hypothesis, the Critical Limit Hypothesis, Baumol's Cost Disease, the Ability-to-Pay Theory, and the Benefit Principle were found to be key economic theories to the dynamics of public expenditure. These were reviewed in comparison with the theories of economic growth, both classical and neoclassical models, to endogenous growth and the human capital theory. Major academic databases, such as Scopus, Web of Science, JSTOR, ScienceDirect, and SSRN, were searched through literature searches with the addition of specific searches in Google Scholar. Keywords were divided into three main groups: theories of public expenditure, education and public finance, and theories of economic growth, and were searched with the help of Boolean operators to cover all the areas.

Inclusion criteria to select sources, which were based on theoretical works that specifically discussed the public expenditure or economic growth, and had clear links to education. Historical sources and modern peer-reviewed references were used to provide historical breadth but keep it up-to-date. Sources were filtered out based on the lack of a theoretical foundation, purely empirical articles that do not discuss a concept, and those that only discuss micro-levels of education finances but do not correlate with macroeconomic growth. This procedure allowed the review to be based on relevant and academically sound references that could help conduct a thorough theoretical discussion.

A thematic approach was used to review the selected literature. Theories whose conceptual parts overlapped were consolidated into larger analytical themes to increase clarity and prevent overlaps. As an illustration, the theme of structural and shock-based growth in public expenditure was subsumed by the works of Wagner, the Law and the Peacock-Wiseman Hypothesis, and the normative principles of allocation were combined in the works of Pigou, the Ability-to-Pay Theory, and Lindahl, the Benefit Principle. Likewise, the economic growth theories were discussed in such a way that the focus of discussion shifted from neoclassical and classical models to the endogenous and human capital models, and the manner in which thinking

on the role of education in growth evolved. This thematic organization made it possible to have a logically ordered review that links fiscal theory to the macroeconomic theory in the context of education investment.

The analysis concentrated on finding the explanation or justification given by each theoretical tradition on public investment in education and the results that it projects on economic growth. Comparative interpretation was used to emphasize commonalities of the theories, conflicts among the literature, and omissions from the theoretical linkage of fiscal policy and economic growth. This synthesis has brought together these perspectives into a coherent view, taking into account that education is not merely a sectoral expenditure but also a strategic element of innovation, productivity, and economic growth, which grows in the long run. Such a methodological approach guarantees a balanced and holistic description of the theoretical underpinnings of the nexus of education and economic growth.

Conceptual Framework

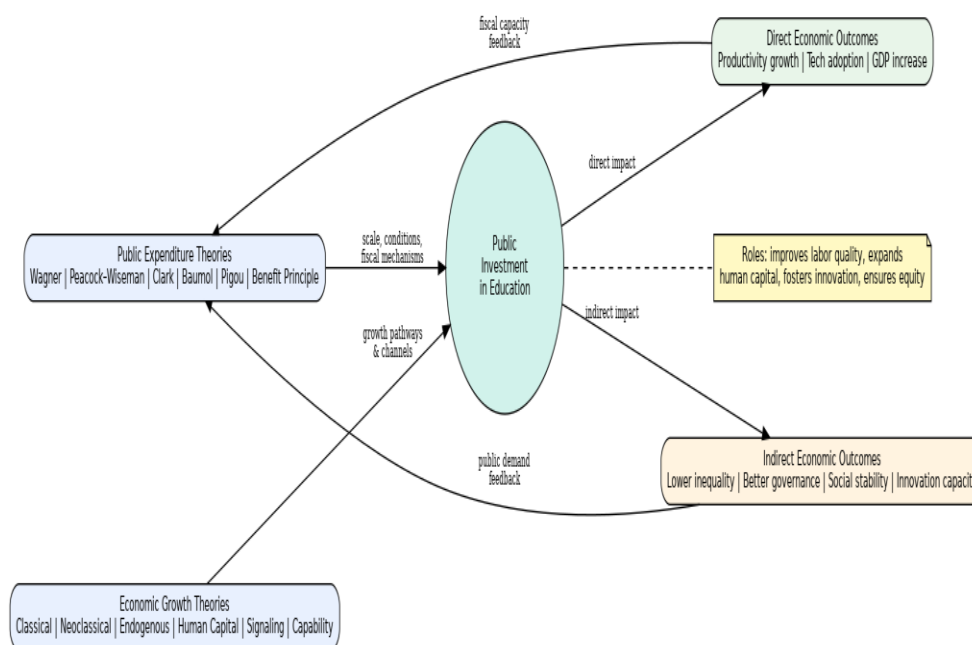
This framework combines the theories of public expenditure and economic growth to make education the key to the connection between the choice of fiscal policy and macroeconomic performance. The theory of public expenditure describes how governments choose the level and resource distribution, whilst economic growth theories describe the mechanisms by which such investments generate long-run economic growth. Furthermore, Education is also a dual contributing factor to productivity and producing positive externalities that contribute to sustainable economic growth as both a public good and a type of human capital (Abowitz et al., 2015).

Considering the theory of public expenditure, there is a combination of both the long-term structural forces and short-term shocks that determine the development of education spending. In his Law, Wagner assumes that a rising per capita income leads to an increase in the proportion of government spending in the GDP, especially on income-elastic services like education, health, and infrastructure (Wagner, 1883, as cited in Magazzino et al., 2015; Jaén-García, 2018). Contrastingly, the Peacock-Wiseman Hypothesis accentuates the fiscal changes driven by crisis, where unusual events like wars or pandemics produce a displacement effect on government spending levels, which are permanently increased (Herenkson, 1993; Kabayel & Dogan, 2022). Fiscal sustainability ideas, including Colin Clark Critical Limit Hypothesis, caution against government expenditure rates that can disrupt the productivity of the private

sector and precipitate inflation (Clark, 1945), and the Cost Disease concept by Baumol points to the structural propensity of labour-intensive services such as education to face an increase in costs (Nose, 2015; Kander, 2005). A framework of equity in financing education exists in normative allocation theories such as the Ability-to-Pay principle by Pigou (Blinder, 1974) and the Benefit Principle by Lindahl, Bowen and Samuelson (Johnson, 2015; Nouweland, 2015; Pickhardt, 2006): these theories balance efficiency with distributive justice.

The theories of economic growth have several implications for public expenditure in education. Classical and neoclassical models describe a positive but declining relationship between education and labour quality, with an increase in steady state output with education, but only if there are technological advances (Solow, 1956; Swan, 1956). Romer (1990) and Lucas (1988) are central in endogenous growth theories that focus on human capital and the process of knowledge accumulation that drives sustained economic growth; education fosters innovation, the adoption of technology, and high productivity. Human capital theory is a concept that was developed by Schultz (1961) and Becker (2009) and considers education as an investment that can provide quantifiable payoff in terms of higher wages, increased productivity, and greater economic adaptability (Hanushek & Woessmann, 2015; Osiobe, 2019). Complementary views include signalling theory (Spence, 1973) and the capability approach (Sen, 1999) that broaden the viewpoint by understanding the purpose of education in signalling capability, facilitating social mobility, and increasing freedoms, hence leading to economic growth.

The framework, thus, construes the public expenditure theories to elucidate the extent, conditions, and the process by which governments invest in education, and economic growth theories to represent how these investments are converted into economic outcomes. Education is regarded as a direct stimulator of growth, as it leads to more skills, innovation, and technological dissemination, and an indirect stimulator of development, as it improves the quality of governance, reduces inequality, and enhances social cohesion (Khattab et al., 2020; Psacharopoulos and Patrinos, 2018). This combined framework provides the analytical basis to bridge fiscal decision-making and long-term economic outcomes, and education as a critical public investment is a key to sustainable and equitable growth.

Figure 1. *Conceptual Framework: Public Expenditure, Education, and Economic Growth*

The conceptual framework presented in this paper depicts the role of public expenditure in the economic growth of a country and places education as the key linkage between the two. There are theories of public expenditure on education, which explain the scale, conditions, and financing mechanisms of investing in education (Blinder, 1974; Clark, 1945; Herenkson, 1993; Johnson, 2015; Kander, 2005; Wagner, 1883, as cited in Magazzino et al., 2015; Nose, 2015; Nouweland, 2015; Pickhardt, 2006). There are several economic growth theories, including labour quality, innovation, and knowledge accumulation theories, which explain the role of education in contributing to economic growth (Solow, 1956; Swan, 1956; Lucas, 1988; Romer, 1990; Schultz, 1961; Becker, 2009; Spence, 1973; Sen, 1999). Education serves as a direct productivity booster, and it is an indirect enabler of inclusive development (Hanushek & Woessmann, 2015; Psacharopoulos & Patrinos, 2018; Khattab et al., 2020; Pelinescu, 2015).

Education as an Engine of Economic Growth: A Theoretical Review

For more than 100 years, public education spending has played a crucial role in the areas of public finance and growth economics. This has established education as a public good, non-rivalrous and non-excludable, and many benefits, including those to society, have been documented, such as increased productivity, innovation, and social cohesion (Abowitz & Stitzlein, 2018; Ostrom & Ostrom, 2019). Theories of government expenditure, which relate to

the dynamics, constraints, and optimal levels of government spending, influence the decision to invest in education, as do theories of economic growth that connect these investments to long-run output growth. When these theories are compared and contrasted, a complete picture of how the investment in public education can be a catalyst for economic growth.

General Theories of Government Expenditure and Education

Structural and Shock-Driven Growth in Public Spending

One of the earliest and most important explanations of the growth of government spending is Wagner's Hypothesis. The increase in the share of public spending in the national output, especially on education, health, and infrastructure, was a concept advanced by Wagner (1883) as per capita income increases. In the culture and welfare sector, high income elasticity can be observed: the more affluent the societies, the more and better educational services they require. Empirical work, such as Jaén-García (2018), has validated that there is a long-term positive correlation between the education budget and GDP, indicating that the increases in the education budget over time are correlated with the increases in economic growth.

In addition to Wagner's Law, which refers to the income-induced growth of public expenditure, the Peacock–Wiseman Hypothesis focuses on the significance of crises in changing the fiscal course (Herenkson, 1993; Kabayel & Doğan, 2022). Under this displacement effect, public spending rises to new highs in extreme situations, like war, natural disasters, or a pandemic. In education, this can happen in the event of a crisis, which reveals a shortage of skills or a lack of educational infrastructure, calling for a massive boost in educational expenditure by the government. Prior examples are the post-war reconstruction in Europe, where the expansion of education was woven into the policies of the welfare states (Crafts & Toniolo, 2008). When the crisis is over, spending is seldom restored to its pre-crisis levels because the public comes to terms with new taxes and a bigger government in the provision of services.

Fiscal Sustainability and Cost Dynamics

A countering argument, however, is Colin Clark's Critical Limit Hypothesis (Clark, 1945), which outlines the possibility of inflationary pressures arising from a fall in the private sector's incentives and resource misallocation if government expenditure exceeds, say, 25% of GDP. As a form of public policy, this is a cautionary call to policymakers for the danger of overspending without a commensurate boost in productivity in education. In many developing

countries, however, the returns to education are high, and human capital gaps are large, so that the benefits of spending beyond these limits are warranted (Psacharopoulos & Patrinos, 2018).

Another structural constraint is the Cost Disease Hypothesis suggested by Baumol. This is because labour-intensive public services, like public education, have less productivity than sectors that are technologically dynamic, and thus have increasing relative costs with time (Baumol, 1967; Kander, 2005; Nose, 2015). This could require education budgets to increase more rapidly than the inflation rate in order to keep up with the quality of services provided. The problem for governments is that these additional costs need to be matched by real improvements in learning outcomes, which may be achieved with some targeted innovations, such as digital learning tools, better teacher preparation (Hanushek & Woessmann, 2015).

Pure Theories of Public Expenditure and Education

Normative Allocation Principles for Education Spending

Theories of public expenditure that do not involve the use of data concentrate on a normative aspect of the problem – on the optimal allocation of resources to increase welfare. The Ability-to-Pay Theory states that people should pay according to their income, and it should be an equitable way to fund the essential services, such as education, a theory that was first stated by Pigou (Blinder, 1974). This principle is reflected in progressive taxation, which ensures universal access, especially to marginalized groups.

The Benefit Principle, the one by Lindahl, Bowen and Samuelson (Johnson, 2015; Nouweland, 2015; Pickhardt, 2006), relates the expenditure to the benefits citizens receive. In education benefits are private, that is increased lifetime earnings and public, that is decreased crime rates, public health and civic participation. Samuelson's model looks at the efficiency of providing public goods where private supply will not be enough, which is particularly applicable to education, particularly at the primary and secondary levels (Hammond, 2015). Such normative criteria rationalize government intervention, both because of efficiency concerns and equity and externality concerns.

Classical and Early views on public expenditure in education

The classical economists took a laissez-faire approach to government intervention. Adam Smith did identify an exception, however, for public goods such as education, which he believed would increase the productivity of labor and the prosperity of the nation (Smith, 1776/1976;

Winch, 1998). This recognition laid the foundations for a early theory of the state role in schooling even in the most market-oriented theoretical perspective.

This was reinforced by Marshall (1969), who has suggested that significant public investment is needed in human resource development for continued economic growth. The Great Depression was the turning point, however, as Keynes (1936) and others argued that the governments should intervene in the economy to stabilize it and increase full employment. The sector of education proved to be an important one to invest in during a recession, not only because of its job creation function, but its human capital development.

Modern Economic Growth Theories and Education

From Factor Accumulation to Knowledge-Driven Growth

Some classical growth models, such as Malthusian, Ricardo's, and Mill's growth models, placed limited explicit emphasis on education and tended to concentrate on land, labour, and capital as the primary factors of production and economic output (Ricardo, 1817/2001; Deardorff, 2007). The neoclassical Solow–Swan model (Solow, 1956; Swan, 1956) made growth a function of capital accumulation, labour, and an exogenous source of technological change. In this view, education affects growth indirectly through improving the quality of labour, which leads to an increase in the economy's steady-state output.

In the late 20th century, endogenous growth theory made education a focus of study. Lucas (1988) developed a model of human capital accumulation as an important source of private and social returns, and Romer (1990) emphasized knowledge growth as a way to maintain innovation. These models point to the fact that education is not merely a complement of capital and technology; it is also a direct source of long-run growth, and thus a source of declining returns as neoclassical models suggest. Empirical research by Barro and Lee (2013) has found that an increase in average years of schooling is strongly associated with GDP per capita growth for countries.

Human Capital Theory

The human capital theory, first developed by Schultz (1961) and extended by Becker (1964/2009), brings together the public expenditure and growth theories by representing education as an investment that can be measured with known benefits. Schultz stressed that education improves people's productivity and helps them to adjust to technological change and

economic restructuring. Becker proposed the concept of rational decisions made by individuals regarding the investment in education based on expected return in terms of lifetime earnings. This is corroborated by modern empirical literature which demonstrates that education investment leads to higher productivity, it can help adopt innovations, it can help mitigate inequality, and it can help increase labor market efficiency (Khattab et al., 2020; Osiobe, 2019; Pelinescu, 2015). The role of public expenditure in this process is also very important as it ensures equity of accessibility and can help to correct market failures in education provision.

Alternative and Complementary Perspectives

While human capital theory assumes that education directly enhances productivity, signalling theory (Spence, 1973) suggests that part of education's observed wage premium reflects its role as a signal of innate ability or work ethic. This implies that without attention to quality and relevance, public spending could yield credentials without corresponding skills.

The capability approach (Sen, 1999) offers a broader perspective, valuing education for its role in expanding individuals' freedoms and life opportunities. From this view, education contributes to economic growth indirectly, through improved governance, social stability, and health outcomes. This approach complements purely economic arguments, strengthening the normative case for sustained public investment.

Conclusion

The merging of ideas shows that education financing should be seen as a long-term growth plan instead of something that may be cut from the budget. Theories such as Wagner's Law and the Peacock-Wiseman Hypothesis illustrate that rising revenues and strategic responses to crises create opportunities for augmenting educational investments. The effectiveness of investments in human capital and endogenous growth is closely tied to how well they fit with innovation systems, the needs of the labour market, and rules that promote fair access. The capacities approach broadens the policy discourse by emphasizing the socioeconomic and democratic advantages of education, going beyond just GDP growth. In this context, the integration of fiscal sustainability and the maximization of educational social returns is imperative. This means addressing the issues raised by signaling theory through quality improvement efforts and making sure that educational policies are always in line with larger goals for growth. From this point of view, education is both a way to build human capital and an important part of encouraging fair and strong economic growth.

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